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ECLAC and the *new growth theories*

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This article reviews various different growth models, with emphasis on the interactions between economies with differing degrees of technological development. It takes as its starting point the proposals put forward by ECLAC in the 1950s (section II); as subsequent proposals by ECLAC in the 1980s and 1990s have incorporated various contributions made by more recent models it may be asserted that the evolution of ECLAC's ideas likewise illustrates the evolution of economic growth theory in general. It then goes on to analyse endogenous growth models with monopolistic competition conditions of the neoclassical school (section III), presents Schumpeterian models of what has been called the "evolutionary school" (section IV), and describes the thinking of the "new ECLAC" of the 1980s and 1990s and its conceptual and propositional renewal (section V). It then compares the different models and approaches analysed in the light of some aspects considered to be of key importance, such as the role assigned to endogenous technical progress in explaining long-term economic growth, the way the different conceptions of technology condition the nature of public intervention to promote development, and the validity of the concepts of bipolarity and/or international divergence with respect to the long-term growth rates of the per capita product (section VI). The final considerations (section VII) contain some reflections on aspects relating to development policies, both from the standpoint of the various approaches reviewed earlier and from that of the special structural features typical of the Latin American economies.

I

Introduction

Since the mid-1980s –partly because of the appearance of new growth models– there has been a revival of interest in the processes of convergence or divergence of the growth rates of the product or of per capita income between the different economies. This study proposes to review those models[1] from a perspective which stresses the interactions of economies with different degrees of technological development.

As our starting point, we have taken the ideas and proposals made by ECLAC in the 1950s, which are referred to in section II. This starting point was selected for three reasons. The first is that ECLAC played a pioneering role in the study of the North-South or Centre-Periphery economic dynamics, to use its own terminology. The second reason is connected with the emphasis placed in the initial ECLAC position on technical progress and its key role in international convergence or divergence. Indeed, this was to become one of the leading items in more recent models. Finally, there is the fact that the "New ECLAC" –that of the 1980s and 1990s, which is dealt with in section V– has incorporated various contributions from those models. Thus, it may be asserted in general terms that the evolution of ECLAC's ideas illustrates the evolution of economic growth theory as a whole.

Section III analyses the changes in neo-classical growth theory. In this theory, Solow's model, which had a decisive influence up to the mid-1980s and is to a large extent typical of it, attributed long-term growth to an exogenous variable: technical progress (Solow, 1956). More recent theories, called "endogenous growth theories", in contrast, seek to take this variable into account by relating it with the decisions of the economic agents on investment in technology. By doing this, they arrive at results which, like the earliest ECLAC approach, allow for possible systemic divergences between the growth rates of different countries which cannot be addressed through the conventional models.

Section IV presents the Schumpeterian models of the "evolutionary" school. These models –especially those that use simulation techniques– seek to incorporate more fully the diversities of technological level and behaviour which exist among firms and countries. The evolutionary school is also marked by the importance it assigns to the institutional framework in which technical progress takes place and the important role of demand in economic growth. It is argued in the present article that the models of this school point out some of the most promising directions for research, partly because of the greater breadth and realism of their basic assumptions and partly because of the flexibility with which these assumptions can be adapted for the analysis of complex situations.

Section V deals with the ideas of the "New ECLAC", as already noted in the paragraph above concerning section II, and their receptiveness to the new economic growth theories.

Section VI analyses and compares the different models and approaches presented, in the light of some aspects considered to be of key importance, such as the role attributed to endogenous technical progress in explaining long-term economic growth; the way in which the different conceptions of technology condition the nature of public intervention in the promotion of development and, finally, the validity of the concepts of bipolarity and/or international divergence in the long-term growth rates of the per capita product.

Finally, section VII reflects on some aspects relating to development policies, both from the angle of the different perspectives involved and from the standpoint of the specific structural features of Latin American economies.

□ The authors wish to express their gratitude to Octavio Rodríguez for his support in the preparation of this study, and to Oscar Burgueño for his collaboration in various discussions on this subject. Both these academics are researchers in the Institute of Economics of the Faculty of Economic and Management Sciences of the University of the Oriental Republic of Uruguay. It goes without saying, however, that the views expressed here are entirely the responsibility of the authors.

[1] The term "model" is used here in a similar sense to that given to it by Schumpeter and therefore includes analytical formulations in any language: not just that of mathematics (see, in this respect, Vercelli, 1991, p. 15).

II

The bipolarity between centre and periphery

In his 1948 "manifesto", Raúl Prebisch ascribed the differences between the level of development of a group of countries which he termed "central" and the countries which he termed "peripheral" to the slow and uneven spread of technical progress through the international economy.[2]

The essence of his seminal ideas may be summed up, very briefly, as follows:[3] There are two groups of countries, differentiated by the characteristics of their respective economic structures, which form the two poles of a single system. One of them –the centre– has a diversified and homogeneous productive and economic structure:[4] diversified, because it is made up of a relatively broad spectrum of economic activities, and homogeneous, because labour productivity levels are relatively similar in all those activities. The periphery, in contrast, occupies a place in the world economy based on specialization in primary commodity production for export and therefore tends to display a narrower range of activities (for example, it starts off by lacking a significant industrial sector). In some of these activities, labour productivity is high because of the penetration of technical progress. A large proportion of the labour force, however, continues to work at jobs of very low productivity, thus giving rise to a situation of structural heterogeneity.

In contrast with that of the centres, then, the production structure of the periphery is initially heterogeneous and specialized, and this difference persists in the spontaneous industrialization process sparked off in the periphery by the crisis of the 1930s and the Second World War. The basic reason for this is that technical progress –which is more intense in industry than in primary production– is likewise uneven between the two poles.

The disparity in the rates of generation and incorporation of technical progress, associated with the initial specialization, means that the spontaneous industrialization of the periphery begins with the production of technologically simple manufactures and gradually progresses towards the production of industrial goods of growing technological complexity. This pattern of industrialization, which progresses from simple to more complex goods through import substitution, means that while the production structure of the periphery gradually changes, it nevertheless remains essentially specialized (for example, in terms of the degree of intersectoral complementarity and vertical integration of manufacturing activities). This repetition of specialization lies at the root of the trend towards external imbalance, which is due ultimately to the fact that import substitution industrialization itself generates snowballing increases in the demand for imports, while primary commodity exports grow only slowly.[5]

Spontaneous industrialization brings with it an increase in employment, both in manufacturing and in the other modern activities which grow up along with it. However, this increase in the demand for labour does not match the increase in its supply, because the latter is due to the number of workers attracted to the cities and, even more so, the labour

[2] At that time, Prebisch's document entitled "The economic development of Latin America and its principal problems" came to be called the "ECLAC Manifesto". In it, the "slow and uneven spread of technical progress" was linked for the first time with the unequal or bipolar nature of development in the centre-periphery system. This document was also published later in the *Economic Bulletin for Latin America* (Prebisch, 1962).

[3] The body of ideas of ECLAC has been dealt with in detail in various documents (Furtado, 1985; Rodríguez, 1981; Bielschowsky, 1988). In this article, we will limit ourselves to presenting a very brief summary.

[4] The expression "productive structure" refers to the composition of the output of material goods. The economic structure includes, in addition, the production of various kinds of services, including public goods and services.

[5] The structural reasons for the external imbalance referred to in this paragraph are usually presented in terms of the well-known argument of the disparity between the income-elasticities of demand for the imports and the exports of the periphery.

displaced from low-productivity activities as a result of the modernization of agricultural activities.

The result is that the heterogeneity is repeated too, but this process does not take place without changes, in what has been called "inward-looking development". In this phase, the heterogeneity and the tendency towards structural underemployment which reflects it are increasingly evident in urban areas, through what has come to be known as marginality or informality.

It could be said, then, that according to the original ECLAC conception specialization is the underlying reason for external imbalance, while heterogeneity lies at the root of structural underemployment. This conception also holds that these two structural conditions give rise, together, to a third tendency: deterioration in the terms of trade.

Increases in labour productivity are more marked in the central countries, where the relative scarcity of labour and workers' capacity for organizing themselves in trade unions cause increases in productivity to be reflected in higher wages. For the opposite reasons, the opposite takes place in the periphery, and the resulting differences in wages are reflected –through mechanisms which need not be discussed here– in a decline in the relative prices of the periphery's exports compared with those of its imports which come from the central countries.

Prebisch holds that this deterioration in the terms of trade is the visible expression of a deeper phenomenon: the concentration of the fruits of technical progress in the great industrial centres. This means that in those countries the per capita income tends to grow more than labour productivity, because they take advantage of part of the increases in productivity registered in the periphery. In contrast, per capita income in the periphery tends to grow less than productivity because the peripheral countries transfer part of their increased productivity to the centres, through the deterioration in the relative prices of their exports.

We have just referred, above, to the differences in income. These represent the first and most directly visible aspect of the bipolarity inherent in the development of the centre-periphery system. The second salient aspect is the differences between their productive and economic systems, which tend to persist or, if you prefer, to be reproduced in new forms.

However, such bipolarity –"divergence", as it is called nowadays– is not seen as an inevitable phenomenon. In order to avoid it, the development process of the periphery needs to be directed along certain lines, the most important of which is industrialization. In other words, it is maintained that by applying suitable long-term policies it will be possible to bring about gradual "convergence" between the two poles of the system, with beneficial effects for the world economy as a whole. It may be gathered from this that the question of convergence or divergence lies at the very heart of the original ECLAC ideas and proposals. We will return to this matter later.

III

Neoclassical growth theories

In this section we will briefly contrast the traditional versions of neoclassical growth models with what have come to be known as "endogenous growth models" and we will also briefly describe some models of this type which include monopolistic competition among their key assumptions. We will then enter in greater detail into the conception of technology used in the new models and, finally, analyse the connotations of this conception as it affects both convergence or divergence of the per capita product among different economies and international trade and public policies.

1. Endogenous growth models

In their traditional versions (Solow, 1956 and 1957), the neoclassical models start out in general by assuming the existence of a production function with two factors –labour and capital– with constant yields to scale and decreasing returns on each factor. These models aim to show that, in the absence of technical progress, in the long term the growth rate of the per capita GDP will tend to decline to zero.

This tendency is connected with the decreasing nature of the marginal productivity of capital, for this

assumption means that the accumulation of this factor will bring with a decline in its yield, thus discouraging real investment. In the long term, the latter will barely be sufficient to cover the depreciation of the existing capital stock and the provision of equipment for the new labour entering the production process. This gives rise to a steady-growth state in which the product grows at the same rate as the active population. In contrast with this basic reasoning, the models in question show that in order to achieve a higher growth rate which will enable the per capita product to register sustained growth, technological change exogenous to the economic system will be required.

This exogenous nature of the change assumes that technical progress takes place without the intervention of the economic agents. The new endogenous growth models reject this exogenous character and likewise question the decreasing nature of the marginal returns on accumulable factors such as physical and human capital.[6] These models assume, on the one hand, a context of imperfect competition which makes possible remuneration of intentional innovation by private entrepreneurs, while on the other they assume that the externalities generated by this innovation obviate convergence of the growth rate of the product towards that of the active population.

Among the models mentioned, the first example that springs to mind is that of Romer (see Appendix 1). In this model (Romer, 1990), economic growth comes from the heightening of the division of labour achieved through the incorporation of technical progress, which is reflected in the creation of new varieties of capital goods which are neither better nor worse than the existing ones.[7] In this model, then, technical progress operates through the horizontal differentiation of such goods. This wider range of capital goods makes it possible to increase the social division of labour, permitting each producer of final goods to find the most suitable instruments for the purpose which will give him greater productivity of physical capital, human capital and unskilled labour.

In the model by Aghion and Howitt (1992), growth comes directly from technical progress, which is in turn the result of competition among the firms that produce innovations. Each innovation generates a new type of capital good whose use will improve the productivity of the manufacturer of the corresponding final good. In contrast with Romer's model, in this model the new capital good takes the place of the previous one, giving rise to a process of "creative destruction". It is understood that technical progress creates profits but also losses, since production processes, products, skills, markets and areas of competitiveness are made obsolete, and it may be that the losses outweigh the gains. Moreover –also in contrast with Romer's model, where innovation takes place through incremental improvements– it is understood that innovation takes place through radical shocks in the economic systems.[8]

The third model to be considered is that of Grossman and Helpman (1991, chap. 3), in which technical progress takes place essentially through expansion of the variety of goods produced. In an innovative economy, knowledge (as measured by the quantity of designs of different goods) increases with time, increasing the productivity of the resources used in research laboratories.[9] Furthermore, a substantial part of the knowledge accumulated in the research and development (R&D) process can be used by other agents at no cost to them. Within the context of the model in question, this phenomenon plays a central role in explaining sustained long-term growth.

Each new product imperfectly replaces the previous ones. It is also assumed that companies are the only ones to possess the technology needed to manufacture a unique differentiated product, thus having monopoly power in the supply of that good.[10]

[6] For the purposes of this article, it is sufficient to consider the models that incorporate monopolistic competition in the analysis, since they are the same ones that see technical progress as endogenous. We shall refer to this again later on. Among the models which have been excluded from consideration are those of Jones and Manuelli (1990) and Rebelo (1991), which consider the accumulation of physical and human capital to be the mainspring of growth, and the studies by Lucas (1988), among others, in which the sustainability of growth is linked with the accumulation of inputs that generate positive externalities.

[7] In other words, Romer introduces a simplifying assumption that there is no obsolescence of capital goods.

[8] It should be noted that in this model the time interval between two innovations is a random variable, with the probability of occurrence of an innovation depending on processes subject to a Poisson-type distribution.

[9] This assumes that there is a learning process in research activities or in the practice of conducting research.

[10] The authors in question also propose other models in which technical progress is reflected in goods of better quality which take the place of the previous ones, thus eliminating the monopoly power of entrepreneurs manufacturing goods of lower quality.

Assuming a given quantity of resources, the model is developed on the basis of a trade-off in the allocation of those resources between R&D activities and the manufacture of high-technology products. The rate of innovation can be increased by allocating more resources to R&D at the expense of manufacturing, up to the point at which the opportunity costs of the two activities become equal. When this point is reached, the economy will attain a state of dynamic equilibrium, with positive and constant rates of innovation and growth and with a distribution of resources between R&D and manufacturing which is maintained over time.

It is important to note that, leaving aside their special features, the three models considered can give path-times for growth which may vary according to the basic conditions of each economy but which depend ultimately on the rate of technical progress deriving from the manner of operation of each economic system. This endogenization of technical progress is closely related with the way such progress is conceived, which is dealt with in the following section. The possible paths also have implications for the convergence or divergence between economies, international trade and public policies: matters which are dealt with in section 3 below.

2. Technology as an economic good, and its implications

Endogenous growth models consider technological knowledge as a non-pure public good, because of its dual character of a non-rival and partially exclusible good. Its non-rivality is associated with the possibility of using it in one economic activity without preventing or reducing its simultaneous use in another. In other words, it is understood that technological knowledge can be used by an indeterminate number of firms for innumerable periods of time, without depletion or additional costs. The partially exclusible nature of a technology means that its creator can only appropriate part of its economic results. The other part consists of externalities or technological spillover: i.e., the free and automatic acquisition of knowledge created by other enterprises. This spillover exists because although a patent or secrecy prevent others from making unauthorized use of new knowledge, this exclusion is only temporary, and moreover there are certain aspects of knowledge which are not susceptible to exclusion.

In contrast with traditional growth theories, this new conception of technology makes it possible to construct models incorporating endogenous technical progress and sustained growth of the per capita product. These models incorporate, on the one hand, a framework of monopolistic competition, in order to justify private investment in R&D, and on the other hand, the externalities that may be associated with the creation of general technological knowledge, which is the prime source of sustained growth. These two aspects will be analysed in the following sections.

a) *Innovation and monopolistic competition*

In order to explain how private enterprises that generate technological knowledge behave, we must abandon the usual assumption of the competitive nature of markets and admit that their structure takes on special features because of monopolistic competition. The key to this reasoning is the partially exclusible and non-rival nature of the technology.

In order for an entrepreneur to be willing to innovate, he must be able to appropriate some of the income associated with technological knowledge. If the latter is non-exclusible, there will be no way to effect such appropriation. If a good is partially exclusible, however, a private generator of technology can prevent others from using it freely for a time, either through a patent or through secrecy. This is what determines if an entrepreneur can obtain a monopoly rent after innovation.

In traditional neoclassical models, the conditions in which production activities are carried out in any enterprise are represented by a homogeneous production function with a degree of unity. With this type of function, if the amount of resources is doubled and exactly the same sequence of productive actions are carried out, the amount produced will also be doubled. In other words, there will be constant returns to scale.[11]

[11] Formally, if $Y = F(K,H,L)$ is a function of the type in question, in which K, H and L represent respectively physical capital, human capital and labour, then $F(\lambda K, \lambda H, \lambda L) = \lambda F(K, H, L)$.

In the new neoclassical models, technological knowledge becomes a non-rival factor of production. As already noted, because of this it can be used again and again without depletion or additional cost. A production activity of this nature is represented by a production function with increasing returns to scale.[12] As the latter are expressed in a homogeneous function with a degree greater than unity, this ensures the existence of sufficient resources to remunerate technological activities.[13]

In short, enterprises that generate technology will not be able to survive unless they can receive monopoly rents. The exclusibility of knowledge –even if only partial– permits the appropriation of this additional income associated with innovation, while the non-rivality of technological knowledge is reflected in production functions with increasing returns to scale, so that firms can sell their products at prices above the marginal production costs.

b) *Technological externalities and growth*

At the aggregate level of the economy as a whole, the fundamental idea of the models analysed here is that imperfect appropriation and non-rivality make possible the wide dissemination of technological knowledge. These technological externalities give rise to sustained growth of per capita GDP. Thus, in contrast with the traditional models, in the new models such growth is an endogenous result of the functioning of the economic system.

The models in question distinguish between specific and general knowledge, both derived from the R&D carried out in private firms. Specific knowledge permits a firm to manufacture a particular product or incorporate a particular production process. This is the type of knowledge which can be temporarily protected by patents or secrecy, which makes it an exclusible economic good. General knowledge, in contrast, is of broader application and is much more difficult to exclude, as it is much harder to invoke universal principles and use the existing legislation to legitimize the ownership of this type of knowledge. The novel feature incorporated by endogenous growth theory is, precisely, that it recognizes the existence of externalities in respect of general knowledge resulting from private R&D efforts.

Such technological spillover gives rise, on the one hand, to growing returns from the accumulation of technological knowledge, and on the other to increases in the productivity of rival factors of production. With regard to the first of these effects, it is shown that each researcher's function of production of knowledge helps to increase the productivity of all the others, who will have these discoveries at their disposal in the long run. The externalities take place not only between contemporaneous agents, but also over the course of time. In other words, each innovation is an addition to the stock of existing knowledge, which, moreover, is not depleted. It can therefore be asserted that the marginal product of research activity increases in proportion as that stock grows.[14]

The second effect is connected with the capacity of technological knowledge to act on each and every one of the other inputs, so that the relation between the amount of product obtained per unit of input is greater when the latter is used in combination with new knowledge. This effect makes it possible to compensate for the tendency towards decreasing marginal returns on accumulable factors such as physical and human capital, thus resulting in sustained growth of the per capita product.

3. The implications of the new theories

We will now analyse the way these models visualize the relations between economies at different levels of technological development and the ways in which these relations affect the capacity to incorporate technology and grow, as well as the role these models assign to public policies.

[12] Formally, if $F(A, R)$ represents a production function where R denotes the rival inputs K, H and L and A denotes a non-rival input, the non-rivality of the latter will mean that $F(\lambda A, \lambda R) > \lambda F(A, R)$.

[13] It should be recalled that, when constant returns to scale are expressed as a homogeneous production function with a degree of unity, payment to factors according to their respective levels of marginal productivity depletes the exact value of the product without taking away resources that could serve to remunerate innovation.

[14] Formally, this may be represented by the equation $a = f(A)$, where a is the amount of discoveries made by a researcher over a certain period, A is the stock of available knowledge, and f is a growing function. This representation may be made more complex by introducing, for example, a random variable for the length of duration of the research (Aghion and Howitt, 1992).

a) *Convergence or divergence?*

Traditional neoclassical models predict what they call "conditional convergence". This expression means that the per capita income growth rate of each economy converges towards its own steady growth value and also towards the per capita income levels of the other economies. The word "conditional" refers to the fact that this convergence also depends on the different economies having certain similar parameters, such as rates of saving, of capital depreciation or of population growth.[15]

In contrast, by abandoning the hypothesis of equality of technological opportunities between countries or regions, the advocates of endogenous growth theories find that it is not possible to predict convergence on the basis of their models. The result will depend on the effect of the spread of technology on the growth of the various economies.

In the models of Grossman and Helpman (1991), in principle the free spread of "general" technological knowledge benefits both firms in the country where the new knowledge is generated and those in other countries too. However, the international spread of the new knowledge takes place with lags due to legal and cultural barriers that inhibit the free circulation of persons and ideas across national frontiers. The international or national reach of this technological spillover and its rate of spread will directly affect the possibilities of economic convergence among nations.

"Specific" knowledge, for its part, can spread through imitation. There will be entrepreneurs who are interested in imitating a new product or process, provided that the expected rent exceeds the costs by a suitable margin, which will depend to a crucial extent on the incidence of the patents system on those costs.

The possibilities opened up by imitation have analytical implications that affect North-South relations regarding the dissemination of technology. Thus, Grossman and Helpman (1991, chap. 11) have prepared a specific model on this matter, in which it is assumed that the South does not innovate itself but imitates technologies generated in the North. Such imitation is not exempt from costs, however: the learning process needed to master new technologies calls for efforts in the form of investments in technological capacity. The spillovers generated by these investments allow the South to accumulate a stock of knowledge which grows with its experience in imitation, which is associated with the amount of technology copied from the North. The technological lag of the South therefore has some positive aspects in the form of the growth possibilities opened up by the lower cost of imitative rather than innovative R&D.[16]

International trade also affects the possibilities of convergence among nations. For the purposes of this article, cases of particular interest are those where the production factor endowments differ, and especially those where there are differences in the endowments of skilled and unskilled labour, as between North and South. In countries where there is a relative shortage of the former and an abundance of the latter, rapid opening up of foreign trade will tend to induce specialization in activities using unskilled labour, to the detriment of those making intensive use of human capital, such as R&D. Furthermore, as there is a lag in the spread of technological spillovers, the researchers of countries with a small knowledge base will find it difficult to compete with those of countries better endowed in this respect. The long-term growth rate of the first-named countries could be increased by giving them time to catch up with foreign technologies –and at the same time improve their capacity for imitation and innovation– before exposing them to unrestricted international competition.

[15] For example, Mankiw, Romer and Weil (1992) have found that the international disparity of per capita income levels and growth rates is consistent with Solow's standard model, modified by the inclusion of human capital as an accumulable factor and by the possibility that different countries may have different rates of saving. Barro and Sala-i-Martin (1995), for their part, found that there was convergence of levels of per capita income or product between the different states of the United States (1880 to 1990), between 47 Japanese prefectures (1930 to 1990) and between 90 regions of 11 European countries (1950 to 1990).

[16] It should not be assumed that the costs of such imitative R&D are insignificant, however. Mansfield and others have estimated that the cost of copying a new product or process is equal to 65% of the cost of the original innovation (cited by Grossman and Helpman, 1991, p. 286).

In short, endogenous growth models give rise to development processes in which it is admitted that there will not be convergence between the growth rates of North and South because the initial advantage of the Northern economies will tend to be further reproduced, resulting in an ongoing difference between their income levels and those of the South. This tendency can be partially offset if the efforts made by the latter make it possible to expand the international reach of the technological externalities generated in the North, if they are capable of taking the fullest advantage of their possibilities of imitation, and if they implement a form of trade openness which does not undermine the creation and full development of their domestic technological capacity.

b) *Public policies*

The neoclassical formulations on the functioning of competitive economies give rise to a generic recommendation that State intervention should be eliminated.[17] The models we have just been discussing here, however, give rise to recommendations in favour of public intervention.

As noted by Grossman and Helpman (1994, p. 37), in economies that grow on the basis of innovation there are two types of obstacles that hinder attainment of the standards of efficiency usually associated with the free play of the market forces. On the one hand, the existence of monopolistic markets prevents the optimum condition of "equimarginality" whereby the prices of all the factors of production should be equal to the respective levels of marginal productivity. On the other hand, by not considering the effects of technological externalities, private agents obtain from their investments in technology –and, in more general terms, from their accumulation efforts– returns which are lower than the virtual social return of alternative decisions.

Both these obstacles give grounds for assuming that, in growth dynamics, it is possible to secure improvements in levels of well-being through State intervention. It is suggested that suitable public policies for this purpose may be of various types, depending on the origin and magnitude of the externalities and the nature and degree of imperfect competition. Clearly, however, emphasis is placed on intervention mechanisms which correct the rates of generation of technology to bring them closer to their socially optimal levels and which also disseminate the effects of the technological externalities and reduce the discretionality of monopolistic decisions regarding the qualities and quantities of the goods produced.

The new models have specific and particularly important repercussions on public policies typical of less-developed countries. Thus, for example, Romer (1993) holds that there is a technology gap between the less developed countries and the more highly developed nations.[18] It may be concluded, from an analysis of the dynamics of that gap, that in the more backward countries public policies are of fundamental importance for the creation of the human capital needed in order to speed up growth. The State has a central role to play in building the necessary domestic base, by adapting the educational system and institutional frameworks to make the improvement of physical and human capital profitable for private enterprise.

As a general appraisal, it may be said that the new theories dealt with in this section treat technical progress as an endogenous factor in the growth process, while they consider such progress to be the result of explicit and conscious decisions to invest in technology.

The consequences of this change in attitude are to be seen in various areas. As we already saw, it is no longer reasonable to assume that there will be convergence between the growth rates of economies of different levels of development regardless of the circumstances. Nor is it valid to assert that the rapid and unrestricted opening of international trade will have beneficial and even-handed effects on all such economies, whatever their level of development. Finally, the new theories

[17] Indeed, the growth models claim that if individuals focus on distant horizons when defining their behaviour with regard to saving and take into account the future situation of their descendants, the long-term growth path of the economies will be socially efficient provided that the State does not intervene.

[18] In the study in question, Romer identifies two technology gaps separating the industrialized nations from the less developed countries: gaps in terms of "objects" and in terms of "ideas". The first of these refer to shortcomings in terms of physical and human capital, while the latter refer to access to the types of ideas which further the ongoing creation of new goods and processes in the developed countries.

contain a clear justification of public policies, especially those having to do with the long-term development of backward economies.

It must be borne in mind, however, that this justification assumes that there will be continuing full use of production resources over time, which means that no account is taken of the possibility of various kinds of imbalances and fluctuations. As we shall see below (section IV), the models which are termed "evolutionary models" have features which permit them to overcome this highly restrictive assumption.

IV

The "evolutionary" school

1. General features

Like the neoclassical endogenous growth models, evolutionary models highlight the role of technical progress in economic growth. They differ from them, however, in the following aspects: i) generally speaking, they emphasize the importance of the institutional context in which technical progress is generated and disseminated and the role of demand in growth, combining Schumpeterian and Keynesian variables, and ii) in the case of simulation models, they assume decision-making processes based on conventional heuristics or rules (limited rationality) and allow for the incorporation of the sectoral diversity of demand and technical progress.

In the evolutionary school, two types of models may be identified. Both of them have their advantages and disadvantages and may be considered complementary to each other. On the one hand, there are aggregate models, in which the decision-making processes of firms are not specifically dealt with. Such models make possible simple analysis of the influence of certain structural variables on growth. Assuming the existence of an initial technology gap between North and South, aggregate models seek to determine in which cases the international dissemination of technology will give rise to processes of convergence or divergence.

On the other hand, there are simulation models in which the aggregate dynamics of the system are identified through "artificial worlds" (Lane, 1993). These consist of a varied set of agents endowed with certain attributes, a certain environment, and a dynamic which operates through selection and learning mechanisms. These simulation models are more theoretically exact, since they explicitly identify the links between (microeconomic) decision-making rules and (macroeconomic) growth paths. They also have great flexibility for the incorporation of technological diversity and the contexts of competition and behaviour at the microeconomic level. Their disadvantage is that the complexity of the interactions may in some cases obscure the roles played by each of the variables in the system.[19] This complexity makes it advisable to use them in combination with simpler analytical models, such as aggregate evolutionary models.

2. Aggregate evolutionary models

As well as taking into account the incidence of technical progress on the productivity of resources, as in endogenist neoclassical models, aggregate evolutionary models also take account of its incidence on international competitiveness, which conditions the growth rate through effective demand. Thus, aggregate models assume that the long-term growth rate of a country will be that which is compatible with balance-of-payments equilibrium, which introduces a Keynesian component into the model, associated with the income elasticities of demand for exports and imports, corrected by the availability of international finance.[20] These variables define the behaviour of demand on domestic and external markets.

[19] This is, basically, the criticism that Romer makes of the simulation models. See, in this respect, his comments on the article by Dosi and Fabiani (1994), published together with that article.

[20] See McCombie and Thirlwall (1994, chap. 3). The restrictions on demand are viewed in the context of an open economy and expressed as balance-of-payments constraints. This clearly coincides with some key issues dealt with in the early ECLAC ideas.

There are various types of aggregate evolutionary models.[21] Here, we shall refer to the model by Verspagen (1993), because of its ability to represent, in a simple manner, a broad range of convergence and divergence paths (see Appendix 2). Verspagen's model suggests that in the countries of the South, technical progress is, on the one hand, a non-linear function of the initial level of the technology gap. Up to a certain point, the existence of such a gap favours technical progress in the South, because it permits the imitation of existing technologies. If the gap is very large, however (greater than a certain critical value), the spread of technology becomes more difficult, because the capacity for imitation goes down with the distance behind the technological frontier.

For a given initial level of the gap, the intensity of imitation will depend on the existence of domestic learning capacity, that is to say, the existence of a domestic institutional base which makes it possible to identify, adapt and improve the technology to be imported. In the model in question, this base is expressed through the parameter δ.[22] If the intrinsic learning capacity is very small, the international dissemination of technology will be only feeble.

The technology gap also implies a gap in terms of competitiveness between North and South. The lower competitiveness of the South is reflected in lower growth of demand and less incentive for growth. The global incidence on growth will depend on the direction and intensity of the competitiveness effect and the technology dissemination effect.

Thus, the model in question plays down the optimistic idea, implicit in most of the models based on "catching up", that the technology gap leads automatically to the more rapid spread of technology. Convergence is conditioned by the existence of certain national institutional and technological capacities. Moreover, even if the size of the gap remains stable, this does not guarantee the convergence of growth rates if there is still a difference in the absolute levels of productivity (and hence of competitiveness).[23] Convergence would be achieved only by speeding-up the autonomous innovation process in the South.

It should be noted that the model assigns an important role to public policies, which act by changing the parameter δ. In this sense, Verspagen's model defines the field of action of public policies in broader terms than Romer's model, by incorporating the whole range of institutions that influence the technological learning process.

3. Simulation models

Simulation models make it possible to capture the diversity of the microeconomic agents and the sectoral diversity of technology and demand with a high degree of detail. The model by Dosi and Fabiani (1994) is an example which is relatively simple but illustrates the potential of this type of analytical construct for studying growth dynamics (see Appendix 3).

This model assumes the existence of two sectors, *m* firms and *n* countries. The decision-making units are the firms, which decide how much they will invest in innovation or imitation and what price they will charge for their products, using conventional rules of behaviour for this purpose. It is considered that these rules more adequately reflect the taking of decisions in conditions of uncertainty

[21] Among them are those by Amable (1994), Canuto (1995) and Cimoli (1988). Each of these authors offers a model with some distinctive features that make them members of a single family tree whose main trunk is formed by aggregate models dealing with North-South technological dynamics.

[22] In principle, this parameter will depend on factors that affect the capacity for the future absorption of technology or the capacity for learning over time but are not reflected in the initial technological level. Otherwise, they would already be taken into account in the initial level of the technology gap. In highly simplified terms, it could be held that two countries from the South with similar levels of factor productivity will have the same initial technology gap compared with the North. However, if one of them has, for example, a system of support for innovation or a credit programme to promote the dissemination of new technologies, it will be able to import or disseminate the technological advances made by the North more rapidly. The initial gap is the same, but the parameter δ is different, because the science and technology institutions are different.

[23] As may be seen in Appendix 2, the absolute equilibrium value of the gap *G* (at which the rate of increase of the gap is zero) is positive, which means that the gap does not close completely. For this equilibrium value of *G*, the difference between the growth rates of the product in the North and in the South will have a constant positive value ($D > 0$).

than the maximization rules, which would not be applicable to a context of limited rationality which depends precisely on those conditions.[24]

Technical progress generates increases in productivity in accordance with a stochastic process that depends on investments in technology and the technological opportunity of the sector. These increases in productivity alter firms' competitiveness[25] and redefine their market shares. The dynamics of the system can give rise to virtuous circles of growth and competitiveness. Thus, as it is assumed that investment in technology is a percentage of the firm's sales in the previous period, expanding firms will also increase their investments in technology and will therefore have greater probabilities of innovating or imitating successfully in the following period.

The intensity with which stragglers are eliminated from the market (selection) or manage to imitate the new technologies (learning) depends on three classes of parameters: i) technological parameters, which determine how far the innovation effort changes the firms' productivity (technological opportunity)[26] and the degree of difficulty of imitation (appropriability of the innovation);[27] ii) parameters of behaviour, which define to what extent increases in productivity will be reflected in lower prices and/or greater competitiveness, through the application of a mark-up over costs, and iii) parameters relating to the market structure or competitive environment, which define the intensity of the selection process for a given difference in competitiveness.[28] As a function of these parameters, the model can give rise to a process of emulation –if the imitation process (learning by the stragglers) is faster than the selection process– or else to rapid concentration of the market, if the opposite is the case.

There are mechanisms which limit the intensity of the selection and the tendency towards market concentration, for given values of the parameters. The model in question envisages the possibility of adjustments in the exchange rate when the trade balance runs up large deficits. It also incorporates a wage adjustment mechanism whereby wages increase more rapidly when the level of employment rises. This means that countries that grow more quickly will have larger wage increases, thus favouring the competitiveness of the stragglers. At the same time, the random nature of technical progress means that past expansion does not automatically result in higher productivity in the future. The fact that innovation and imitation are stochastic processes opens up additional possibilities of change in industrial leadership, including processes in which the leader is overtaken by firms and countries that were stragglers ("forging ahead").

Different growth paths can be generated by changing the parameters (such as those regarding the characteristics of the technology, the competitive environment and the decision-making rules) or the initial conditions of the model (such as the number of firms and their characteristics, the type of sectoral specialization and the distribution of markets). This gives simulation models great flexibility for reproducing different economic development experiences. Such changes in the parameters and in the definition of the initial conditions should correspond with the available empirical information, of course.

This potential for interacting with results taken from economic history and from case studies is one of the main virtues of simulation models. As noted by Nelson (1994), traditional neoclassical theory reached a "ceiling" in the 1960s, partly because of its inability to absorb the wealth of information offered

[24] With regard to the problems of finding regularities of behaviour in conditions of Knightian uncertainty, see Possas (1988).

[25] This occurs through changes in prices, assuming that these are fixed by applying a mark-up over costs.

[26] The greater the technological opportunity, the greater the increases in productivity associated with successful innovation and, hence, the greater the impact of the innovation on competitiveness.

[27] The greater the appropriability of an innovation, the slower its imitation. The appropriability depends on the accumulativity and tacit content of technical progress. Accumulativity exists when the probability that a firm will find an innovation in the period $t+1$ is a function of its distance from the technological frontier in period t (for a given investment in R&D). The tacit content of the innovation is the degree to which mastery of the technique depends on the amount of experience in production and the investment in technology, in contrast with learning through manuals or other coded forms of dissemination.

[28] For example, markets with a large number of marginal firms will tend to have more intensive selection processes than those in which only a few large firms are competing with each other.

by historical and empirical research. Evolutionary simulation models open up a doorway to the knowledge accumulated in other areas, which historians and economists can cross (in both directions).[29]

At the same time, simulation models offer a natural path for making aggregate growth models increasingly precise. This does not mean that such models should be replaced or abandoned,[30] for the simplicity of aggregate models allows them to be used for the analysis of fundamental theoretical problems which could remain unsolved because of the complexity of simulation models. The latter, however, do make it possible to deal comprehensively with the non-linear aspects and imbalances which are inherent in complex systems such as economic systems.

Finally, simulation models are particularly appropriate for studying the effects of economic and industrial policies. The greater realism of their microeconomic assumptions and their great flexibility give them advantages in this field compared with aggregate models, whether conventional or evolutionary.

Evolutionary models have brought out both the importance of the role of development policies for inducing the sustained growth of lagging economies and the fact that the technological effort made by such economies is the key to international convergence or divergence. In the light of these models, the role of development policies is seen to be both broad and complex: they must stimulate the spread of technology, and not merely the attainment of higher rates of accumulation of physical capital, which is seen primarily as a vehicle for the learning process. The construction of institutions in the field of science and technology becomes important in view of the massive transfer of resources between sectors. This does not mean that the type of sectoral specialization is irrelevant. Any horizontal policy for stimulating the dissemination of technology has important sectoral consequences, since it favours some activities more than others and thus redefines the growth path. By giving priority to science and technology policy, the evolutionary models suggest that the desired structural change should be sought more through indirect dissemination methods than through direct subsidies for accumulation in certain sectors.

Indeed, an interesting line of future research would be to use simulation models to study the different growth paths that could be generated on the basis of various different sectoral structures and different assumptions regarding technology and demand in the initial period.

V

The new ECLAC

1. ECLAC and the new growth theories

Since the mid-1980s, ECLAC has been incorporating the results of the new growth theories mentioned above into its approaches. This permeability of ECLAC thinking is due, as already noted, to the fact that the core of its original contributions already contained concepts which have now reappeared and are being highlighted in these theories. Moreover, many empirical studies carried out in ECLAC and, above all, the efforts to renew their interpretation and the proposals put forward by that institution in the

[29] Quite an obvious direction for the construction of new simulation models is a systematic analysis of sectoral diversity, which is given relatively little attention in the two-sector model by Dosi and Fabiani. Another direction is the incorporation of the specific features of labour markets in the North and the South. A differential aspect which is as yet under-analysed is the heterogeneity of those markets in the economies of the South, where underemployment (that is to say, employment at very low levels of productivity) affects a very high percentage of the total economically active population.

[30] It is generally recognized that the whole question of the validity of aggregate models whose microeconomic bases are not explicitly stated is extremely complex. Such models are often criticised on the grounds that their microeconomic bases are obtained by extreme reduction of the variety of agents to a single "representative agent" (Vercelli, 1991, p. 235).

1980s are basically consistent with evolutionary theories.[31] It should also be borne in mind that the basic subject of ECLAC's studies –the Latin American economies– implies a recurrent challenge to conventional theories, both because of the special features of these economies and the problems which beset them in the 1980s.

The big changes taking place in the international setting (the technological revolution, globalization) call for the reinterpretation of the problems of Latin American development and the reformulation of proposals for overcoming them. The analyses made in recent years are not as consistent in content or form as those made by ECLAC in its first decades of activity, but this may be attributed at least in part to the level of complexity of the phenomena that must be dealt with now, or, if one prefers, to the depth and speed of the changes. To a certain extent, the efforts of the "new ECLAC" may be seen as an attempt to apply the more recent growth theories to the study of Latin America, with emphasis on the policy implications of those theories in the structural and institutional context of the countries of the region. As we shall see in due course, these implications are directly related to the importance assumed by technological dynamics, increasing yields and externalities in the new theories.[32]

2. Competitiveness and growth

The starting point for the arguments of the new ECLAC is the importance of competitiveness for sustained long-term growth. The "genuine" competitiveness of an economy is understood as "the capacity to increase (or at least maintain) its international market share while at the same time raising the standard of living of the population".[33] This capacity depends on the incorporation of technological progress, as reflected in the ongoing introduction of new processes and the production of new goods and services. In the long term, in order to increase the competitiveness of an economy it is necessary to reduce the distance separating it from international best practices (or at least prevent this distance from increasing). At the microeconomic level, this means attaining the standards of efficiency prevailing in the rest of the world with regard to resource use and the quality of the products or services offered, which in turn implies the identification, imitation and adaptation of new production functions by enterprises (ECLAC, 1990).

With the intensification of international competition and the development of information technology, the incorporation of technical progress becomes a salient feature in the production of a wide range of goods and services. Consequently, in order to win a successful place in the world economy there must be ongoing efforts to improve the efficiency with which production resources are used, to incorporate intellectual added value into the goods and services produced, and to keep on raising the skills of the population so as to increase its capacity to participate in the processes of innovation and the dissemination of technology. These conditions are directly related with the type of production specialization followed by the region, which is related in turn with the behaviour of demand and technical progress in the different sectors of the economy (ECLAC, 1990).

[31] Indeed, in his study *La industrialización trunca de América Latina* Fajnzylber (1983) anticipates the general ideas of the new evolutionism. This and other later works by Fajnzylber are undoubtedly landmarks in this renovation. Among them, special mention may be made of "International competitiveness: agreed goal, hard task" published in *CEPAL Review* (Fajnzylber, 1988) and *Industrialization in Latin America: from the "black box" to the "empty box"* which appeared in the "Cuadernos de la CEPAL" series (Fajnzylber, 1990).

[32] Everything indicates that in the effort that culminated in the late 1980s with the document "Changing production patterns with social equity" (ECLAC, 1990), the influence of evolutionary ideas was predominant. Since then, ideas from the endogenous growth theories (ECLAC, 1992, 1995 and 1996) have been gradually incorporated as these theories develop.

[33] ECLAC, 1990, p. 68. Genuine competitiveness is seen to be different from the type of competitiveness deriving from short-term or "spurious" factors, such as an undervalued exchange rate or low wages. This definition is in line with the term "structural competitiveness" proposed by the Organization for Economic Cooperation and Development (OECD). Quite apart from its implications in terms of successful enterprise management, the latter term reflects the strength and efficiency of the national production structure, the long-term trends of the rate and structure of investment, the technical infrastructure, and other factors determining the externalities providing support for the activities of enterprises (OECD, 1992, p. 243). Likewise, both these definitions are similar to that used in the 1985 report of the Presidential Committee on the competitiveness of United States industry, according to which a nation's competitiveness reflects its capacity to respond to international market challenges, while at the same time increasing the real income of its citizens.

As we have seen, the growth of trade in manufactures is greater than the growth of world trade as a whole, especially in the branches where technological innovation is most intense.[34] This suggests that the only sustainable way of penetrating international markets is to add knowledge to the goods and services exported. It is also asserted that the polarization between primary commodities and industrial products has lost significance. Nowadays, the most important thing is to produce goods involving the intensive use of knowledge and technology, along with the creation of export-oriented production and services networks (ECLAC, 1990, p. 84). In other words, rapid export-driven growth calls for the diversification of goods and markets in the direction of the most dynamic products, which are generally those with the greatest technological content and value added.

In the difficult transitional period of the 1990s, in spite of their limited demand elasticities exports based on the processing of natural resources may become a means of progressing to the export of manufactures of higher technological content, provided that they give rise to an "export mentality" which becomes firmly rooted in the systems of production, transport, marketing and finance (ECLAC, 1990). However, the key to long-term growth of productivity and the product lies in a successful effort to improve the export structure.

It is clear that this proposal is more than a mere hypothesis. Thus, ECLAC notes that "There is a distinct process at work which is establishing a new pattern of international specialization. As a result, the region's countries appear to be increasingly dedicated to highly standardized industrial products over whose international prices they have no decisive say, since these products are traded in highly competitive markets. From this standpoint, the productive system is adapting to a new set of relative prices that are closer to the opportunity cost or international price of the resources; at the same time, however, the main sectors of activity have become technologically less complex than during the import-substitution phase or have lost the capacity to stimulate technology assimilation processes in other sectors" (ECLAC, 1996, p. 39).

The foregoing considerations bring us to a central aspect of the arguments of the new ECLAC. In recent years, the economies of the region have passed through a rapid process of increasing external openness, which is seen as a positive factor from the point of view of competitiveness and in comparison with the inefficiencies associated with the indiscriminate protection applied in previous periods. At the same time, however, it is understood that, if used as an exclusive policy instrument, such openness can heighten the less dynamic type of specialization currently observed. In order for there to be a "virtuous" form of insertion in international trade, pro-active (mesoeconomic and microeconomic) policies are needed that will make it possible to correct the flaws in the technology and human capital markets, as well as in the oligopolistic markets for products subject to increasing returns. At the same time, if these increasing returns are associated in many sectors with economies outside the firm, the price mechanism will not be capable of adequately reflecting the social yield of the production and of the investments made in it (ECLAC, 1996). This is a further justification for adopting deliberate policies in the areas of trade, production and technology, or, in more general terms, development policies which promote changing production patterns in the economies of the region, with a view to the attainment of genuine competitiveness.

3. Competitiveness and the national innovation system

In this field, the new ECLAC shows significant advances, since it directly addresses the area of the interactions of public and private agents and their role in innovation and the dissemination of technology. ECLAC maintains that each country, region or enterprise has a specific context which causes the agents to react differently to a given signal. This context includes i) the technological

[34] In the period 1962-1985, "the growth rate of exports of primary commodities (1.6%) was less than that of natural-resource-based manufactures (mainly processed foodstuffs), which grew at the rate of 3.7%. Traditional non-natural-resource-based manufactures, for their part (mainly labour-intensive consumer goods), grew at the rate of 6.8%, while the highest growth rate, 8.1%, was registered by the new manufactures heavily reliant on research and development (microelectronics, telematics, biotechnology, genetic engineering and new materials)." (ECLAC, 1990, p. 41).

opportunities and obstacles;[35] ii) the experience and skills acquired by individuals and organizations; iii) the capabilities and experience that flow from one economic activity to another; iv) the institutional environment, determined by the combination of public and private mechanisms and institutions and the existence of major processes of "institutional innovation" (understood as the capacity to adapt and transform the institutional schemes on which the capacity for innovation is based), and v) conditions of mutual interaction between the creators of technological innovations and their users, which can be of crucial importance for either stimulating or inhibiting enterprises' capacity for learning and adaptation (ECLAC, 1990).

These conditions come under what is called the national innovation system, which is defined as the set of agents, institutions and rules of behaviour that determine the rate of importation, generation, adaptation and dissemination of technological knowledge in all the sectors of the economy, including human resources training activities and their financing (ECLAC, 1996). The characteristics of the national innovation system are determined by the degree of scientific and technological maturity,[36] the system of macroeconomic incentives, the regulatory framework, and the business, legal and regulatory "culture".

The importance assigned to the national innovation system reflects the view that the consolidation and expansion of this system –or, if preferred, the increase in innovation capacity that this implies– is the key element in development policy and/or policies for changing production patterns.

[35] As already noted (see footnote 26), the greater the technological opportunity, the greater will be the increase in competitiveness associated with a successful innovation. In turn, the technological opportunities are determined by the prevailing technological paradigm, so that the appearance of new paradigms leads to their reformulation, both as regards their scope and their ease of materialization. The sectoral distribution of such opportunities depends on the nature of the activities, the technological distance from the "revolutionary core", and the knowledge base (Dosi, 1988).

[36] The greater the maturity of the technology (standardization and slow rate of change), the less costly it is to transmit the relevant information over longer distances (both geographical and cultural). On the other hand, when the technology is changing rapidly and radically, geographical and cultural proximity is more important (ECLAC, 1990).

4. The question of equity (technology, competitiveness and equity)

The links between technology, competitiveness and equity occupy a particularly important place in the proposals of the new ECLAC. Lower wages are often perceived as a variable that favours competitiveness, but in the ideas of the new ECLAC the concept of competitiveness incorporates technical progress and also equity. Moreover, it is suggested that greater equity favours the spread of technology, since it gives rise to a more favourable framework for the efforts to further inter-firm cooperation required by the new technologies. At the same time, this includes elements of a virtuous circle, as increases in productivity would permit a gradual improvement in income distribution.

The relation between the domestic market and competitiveness also takes on new dimensions (ECLAC, 1990); it is perceived that expansion of the national and regional domestic market deriving from growth with equity provides an irreplaceable base for tecnological learning. The arguments in this respect note that in the cases where there has been feedback between competitiveness and equity the following phenomena have been observed: i) a change in agriculture towards more homogeneous agrarian structures, with rises in productivity; ii) more equitable access to property, through the creation of small and medium-sized enterprises tied into the production system and registering growing levels of productivity; iii) upgrading of labour skills, universal access to education and a higher degree of social integration; iv) growth in employment, linked with export growth; v) increases in productivity and wages; vi) the spread of an industrial rationale, and vii) income redistribution through the public finances.

As may be gathered from this, the new ECLAC holds that the expansion of the economies of Latin America depends on the attainment of genuine competitiveness, based on the ongoing generation and incorporation of technical progress, which are likewise necessary for sustaining an outward-looking growth pattern. In order to achieve this sustainability, production and technology policies of various types and scopes are needed, among which special mention may be made of those designed to consolidate and expand the national innovation system. It is also perceived that the success of these policies cannot be divorced from the gradual improvement of distributional equity, both because of its effects on

the dimensions of the domestic market and its indirect effects on the growth of innovative capacity.

The brief summary given in the previous paragraph highlights the links between the new ECLAC proposals and the most recent endogenist and evolutionary models. Essentially, the analytical effort of the endogenist models is focussed on the treatment of technical progress as an endogenous variable. That effort is also aimed at outlining the policies required in order to avoid increasing divergence or even to achieve a process of international convergence.

VI

Comparison of the most recent growth models with the ECLAC approach

In the previous pages, we described some recently formulated growth models which are also useful for the analysis of North-South relations and we outlined some approaches to these matters developed in Latin America, especially in ECLAC and its academic circles. In this section, we will review and compare some key aspects of these approaches and those models.

The first item that strikes us is the importance assigned by the most recent growth models to technological knowledge as an economic growth factor and their general agreement on the important role of the technical progress of each country as the main source of international differences, reflected in the divergences between long-term growth rates. The new models thus bring up once again an aspect which was of central importance in the conception of the centre-periphery system formulated by ECLAC in its early years, which attributed the bipolar nature of economic development to the slow and uneven spread of technical progress through the international economy.

It should be borne in mind that in the late 1940s there were no theoretical schemes permitting a systematic analysis of the links between technology and growth. These links were only incorporated into formal economic models after a long and complex process which only began to show marked advances as from the mid-1980s. Since then, substantial differences have begun to be observed in the conception of technical change.

Whereas the original ECLAC approach may be interpreted as being connected with what we now call the "metal products and machinery-based technological paradigm", both the new theories and the recent documents of ECLAC have arisen in a period of "technological revolution" in which a new paradigm is assuming increasing prominence: that based on information technology. Under the previous paradigm, technology was seen mainly as being incorporated in capital goods and was reflected in changes in processes and products and, ultimately, in particular sectors of activity. Similarly, technical progress was seen as being exogenous to production activities and enterprises, as well as to the economic systems of the periphery.

The extraordinary speeding-up of technical change in the last fifteen years and the great capacity for the spread of information technology to an ever-growing range of goods and services have formed a context in which the technology factor can hardly continue to be viewed as exogenous. This, together with the evolution of the theories themselves, has formed the basis for a profound change in the manner of visualizing technical progress.

In the neoclassical tradition, emphasis is now placed on technology's character of a non-pure public good. Innovations are generated by enterprises in a system of monopolistic competition which permits the partial appropriation of their benefits by those enterprises. At the same time, the technical progress that they do not appropriate generates technological externalities which become a key element for explaining economic growth.

In the evolutionary approach, emphasis is placed on the tacit and accumulative nature of technological knowledge, which makes the processes of generation, imitation, adaptation and dissemination more complex, a fundamental factor being the surrounding institutional environment. Technical

progress determines the competitiveness of products, enterprises and economies, conditioning the long-term growth rate through the demand for the various goods, in an increasingly interdependent world. This explains both the sectoral technological diversity and the international differences in per capita income growth rates.

The ECLAC of the 1990s basically has a systemic conception of technical progress. Indeed, the development of a national innovation system forms one of the central proposals of ECLAC neostructuralism[37] and represents the hub of technological and production policies because of its influence on the development of local learning capability. This base of a markedly evolutionary nature is accompanied by arguments deriving from endogenous growth theories: the technology market has flaws due to the fact that technical knowledge and information is a non-pure public good, and these flaws lead to under-investment in technological matters and justify direct State intervention through mesoeconomic or "horizontal" policies.

A second aspect which needs to be compared is that of the attitudes to sectoral development policies (also known as "horizontal" policies). These attitudes derive from the different conceptions of technology. In the traditional ECLAC approach the sectors were clearly defined. It was considered that industrial development should be supported, especially in the case of those activities where the productivity of capital was closer to that of the centres, by establishing a system of protective tariffs, with decreasing levels of protection, to make up for the disadvantages inherited from the past. It was also considered that, in order to offset the tendency to an external imbalance inherent in the industrialization of peripheral-type economies, it was necessary to undertake the production of goods at different stages in the industrial chain.[38] Likewise, in view of the requirements of some of these goods in terms of production scales, it was also considered that the industrialization effort should be carried out in economic spaces of a suitable size, which could be achieved more easily through regional integration.

In the new models and approaches, the above sectoral approach has become less clearly defined. It is not that production specialization has lost importance –there is a general view that greater international division of labour is a positive factor for trade– but there is general agreement on the growing difficulty of picking "winners" and "losers" in advance at a time of intensive changes in technologies and markets.[39] Although it is acknowledged that technical progress may be concentrated in specific areas or branches of science and technology, there is no clear advance knowledge of the sectors of production which are going to expand most because they are "technology vectors" or make intensive use of knowledge. Thus, for example, while giving priority to science and technology policy, the evolutionary models suggest that the desirable structural changes should be sought mainly through indirect (or horizontal) means rather than through massive transfers of resources between sectors.

Much of the difficulty of forecasting "winning" sectors is undoubtedly connected with the fact that the new technologies make intensive use of knowledge, but the latter is highly dynamic. The Latin American debate on development policies is also influenced, however, by some attitudes which are closer to the ideas of unbridled liberalization than to the analytical bases of the new growth theories. These attitudes range from negation of the sectoral perspective and even of industrial development policy itself to an extreme position which questions both the deliberate promotion of industrialization (which ECLAC advocated up to the late 1980s) and the industrialization in closed markets which was actually taking place and whose inefficiency is rather unfairly blamed on ECLAC. The implicit assumption of these attitudes is of course that the market optimizes resource allocation without any need for State intervention to guide and stimulate economic development, even in the case of the peripheral countries.

[37] Making it different from other proposed processes of change for the region, such as those of the World Bank.

[38] Simple consumer goods, complex consumer goods, intermediate inputs, widely used intermediate inputs, and capital goods.

[39] Krugman (1992b) might be an exception in this respect. In the search for criteria on which to base a selective sectoral policy, and in the light of the concepts of pecuniary external savings and strategic complementarities, he proposes that geographical clusters of enterprises should be identified, that their causes should be investigated, and that an evaluation should be made of whether the externalities are substantial enough to warrant government support.

In short, although the models and approaches analysed agree on the desirability of public policies to further the incorporation of technology and promote growth with a view to fostering international convergence, there has been a significant change in the method proposed: instead of the traditional policies of supporting specific sectors of production, it is now proposed that there should be policies to correct, complete or promote factor markets –especially those for human capital (educational policies) and technology (science, technology and innovation policies)– as well as to address other institutional aspects that determine the environment in which enterprises operate.

The third point of comparison which is worthy of note concerns the concepts of bipolarity and of the international divergence of long-term per capita income growth rates. The endogenist models recognize the possibility that the initial advantage of the economies of the North tends to be reproduced, resulting in an ongoing difference between their income levels and those of the countries of the South. This tendency could be checked if the efforts of the latter were concentrated on absorbing the technological externalities generated in the North and taking the fullest possible advantage of the possibilities for imitation, by adopting a form of trade openness which is compatible with the creation and maturity of their domestic technological capabilities.

The evolutionary models, for their part, represent a wide range of possible growth paths, although those that take into account conditions of backwardness typical of less developed economies give results that indicate a widening of the income gap. The convergence paths are conditional upon the existence of national institutional and technological capacities. The truth is that if there is to be progress towards comparable levels of per capita product among countries it is indispensable that the autonomous innovation process in the South should be speeded up.

In the first stage of ECLAC's analytical studies, bipolarity was the main analytical way of expressing the problems of the periphery, which was seen as an anomaly in comparison with a paradigm of smooth and harmonious functioning of the international economy on the basis of a division of labour providing for the joint industrialization of both poles of the system. The concept of bipolarity means that the spontaneous relations between the two poles are not such as to generate this joint industrialization but instead perpetuate the structural differences: heterogeneity and specialization of the periphery, on the one hand, and homogeneity and diversification of the centres on the other. This differentiation is the underlying element in the unequal evolution of the levels of per capita product.

At the time, bipolarity emerged as an alternative concept to that of static comparative advantages, which advocated the optimization of international resource allocation through unrestricted free trade. In terms of the modern debate on convergence, the initial ECLAC attitude stressed that if the periphery did not industrialize –in other words, if it did not incorporate technical progress– there would be international divergence of income levels between one pole and the other. As already noted, subsequently emphasis was also placed on the need –likewise subject to economistic criteria– to develop those branches where peripheral industrialization could not make a start because of its initial specialization: consumer durables, widely-used inputs, and above all capital goods.

The ECLAC approach in the 1990s is the opposite to that which claims that liberalization itself automatically produces convergence. Although there is no clear reformulation of the bipolarity hypothesis in its recent documents, the present ECLAC attitude could be classed with that termed "conditional convergence". It suggests that the gradual reduction of differences in income between the countries of the region and the developed countries, with parallel absorption of the increase in the economically active population, would be obtained by attaining a given rate of growth of per capita income, which in turn means a certain rate of increase of the product and a high investment coefficient.[40] In order to realize this possibility of convergence it is necessary to adopt a set of policies focussed on the construction and development of a national innovation system.

[40] "Rapid and sustained growth for the Latin American and Caribbean countries, which will represent a gradual decrease in income disparities in relation to the developed countries, will clearly improve the region's traditional performance. Absorbing the increase in the active population will mean a systematic rise in real per capita incomes at a rate of 4% per annum, with relatively minor fluctuations from one year to the next. In order to achieve these goals, the countries must expand their gross domestic product at rates of nearly 6% per year. ….. such a performance will require an investment of around 28% of regional GDP, which means a 7% increase in the current average ratio …." (ECLAC, 1996, p. 51).

VII

Final remarks

The foregoing review of some of the main recent growth models, and their comparison with the views of ECLAC, was designed to bring out their analytical similarities or divergences and to identify the different theoretical bases on which they were constructed. Prime emphasis was placed on the convergence of their views on the role of technical progress as the main source of the differences between countries, as reflected in the divergences between their long-term growth rates.

This review also revealed another type of convergence which is worth noting in these final remarks: in the light of all the models and approaches reviewed, it is clear that there is significantly more scope for the application of policies to promote growth. It was not possible, however, to analyse in depth the various theoretical grounds justifying State intervention.

In the endogenous growth models, this greater scope stems from the consideration of new "market flaws" connected with monopoly situations (necessary in order to provide incentives for investment in innovation) and with various types of externalities (necessary for the long-term continuity of economic growth). Both the monopoly situations and the externalities generate non-optimal Paretian equilibria. Development policies could aim to correct these flaws, resulting in higher growth rates. The existence of such flaws is not new, but what is new is the recognition of their importance for long-term economic performance.

The evolutionary models, for their part, by incorporating institutional aspects, bring out the fact that the new public policies are necessarily more complex than in the past, so that veritable "institutional engineering" is needed to provide the coordination mechanisms that are missing in a free market economy. Development policy becomes a means of creating conditions of competitiveness in the economic system by coordinating the institutions with the strategies followed by enterprises in order to promote technological learning. In turn, this coordination must incorporate more general measures to ensure an efficient infrastructure, adequate scientific and technological resources, human resources training, and other aspects.

Thus, the new models reduce the validity of the arguments that largely blame government intervention for the relative failures of certain countries in terms of growth and participation in the international economy. However, they do not appear to incorporate in their bases, at least explicitly, two aspects which are typical of economies that, like those of Latin America, suffer from certain types of backwardness: on the one hand, backwardness in the diversification and linking-up of their structures of production, where there is little development of the technologically most complex activities, and on the other, backwardness in their existing levels of accumulation, which are indispensable for investment and economic growth. These disadvantages take on even more serious dimensions in a globalized economy where States have less and less independence in the management of their economic policies.

An aspect which will probably continue to occupy a leading place among policy concerns is the level of employment, which appears as a mere "residual" in the models studied: the greater the absorption of technical progress and the degree of capital accumulation, the smaller this residual value. Such an attitude is undoubtedly over-optimistic, however, in the case of economies like those of Latin America which display high degrees of structural heterogeneity: i.e., they still have significant contingents of workers employed in low-productivity activities.

Furthermore, in the 1990s many of these economies are in the midst of intensive restructuring processes. The transition between different production structures can give rise, even when it is taking place in the direction that is most desirable in the long term, to long periods of high unemployment, which not only has social costs but also involves a significant loss of growth potential of the product. It is therefore necessary to make a greater effort to construct models that take account of this specific aspect of the Latin American economies and make a more realistic evaluation of the impact of development policies on employment levels.

(Original: Spanish)

APPENDIX 1

Romer's model

The model by Romer (1990) recognizes four production factors: i) technology *(A)*, defined as a stock of knowledge, assimilable in turn to the quantity of designs of capital goods available; ii) capital *(K)*, equivalent to the sum of a set of production goods which are differentiated and hence not perfectly interchangeable; iii) labour *(L)*, made up of unskilled labour, the supply of which is assumed to be constant, and iv) human capital *(H)*, resulting from the cumulative effect of activities such as formal education and on-the-job training. The total amount of human capital is used in the production of a final good (H_Y) and in research (H_A): $H = H_Y + H_A$. It is assumed that the stock of human capital remains constant.

These inputs are used in three sectors: i) the research sector, which produces new knowledge (for example, designs for new capital goods) on the basis of human capital (H_A) and the existing stock of knowledge *(A)*; ii) the capital goods sector, which uses the designs developed in the research sector to manufacture the capital goods to be used in the final goods sector, and iii) the final goods sector, which uses labour *(L)*, human capital (H_Y) and the differentiated capital goods to generate the final product.

The research sector operates in the following manner: if a researcher *j* has a certain quantity of human capital H_j and has access to a portion A_j of the total stock of knowledge incorporated in previous designs, his output of new designs will be $\delta.H_j.A_j$ (where δ is a productivity parameter common to all researchers).

The model assumes that all those carrying out research have free access to the total stock of knowledge. This is the same as assuming that knowledge is a non-rival good and, ultimately, that all researchers can make use of *A* at the same time. The output of researcher *j* will therefore not be the amount shown in the previous paragraph, but will instead be $\delta.H_j.A$. Adding together the output of all the researchers, we obtain the following equation:

$$\ddot{A} = \delta.H_A.A \tag{1}$$

In this expression it is implicitly assumed that every additional unit of human capital included in the research increases the growth rate of technology, and not just its level. Every new design is added to the existing stock of knowledge, and furthermore this stock is never depleted. Consequently, the marginal product of the researchers grows in line with the growth of *A*. In other words, a researcher working at the present time and having the same human capital as another researcher a century ago (measured in terms of years of education) will have higher productivity than his predecessor because he will be able to take advantage of all the new knowledge accumulated over that period.

It is understood that this externality, which is a specific feature of the generation of knowledge, is produced not only over time but also between contemporary agents. In other words, it is at once inter-temporal and inter-agents. If the marginal product of H_A were decreasing in line with the accumulation of designs, the lack of opportunities in the research sector would eventually cause the human capital to be used in the final goods sector, thus reducing the output of technology.

The sector producing capital goods cannot be characterized by a single representative enterprise because it is assumed that there is a different enterprise for each durable good *i*. Each enterprise acquires the design of capital good *i* in the research sector and obtains a patent of unlimited duration. The owner of the design has exclusive property rights over it for the production of capital goods, but not for its use in research, so that designs may be characterized not only as non-rival goods but also as partially exclusible goods.

The total quantity of capital goods (*K*) may be written as follows:

$$K = \Sigma_{i=1}^{A}.x_i \tag{2}$$

where x_i is the quantity available of capital good i $(1 \leq i \leq A)$.

In this sector there are increasing returns in the production of machinery and equipment because of the non-rival nature of the design, for the use of a design in the production of capital goods has a marginal cost close to zero. Because of this, the capital goods market has a monopolistic structure.

Capital goods are produced with the same technology as consumer goods, using the resources not used for consumption *(C)*: $\Delta K = Y - C$.

The production function for non-differentiated final goods is written as follows:

$$Y = H_Y^{\alpha}.L^{\beta}.\Sigma_{i=1}^{A} x_i^{1-\alpha-\beta} \tag{3}$$

This function is assumed to be first-degree homogeneous, and it is also accepted that the product of this sector can be described in terms of the activities of a single price-taking representative enterprise. It is observed that the level of production of the final goods will depend not only on the quantity of labour and human capital but also on the level and diversity of the goods making up the capital aggregate.

The competitive nature and efficiency of the markets in the final goods sector will mean that $x_1 = ... = x_A = x$, so that $\Sigma_{i=1}^{A} x_i = A.x = K$.

Consequently, equation (3) can be written:

$$Y = H_Y^{\alpha}.L^{\beta}.A.x^{1-\alpha-\beta} \qquad (3')$$

which is transformed into:

$$Y = (A.H_Y)^{\alpha}.(A.L)^{\beta}.(A.x)^{1-\alpha-\beta} \qquad (3'')$$

Equation (3'') reveals, through the explicit introduction of the non-rival input *A*, the mechanism whereby technical progress affects the volume of production. Thus, it is observed that an increase in the stock of capital goods (an increase in *K*) will have different results on the volume of production, depending on whether that increase merely consists of the use of more existing machines (an increase in *x*) or whether it involves the creation of new types of machines (an increase in *A*). In the latter case, the effect will be greater because in addition to the increase in the stock of capital there will be the effect of the technical progress incorporated in the new machines, reflected in the improvement in the efficiency of human capital and labour.[41]

The model in question defines an equilibrium growth rate whose level depends crucially on the allocation of human capital between research and production activities and on the allocation of the final product between consumption and investment.

This growth rate is determined by the expression:

$$g = \delta.H_A = \frac{\delta.H - \Lambda\rho}{\Lambda.\sigma + 1} \qquad (4)$$

In this expression $\Lambda = \alpha / (1-\alpha-\beta)(\alpha+\beta)$ and the intertemporal optimization condition of a consumer with an infinite horizon (along the lines of Ramsey's model)[42] is defined as $\Delta C/C = (r-\rho)/\sigma$, where ρ is the intertemporal preference rate, r is the interest rate and $1/\sigma$ (considered to be constant) is the intertemporal substitution elasticity between the amounts of consumption at different times. Through this ratio, consumer preferences thus have an influence on the growth rates of the model.

It may be noted that the greater the stock of human capital, the higher these growth rates will be. This is therefore the variable whose scale is most significant in the model, since it is the key input in the research sector. It may be inferred from this that the size of an economy is of particular importance, since it is the total amount of human capital (and not just its average level) which is the virtual determinant of its growth rate.

[41] This is reflected in increasing returns to scale which are not internalized by any individual producer of final goods. They are returns which are perceived at the aggregate level of all producers, since they derive from externalities which exist in the economy.

[42] It may be recalled that Ramsey (1928) introduced into a neoclassical model the assumption that families select their consumption path through the maximization of a utility function subject to a budgetary restriction: that is to say, they adopt an optimal form of behaviour.

APPENDIX 2

Verspagen's model

Verspagen's model assumes that technology acts on economic growth both directly and indirectly (Verspagen, 1993, p. 127). The direct effect is associated with the increase in the technological knowledge base that can be used by firms. The indirect effect is associated with the increase in exports, seen as a substitute variable for the increase in demand. Formally:

$$y_i = \alpha.t_i + \varepsilon.x_i \qquad i = s,n \tag{1}$$

where y_i is the proportional rate of growth of the product, t_i is the rate of increase of technological capabilities and x_i is the growth rate of the exports of country *i*. Equation (1) shows that the growth rate of country *i* (in this case, *i* can be a country of the North or of the South) will be a function of the rate of technical change and of export growth.

The export growth rate of each country is a function of its relative technological level –which reflects its international competitiveness, as expressed in equations (2) and (3)– and of the growth rate of the world economy, *z*.

$$x_s = \eta.L(T_s/T_n) + z \tag{2}$$

$$x_n = \eta.L(T_n/T_s) + z \tag{3}$$

If $T_n > T_s$, then $L(T_n/T_s) = G$ (the technology gap) will be a positive number, which means that the exports of the North will grow faster than the international economy.

The rate of technical progress in the North, t_n, is a function of its autonomous rate of innovation (β_n) and of its technological learning associated with learning by doing, which broadly reflects the "Verdoorn effect", represented by the term $\lambda.y_n$ in equation (4):

$$t_n = \beta_n + \lambda.y_n \tag{4}$$

Obviously, the Verdoorn effect introduces positive dynamic impulses (a virtuous circle) into the system, to the benefit of the country which grows more quickly.

The distinctive aspect of Verspagen's model is the form of the function for technical progress in the South –t_s, in equation (5)– where the term $a.G.e^{-G/\delta}$ expresses the international dissemination of technology and $G = L(T_n/T_s)$ is the technology gap.

$$t_s = \beta_s + \lambda.y_s + a.G.e^{-G/\delta} \tag{5}$$

Equation (5) indicates a non-linear relation between the gap *G* and the rate of technical progress in the South, t_s, given by the term $G.e^{-G/\delta}$.[43] Up to a certain point, the technology gap stimulates the international dissemination of technology, because of the possibilities of imitation open to the more backward countries. This stimulus depends not only on the level of the gap but also on the parameter δ, which represents a measure of the "intrinsic learning capacity" of the South. The maximum rate of dissemination of technology to the South is obtained when $G = \delta$. After that critical value is reached, dissemination weakens as the gap widens.

The higher the value of δ, the greater the international spread of technical progress, for a given value of the gap *G*.[44] The learning capacity of the South (δ) is associated with its production structure and science and technology institutions.

The movement of the gap over time is obtained by the subtraction of equations (4) and (5):

$$dG/dt = t_n - t_s = (\beta_n - \beta_s + 2.\varepsilon.\eta.\lambda.G - a.G.e^{-G/\delta}) / (1 - \alpha.\lambda) \tag{6}$$

[43] The effects of autonomous innovation and the learning-by-doing mechanism in the South are in no way different from those observed in the North. It is assumed that b_n-$b_s > 0$, i.e., that the rate of autonomous innovation in the North is higher than in the South.

[44] When δ tends towards infinity, the international dissemination of technology becomes a linear function of the gap, which is the assumption implicit in the linear "catching-up" models. See, for example, Fagerberg (1988).

FIGURE 1
Dynamics of the technology gap

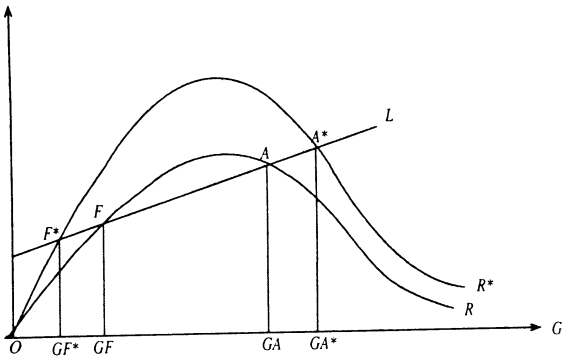
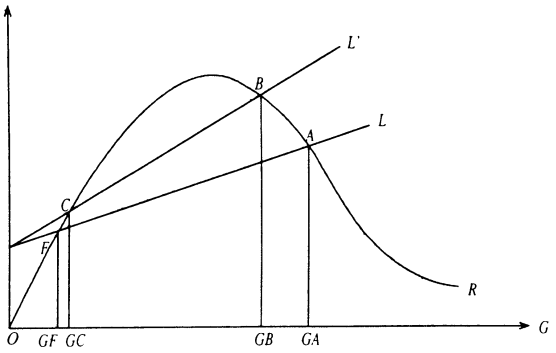


FIGURE 2
Dynamics of the gap and growth



Equation (6) shows that the gap closes *(dG/dt < 0)* when the international dissemination of technology exceeds the divergence effect produced by the autonomous innovation differential and the Verdoorn effect.[45] The evolution of the gap over time is described in figure 1, where the straight line *L* represents the first two terms of the numerator in the equation $(\beta_n - \beta_s + 2.\varepsilon.\eta.\lambda.G)$, while the curve *R* represents the last term $(a.G.e^{-G/\delta})$, so that:

$$dG/dt = (L - R) / (1 - \alpha.\lambda)$$

For values of the gap between *GA* and *GF*, there will be technological convergence, since the growth rate of the gap over time becomes negative. For values of *G* greater than *GA* or less than *GF*, there will be technological divergence. It may be noted that *A* represents an unstable equilibrium point, whereas *F* represents a stable equilibrium. Although the gap never closes completely (unless $\beta_n - \beta_s = 0$), point *F* represents the constant minimum value of the steady-state gap.

The position of point *F* may be changed by changing parameter δ, which is subject, as noted earlier, to the influence of industrial and technological policy. If the value of δ is increased, the curve for the international dissemination of technology *R* moves up (generating curve *R**) and the stable-state equilibrium is obtained for a lower value of the technology gap, *G*F* < GF*. This is how policies designed to increase the capacity for the absorption of technology in the South bring about a change in the equilibrium value of the gap.

Finally, the convergence or divergence of growth rates is obtained by replacing the terms in (1):

$$y_n - y_s = D = [\alpha.(b_n - b_s) + 2.\varepsilon.\eta.G - \alpha.a.G.e^{-G/\delta}] / (1 - \alpha.\lambda) \qquad (7)$$

The effect of the gap on the difference between the growth rates of North and South $(D = y_n - y_s)$ includes a competitiveness effect and a dissemination-of-technology effect, as described in equation (7). The greater the gap, the greater will be the competitive advantage of the North, thus increasing the differential between the growth rates. This effect is partly offset by the dissemination of technology, which increases growth in the South. The net effect of the gap will be given by the difference between the above two effects, i.e., by the sign of the difference $[\alpha.(\beta_n - \beta_s) + 2.\varepsilon.\eta.G] - \alpha.a.G.e^{-G/\delta}$.

Figure 2 summarizes the effects of the technology gap and autonomous innovation rates on the evolution over time of the gap and of growth rates in North and South, for a given value of the parameter δ. If we multiply both terms of the equation by $1/\alpha$ we obtain the straight line $L' = \beta_n - \beta_s + (2.\varepsilon.\eta.G) / \alpha$, while *R* continues to be the same curve as in figure 1.

Thus, we have:

$$D = (L' - R) / \alpha.(1 - \alpha.\lambda)$$

[45] Formally, technological convergence requires that $\beta_n - \beta_s + 2.\varepsilon.\eta.\lambda.G < a.G.e^{-G/\delta}$, where the left-hand side of the inequality represents the effect of the autonomous innovation rates and the "Verdoorn effect" and the right-hand side represents the international dissemination of technology.

Thus:

(i) for $G > GA$, both D and G increase steadily (growing divergence in terms of growth and technological capacity);

(ii) for $GB < G < GA$, there will be divergence in growth rates but technological convergence;

(iii) for $GC < G < GB$, there will be simultaneous technological convergence and convergence of growth rates;

(iv) for $GF < G < GC$, there will be technological convergence but divergence in growth rates, and

(v) for $G < GF$ there will be divergence in D and G.

When the gap reaches its stable equilibrium at F (where $dG/dt = 0$) there will continue to be a positive differential in the growth rates of North and South ($D > 0$). The model permits a transitional dynamic, however, in which $D < 0$ (a situation of emulation), which corresponds to the situation indicated in sub-paragraph (iii) above. In this case, the positive effects of the dissemination of technology on the rate of technical change in the South exceed the effects of the greater competitiveness of the North on exports and growth (these latter effects being determined by the existence of a differential, in absolute terms, between the respective technological capacities). Thus, the model suggests that there may be convergence during certain periods (transitional dynamic) but does not envisage the elimination of the difference in growth rates between North and South.[46]

[46] If it were assumed that there is no link between exports and growth (formally, $\varepsilon = 0$), then growth would depend solely on the direct effect of technology. This would be the case in an economy with permanent full employment, in which growth increases in line with increases in productivity, without changes in demand (through competitiveness) giving rise to any differences in growth rates between countries. The straight lines L and L' become horizontal and coincide perfectly with each other, meaning that the technological convergence automatically induces convergence in growth rates. At the steady equilibrium point, both dG/dt and D will be equal to zero.

APPENDIX 3

The simulation model of Dosi and Fabiani

The starting point for this model is provided by the firm's decisions on how much it wishes to invest in research and development (R&D). These are defined on the basis of a simple rule: a percentage of total sales in the preceding period. Formally:

$$R\&D_{ij}\ (t) = a_{1\ ij}.Y_{ij}\ (t\text{-}1) \tag{1}$$

where R&D is the investment in innovation or imitation in the period t, a_{1ij} is a parameter reflecting the decision-making rule, and $Y_{ij}(t\text{-}1)$ is the total sales of firm i of country j in period $(t\text{-}1)$.[47]

Through a two-stage stochastic process,[48] the R&D efforts give rise to increases in productivity associated with the discovery of an innovation or the successful imitation of competitors. Thus, the technological dynamic defines the evolution of the productivity of each firm, designated as $\pi_{ij}\ (t)$.

Price formation follows the rule of the application of a mark-up over costs:

$$P_{ij}\ (t) = [w_j\ (t) / \pi_{ij}\ (t)].(1 + a_{2ij}) \tag{2}$$

where $w_j\ (t)$ is the level of wages in country j and a_{2ij} is a parameter which reflects the mark-up behaviour. The model has only one production factor: labour.

Competitiveness is defined as a function of the exchange rate and prices.[49]

$$E_{ij}\ (t) = \rho_j\ (t) / P_{ij}\ (t) \tag{3}$$

where $E_{ij}\ (t)$ is the competitiveness of firm i of country j, and ρ_j is the exchange rate of country j. Competitiveness governs the evolution of the firm's share in the domestic and foreign markets, in line with the following equations:

$$\Delta f^{k}_{ij}\ (t,t+1) = a_{3j}.[E_{ij}\ (t) / EM^{k}\ (t) - 1].f^{k}_{ij}\ (t) \tag{4}$$

$$EM^{k}\ (t) = \Sigma_i \Sigma_j\ f^{k}_{ij}\ (t).E_{ij}\ (t) \tag{5}$$

where f^{k}_{ij} is the share in market k of firm i of country j, E_{ij} is the competitiveness of firm i, and EM^{k} is the average competitiveness in market k.[50] Thus, k represents the different national markets. Obviously, if k is not the same as j, it will represent an external market for the firms of country j.

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[47] The model assumes that decisions on technological innovation and imitation are the result of "routine" behaviour: that is to say, they are based on fixed rules and are independent of other events. The authors say that although this rather an extreme assumption, there are good empirical and theoretical reasons for expecting inertial forms of behaviour in uncertain and changing contexts.

[48] The probability of obtaining an innovation in period t is defined as $Pr\ \{I_{ij}\ (t) = 1\} = 1\text{-}exp\ \{-\phi.In_{ij}\ (t)\}$, where In_{ij} is the number of researchers of firm i of country j seeking innovations, I_{ij} is a binary variable which can have the values 0 or 1, and ϕ is a parameter which depends on the technological opportunities of the sector. Higher values of ϕ indicate greater facility for finding new products or processes because of the number of researchers. In a second stage, if the innovation effort $\{I_{ij}\ (t) = 1\}$ is successful, the increase in productivity deriving from this is the result of a Poisson distribution with a mean of λ, where λ also depends on the technological opportunities of the sector (for example, λ could be expected to be higher in the informatics sector than in the textile sector). Similar equations are formulated for the imitation process. In this case, the probability of successful imitation will be a function of the number of researchers assigned to the search for imitations and of a parameter χ which reflects the difficulty of imitation in that specific sector. This parameter depends on certain characteristics of the technology, such as the extent to which know-how can be disseminated through manuals, the role of experience, patents and industrial secrets, the accumulability of technical capabilities, etc. The increase in productivity expected from imitation is defined as an inverse function of the distance between the current productivity of the firm and that corresponding to the best technological practice in the sector.

[49] Although Dosi and Fabiani work with two sectors, in the present case we posit the existence of only a single sector in the economy, in order to simplify the presentation of the model.

[50] The average competitiveness is defined as the sum of the competitiveness of all firms i of all countries j selling their goods on market k, weighted by the respective market share of each firm i in market k. Em^{k} takes account of the competitiveness of all the firms operating in a given national market.

Equation (4) is the core of the model's dynamic. If the competitiveness of a firm is below the average, it will lose participation in the market. Parameter a_3 represents the "selectivity" of the market, that is to say, the speed with which the rewards and punishments imposed by the market are distributed. The total sales of the firm will be given by the following equation:

$$Y_{ij}(t) = \Sigma_k f^k_{ij} \cdot D^k(t\text{-}1) \cdot \rho_j(t) \tag{6}$$

where D^k is the total demand in market k.[51]

If the sales of all the firms of a country j in both the external and domestic markets are added together and then divided by the level of prices in j, this will give the real national product of j:

$$Y^*_{ij}(t) = \Sigma_i [Y_{ij}(t) / P_j(t)] \tag{7}$$

As already noted, exports are represented by the sales of all the firms of country j in markets k other than that of j, while imports are represented by the sales in country j of all the firms based in other countries. The trade balance is thus defined as:

$$BC = X - M \tag{8}$$
$$X = \Sigma_{ik} f^k_{ij} \cdot D^k(t\text{-}1) \cdot \rho_j(t) \quad \forall\ k \text{ different from } j \tag{9}$$
$$M = \Sigma_i f^j_{ik} \cdot D^j(t\text{-}1) \cdot \rho_j(t) \quad \forall\ k \text{ different from } j \tag{10}$$

Imbalances in the trade balance are reflected in adjustments in the exchange rate. At the same time, wages are adjusted in response to changes in the level of employment, prices and productivity in the previous periods.[52] These are feedback mechanisms which compensate (at least partially) for the tendency to market concentration involved in the accumulability of technological capabilities.

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[52] The following equation explains the dynamic of nominal wages: $\Delta w_j(t, t+1) = a_{4j} \cdot \Delta\pi^e_j(t\text{-}1,t) + a_{5j} \cdot \Delta P^e_j(t\text{-}1,t) + a_{6j} \cdot \Delta N_j(t\text{-}1,t)$, where π^e represents the average productivity of the economy weighted by the real product of each firm, P^e represents the consumer price index, and the values of parameters a_4, a_5 and a_6 are between 0 and 1.

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The industrial *policy debate*

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This article seeks to rethink the conceptual framework for the formulation of industrial policy in the conditions currently being faced by most of the more industrialized countries of the region; it may be noted that the debate has very similar features in the economies at an intermediate level of industrial development too. The authors review the different theories on government intervention (section II) and the industrial policy arguments (section III). They then consider the situation of the developing countries, taking a structuralist view (section IV) and the interaction of the macro- and microeconomic levels (section V), after which they briefly review the debate in the World Bank on these matters (section VI) and set forth the systemic approach taken by ECLAC (section VII). In their final reflections (section VIII) they argue that every new industrial proposal must take account of the beneficial lessons of the past and the problems associated with the errors made on the way, and they emphasize the need to overcome such limitations and shortcomings in order to follow paths that will lead to the acquisition of dynamic comparative advantages. A system based on an explicit industrial policy will provide coordination mechanisms which are lacking in a free-market economy but can be more efficient in a context where the interdependence and special nature of the assets involved are given importance. Industrial policy must help to coordinate economic change, encourage experimentation and

I

Introduction

The new conditions in Latin America, particularly with regard to stabilization and the opening-up of the economies, are acknowledged to be necessary but not of themselves sufficient for sustaining development in the long term, which requires growth and new forms of specialization. The recognition that there are imperfect markets and that there are weaknesses in the institutions needed to promote the development of dynamic comparative advantages has led to the rethinking of industrial policy, which can hardly be based on the reproduction of the instruments and institutional framework of the import substitution stage. The challenge is the same as in the past, but the international and internal conditions now have different roots.

At the international level, the world is passing through a new phase of internationalization marked by increasingly globalized real and financial markets. The intensification of competition at the country, sector and enterprise level is one of the main features of the environment in which the present international division of labour takes place. In the relation between the new patterns of international trade and the technical and production models now characteristic of the most highly developed countries, growing importance is being assumed by the level of human resources skills and the scientific and technological base as the foundations for the formation of new competitive capabilities.

In the new international setting, the processes of the formation of blocs and new forms of regional integration interlinked with that setting are also becoming increasingly important. Along with the growing economic openness, they are giving rise to a transition from basically semi-closed economies to economies which, though relatively small, are increasingly open, and they are redefining their role in the processes of integration and globalization.

This difficult transition did not start from nothing. Its starting point was in evolutionary processes in which technological capabilities were being developed. The economies had shortcomings at the microeconomic level in terms of factory sizes and the limited capacity for specialization, and there were also serious macroeconomic imbalances reflected in the ongoing external sector deficits or high fiscal costs associated with the promotion of industrialization. In spite of all these problems, however, the production of industrial goods was accompanied by the generation of a large amount of capabilities in terms of technology, upgrading of human resources, and the development of business skills and institutions. It is on the basis of this background, with all its advances and setbacks, that each country is now facing the challenge of progressing to production chains offering greater added value, overcoming past limitations, and further strengthening accumulated capabilities.

In this respect, the renewed emphasis on the need to develop a competitive strategy incorporating a coordinated industrial policy for strengthening new forms of specialization has a very different context from that of the past. The definition of an industrial policy for relatively small economies which are in a process of change and need to restore the functioning of their economic systems, to which end their stabilization processes must be based on structural changes, will therefore undoubtedly be very different from the import substitution approach. For a start, this policy will be much more complex, since it must meet much more specific sectoral, regional and entrepreneurial requirements, as well as the need for the *aggiornamento* of the relevant institutions to comply with the domestic and international changes already noted. One of its main objectives should be to reduce uncertainty, so that the economic agents –especially small and medium-sized enterprises (SMEs)– can make a better appraisal of the settings in which they will have to deploy their strategies.

This study seeks to rethink the conceptual framework needed for formulating industrial policy in the conditions currently facing the majority of the countries of the region. The problems we will be addressing are not exclusive to them, however, and the debate has very similar features both in the more highly industrialized countries and in those at an intermediate level of industrial development.

II

A brief summary of the theories on government intervention

The role of the State in a market economy has been one of the most controversial issues in economic theory. It includes the appraisal of the possible benefits of industrial policies. Chang (1994) summarizes what has been written in the literature on government intervention, organizing his review in the light of four elements.

1. Efficiency

This concept is addressed in the literature on market failures or the welfare economy, where an analysis is made of failures of the market mechanisms to match social and private costs and benefits and corrective policies through State intervention are set forth. There are three groups of arguments for justifying such intervention:

i) *Public goods:* The feature defining such goods is their "non-exclusive" nature: i.e., once a public good is supplied to someone who pays for it, it is also accessible to everyone else, since it is not economically feasible to exclude those who have not paid. Some authors refer to "non-rivality in consumption", which occurs when consumption by one person does not reduce consumption by the others but can also occur even when there are means of excluding other individuals (as in the case of the so-called "club goods"). The problem of public goods is fundamentally one of rights of ownership. In view of the characteristics referred to above, there is always an incentive not to display preferences for this type of goods, so that their supply may be less than optimal. In that case, the State must intervene by applying taxes and providing public goods with the money thus raised.

ii) *Non-competitive markets:* The existence of economies of scale and/or collusive forms of conduct may result in non-competitive market structures. When monopolies or oligopolies predominate in the market, the quantity of goods supplied is less than in a competitive context. The State must then intervene in order to ensure optimal production. There are also reasons other than those of efficiency for regulating monopolies: for example, the fact that they lead to the concentration of economic and political power in private hands which are not subject to democratic control. Among the measures applied to deal with these problems are anti-monopoly laws or public ownership of enterprises.

iii) *Externalities:* These exist when there are spillover effects from the activity of one individual to those of others, leading to discrepancies between the private and the social cost/benefit structures. In principle, the problem can be solved by defining property rights more precisely and carrying out negotiations between the respective parties. In many cases, however, this is impossible because of the high transaction costs involved in the process: in that case, government intervention is justified to ensure the supply of goods with externalities in socially optimal quantities.

2. Morality

As the representative of the members of a society, the State can intervene in the market, if necessary at the cost of efficiency. The moralist argument takes two forms: i) the State can intervene in the supply of merit goods, which are those whose supply society wishes to promote (regardless of the preferences of individual consumers) or, in the case of demerit goods, it wishes to prevent; or ii) government intervention may also be justified if society believes that market transactions are not morally acceptable in some areas (such as the donation of blood or police services). On the basis of methodological individualism and its politico-philosophical counterpart, contractualism, it was held that all government intervention (except in the case of some minimal functions) is illegitimate because it infringes the liberty of the individual, viewed as the ultimate value of human society. Consequently, liberalism means being willing to sacrifice economic efficiency

for the benefit of individual freedom when such conflicts arise.

3. Intention

The economic policy literature has criticized the approach based on the supposed existence of market failures because it assumes that the intention or objective of the State is to serve the general good. There are three types of arguments which question this assumption:

i) *The autonomous State.* The State can act as an entity with its own objective function which may be different from that of society as a whole.

ii) *Interest groups.* The State is seen as a stage on which economic interest groups or normative social movements struggle or unite to formulate public policy decisions on the allocation of benefits among the various groups demanding them. The most powerful groups will also be those most capable of affecting the decisions of the State, so that economic policies will favour them.

iii) *Bureaucrats protecting their own interests*. It has been suggested that public officials are in no way different from other individuals who pursue their own interests. As officials benefit from the higher salaries they receive and the greater power of their own departments, it is only reasonable that they try to maximize their own department's budget instead of optimizing the social product. Consequently, public officials will produce publicly supplied goods and services in larger amounts than those which are socially optimal.

4. Capability

The assumption of an all-powerful State has been questioned in the literature on government failures on the basis of two arguments:

i) The information argument, which holds that the State can collect and process all the relevant information for correcting market failures only at a cost which exceeds the benefits obtained. This argument has two parts: one concerns insufficient information and the other concerns the uneven access to information (the agent-principal problem) within the State and between the State and the bodies its policies are aimed at.

ii) The rent-seeking argument, according to which government intervention gives rise to additional waste of resources which may more than outweigh the benefits produced: the State is not only responsible for the traditional losses due to its own dead weight, but it also causes some resources to be directed towards unproductive activities in order to obtain the rents generated by its own intervention. The literature on this subject emphasizes that the combined results of individual maximizations may differ greatly, depending on the institutional context.

The debate on government failures occupies a prominent position in the literature on industrial policy. This element will largely determine the result of the policies adopted. In a review of the arguments on this subject made by Shapiro and Taylor (1990), the difficulties that exist are acknowledged, but at the same time the cases where it has been possible to carry out successful interventions are highlighted.

III

Arguments for and against industrial policy

In the 1980s, the intensification of competition among enterprises belonging to highly industrialized countries which entered activities considered to be of high technological complexity led to the rethinking of the question of whether or not government intervention to promote particular patterns of industrialization was advisable or not. On the one hand, the advocates of industrial policy claimed that the performance of the most dynamic sectors of the economy depended on comparative advantages "created" with government aid. In contrast, their opponents denied such arguments, referring to the "invisible hand" that would cause resources to be allocated to the most desirable uses.

In an article published by the Organization for Economic Cooperation and Development (OECD),

Grossman (1990) makes a useful summary of the conceptual arguments and empirical information supporting the opposing positions on the promotion of new industrial activities. He also formulates a framework for analysing government intervention based on the welfare economy approach, comparing the benefits generated by a promoted industry with those that could have been generated if the resources had been allocated to another sector of the economy. He distinguishes three components in the surplus generated by industry: i) the producer surplus, which is the excess value of an industrial product over the opportunity cost of the resources used in its production; ii) the consumer surplus, which is the excess utility derived by the consumer from the purchase of a certain amount of a good over the cost of such an acquisition, and iii) the government surplus, which is the excess income collected by it from industry over the subsidies paid.[1]

The author formalizes this approach by, on the one hand, identifying the arguments underlying orthodox thinking, which ultimately criticises all forms of intervention aimed at promoting industrial development.[2] On the other hand, as shown in table 1, he analyses the factors determining some market failures (economies of scale, externalities, and imperfections in the capital and goods markets) and the distortions they cause in a market operating under assumed perfect competition, establishes a ranking of possible interventions in the light of this, and summarizes the main theoretical and empirical principles justifying the promotion of new industrial activities.

[1] The industry surplus is $W = n\,[(p+z)x-S(x)] - n(f-v) + [U(c) - pc] - (p-p^*)e - znx - nv$, where W is the total surplus of the industry; n is the number of firms in the industry; x is the level of the product of a typical local firm; p is the price paid by local consumers; z is the subsidy per unit of product; $S(x)$ is the social opportunity cost of the resources used to produce x, net of fixed entry costs; f is the social cost of the resources needed for entry (assumed to be equal to the private entry costs); v is the fixed subsidy to induce entry; c is the level of local consumption; $U(c)$ is the utility obtained from the consumption of an amount c of the good; p^* is the international price of the product in local currency; and $e = nx - c$ is the net exports (net imports if the figure is negative). The first two terms measure the producer surplus. The third term is the consumer surplus. The last three terms reflect the cost of export subsidies (or the income from import tariffs, if p is greater than p^* and e is negative), or production subsidies, and the subsidies for inducing entry which help to cover the fixed costs, respectively. Government intervention changes some of the amounts in the right hand side of the equation. The overall change in W is the result of the changes in the economically determined variables: $\Delta W = W_x \Delta x + W_n \Delta_n + W_e \Delta e + W_{p^*} \Delta p^*$. The terms in this equation can be expressed as the sum of seven different effects: 1) The benefits capture effect, $n[p-m(x)]\Delta x$ where $m(x)$ is the private marginal cost. This occurs in oligopolistic markets when the policies induce firms to change their level of production. 2) The externalities effect, $n[m(x)-s(x)]\Delta x$, where $s(x)$ is the social marginal cost. This occurs when the policies induce a change in resource use in situations where the amount that firms pay for their inputs is different from the social opportunity cost. 3) The entry benefits effect, $[px-M(x)- f]\Delta n$, where $M(x)$ is the total private cost of producing x units, net of the fixed entry costs f. It reflects the excess operating benefits obtained by new firms induced to enter by the policies over the private costs of such entry. 4) The entry externality effect, $[M(x)-S(x)]\Delta n$; when the number of firms in the industry changes, this term measures how far the private production costs of the new firms exceed the social costs. 5) The trade volume effect, $(p-p^*)\Delta e$; domestic prices will be different from their opportunity cost (p^*) if there are trade policies. These policies which alter the volume of trade have implications for efficiency, since local decisions are based on prices which differ from the opportunity cost. 6) The terms of trade effect, $e\Delta p^*$, which reflects the benefits obtained by a country when its exports command a higher price on the world market or when it is able to import at lower prices. Policies which induce an expansion in exports generally give rise to a fall in the world price of the good in question and are therefore a negative component of the surplus. Policies which restrict imports have a positive effect if the country has significant status on world markets and affects the international price of the imported good. 7) Consumer surplus effect, $[u(c)-p]\,\Delta c$, where $u(c)$ is the marginal utility of the good after the consumption of c units. It measures the social gain from an increase in consumption of the good in question.

[2] The orthodox paradigm assumes that there are no entry barriers, that the local firms are small and cannot influence the market price of their products, that there are no externalities, etc. Freedom of entry thus means that the surplus benefits (those that exceed the fixed costs of entry)will be zero. Producers receive $p+z$ per unit of product. This means that $(p+z)x = M(x)+f$. Each firm produces until the marginal cost $m(x)$ equals the price $p+z$ that it receives. The effects are reduced to 1) $-nz\Delta x$ and 3) $-zx\Delta n$. The first of these terms is negative if there is a production subsidy ($z>0$) to promote the expansion of firms. The second term is also negative if a production subsidy is used to induce entry ($\Delta n>0$). For the assumptions adopted in this case, effects 2) and 4) disappear. Effect 7) also disappears, since each consumer selects an optimum level of purchases, with the price of the last unit purchased being equal to its marginal utility: $u(c) = p$. If a subsidy is used to promote exports ($\Delta e>0$), the domestic price p will be greater than p^* and effect 5) will therefore be negative. Finally, if export or production subsidies are used, sales on world markets will expand and the international price p^* will fall. If the country is a net exporter of the good in question ($e>0$), national welfare will go down. Consequently, for export industries, production or trade subsidies only generate negative components in the analysis of the surpluses, so that the promotion of industry through whatever type of intervention only serves to reduce welfare.

TABLE 1

Market failures: Factors, effects and possible forms of intervention
(Arguments summarized by Grossman)

Factors responsible for some market failures	Distortionary effects with respect to a market with perfect competition	Possible forms of State intervention	Bibliographical references on theoretical and empirical aspects[a]
		I. ECONOMIES OF SCALE	
A. "Static" economies of scale.	High fixed entry costs. Few firms are capable of entering with scales of production that give profits. Existence of minimum scale of operation with diminishing mean costs.	Entry subsidies if the consumer surplus is greater than the private operating losses and the effect is negative because of the decline in profits of existing firms.	Horstmann and Markusen, 1986 Schlie, 1986
B. Learning by doing (within the firm). "Dynamic" economies of scale.	Existence of a pronounced learning curve. Production costs are initially high but go down rapidly as experience is accumulated in the new activity.	Entry subsidies during the learning phase if the consumer surplus is greater than the private operating losses due to such entry. Entry of more than one firm reduces the volume of sales of the existing firms and the rate at which they gain experience and derive benefits from the associated learning process.	Alchian, 1963 Zimmerman, 1982 Lieberman, 1984 Bresnahan, 1986 Baldwin and Krugman, 1987a Dasgupta and Stiglitz, 1988 Trajtenberg, 1989
C. Strategic promotion of entry (particular case of static or dynamic economies of scale).	Size of the world market only permits one firm in the activity in question. The government undertakes to support local firms in their efforts to compete with rival foreign firms for possession of an emerging market.	Entry subsidy because of the monopoly profits obtained by the firm.	Ethier, 1982 Brander and Spencer, 1985 Dixit and Kyle, 1985 Dixit, 1986 Dixit and Grossman, 1986 Grossman, 1986 Horstmann and Markusen, 1986 Baldwin and Krugman, 1987a and 1987b Baldwin and Flam, 1989 Helpman and Krugman, 1989
		II. EXTERNALITIES	
A. Research and development.	Significant investments in the creation of knowledge. Knowledge as a "public good". Spread of the fruits of research and development efforts throughout society is efficient and possibly inevitable. Private agents will only assume costs if they can internalize the benefits.	Subsidies for private research and development costs. Encouragement for firms to internalize the externalities associated with the creation of new technologies through the promotion of joint ventures for research and development. Increased protection abroad for intellectual property rights. Use of production or export subsidies, or protection of the domestic market, although at the same time they have negative effects.	Arrow, 1962 Griliches, 1979 Jaffee, 1984 Spence, 1984 Grossman and Shapiro, 1985 Griliches, 1986 Katz, 1986 Bernstein, 1988 Bernstein and Nadiri, 1988 and 1989 Chin and Grossman, 1989 Grossman and Helpman, 1989a and 1989b Lichtenberg and Siegel, 1989
B. Learning by doing (outside the firm).	Productivity gains from production experience may be built up by firms other than that which began the manufacturing process (classic variant of the infant industry argument).	Production subsidy due to the benefits of the externality in question. Trade policy is a substitutive variable which promotes learning but at the same time has negative effects.	Lieberman, 1982 Zimmerman, 1982 Bell, Ross Larson and Westphal, 1984

TABLE 1 *(concluded)*

Factors responsible for some market failures	Distortionary effects with respect to a market with perfect competition	Possible forms of State intervention	Bibliographical references on theoretical and empirical aspects[a]
C. Investment in human capital and on the job training.	Externalities of investment in human capital. Firms intervene in a sub-optimal manner.	Subsidies for investment in human capital. As in the case of the externalities of research and development, production subsidies or trade policies do not guarantee solution of the problem of appropriability.	Horowitz and Sherman, 1980 Maranto and Rogers, 1984 Simpson, 1984 Barron, Black and Lowenstein, 1987
D. Failures of coordination and vertical linkages.	If the economies of scale are significant and exports are limited by transport costs or trade barriers, entry of a producer may be inhibited the lack of a purchaser for his product. At the same time, a potential producer who uses the above product as an input may be inhibited from entering by his inability to obtain a low-cost supply of that input. The market solution involves a failure of coordination: neither of the two is willing to assume the high fixed costs, although both would benefit if they did.		Scitovsky, 1954 Pack and Westphal, 1986
III. IMPERFECTIONS IN THE CAPITAL MARKET			
A. Divergences between the social and private costs of funds.	An exogenous divergence exists between the social opportunity cost of funds and the rate at which the market makes them available to borrowers. Such divergences may be due to the lenders' inability to make proper evaluations, to their "irrational" aversion to risk, or to their systematic over-estimation of the risk of new activities.	Loan subsidies if the private rates are not appropriate. Subsidies for guarantors or tax compensation for firms' losses in order to relieve part of private exposure if the aversion to risk is too great. Such subsidies and tax benefits must be available for all investors in all sectors, unless the market is known to discriminate systematically against certain types of activities.	Kafka, 1962
B. Uneven access to information.	Borrowers undoubtedly know more about the nature and degree of risk and the probable returns in various alternative situations and about their own capacity to undertake a new activity. This uneven access to information would not be important for lenders if the debt contracts ensured repayment under all circumstances. Credit markets typically involve State protection under limited responsibility laws and therefore expose lenders to the danger that a firm will declare itself bankrupt (the "adverse selection" problem).	Selective interest rate subsidies, only in cases where the market mechanisms systematically select those firms or potential entrants which are least attractive from the social point of view.	Stiglitz and Weiss, 1981 De Meza and Webb, 1987 Flam and Staiger, 1989 Sen, 1989
IV. IMPERFECTIONS IN THE GOODS MARKET			
A. Quality reputation as an entry barrier.	Consumers have imperfect information on product characteristics. New entrants suffer from the problem of lack of an established quality reputation.	"Differential" incentives for firms to produce high-quality goods (e.g., minimum quality standards).	Bagwell and Staiger, 1988 Grossman and Horn, 1988

Source: Prepared by the author on the basis of Grossman, 1990.

[a] These bibliographical references are taken from Grossman (1990), where they are given in greater detail.

1. Comparison with the organization of financial markets

The arguments presented by Grossman, which justify selective government intervention designed to secure an increase in social welfare, are complementary and are clearly illustrated, in the particular case of financial markets, in a recent study by Stiglitz (1993). These markets are particularly important for the industrial sector.

Essentially, financial markets are connected with resource allocation, so that it may be said that they form the "brain" of the economic system: the central point in the taking of decisions. It is because of this role of financial markets that their performance is so important: if they fail to do their job properly, not only will the benefits be smaller, but this may even adversely affect the functioning of the entire economic system. According to Stiglitz, there are seven market flaws which can justify government intervention in financial markets: i) problems of the "public good" in matters of financial supervision; ii) externalities of financial supervision, selection and granting of loans; iii) externalities of financial upsets; iv) absent or incomplete markets; v) imperfect competition; vi) inefficiency of competitive markets, in the Paretian sense, and vii) investors lacking the necessary information.

Stiglitz's study also describes the forms of government intervention most commonly observed in financial markets and a set of principles determining the regulations to be applied to the sector. Finally, he analyses a special form of intervention: financial repression. Stiglitz concludes that the State has a role to play in financial markets because of the market failures described above.

2. Transaction costs and failures of coordination

Another way of interpreting industrial policy stems from the use of the concept of "transaction costs" (see Chang, 1994). The school of thought that stresses the transaction costs of the new institutional economy notes that the market transactions through which resources are allocated in market economies are not exempt from costs, as neoclassical economics assumes: since individuals have only limited rationality, they allocate resources in order to establish safeguards against opportunistic conduct by their trading partners (to cover the costs of drawing up and enforcing a contract, for example). This recent contribution to economic theory emphasizes that the achievement of efficiency (or the coordination of the forms of conduct of interdependent but also independent agents) involves costs over and above those deriving from failure to obtain the highest possible degree of social welfare. From this point of view, then, costs include not only those involved in the production of goods but also –and to a significant extent– the costs of allocating resources among production units and managing the production process within the units. These costs of coordination between and within economic units, which must be distinguished from purely engineering costs, have been given the name of "transaction costs".

If transaction costs are those incurred with the aim of defining and redefining the property (and other) rights of economic agents, on the one hand, and drafting, reviewing and enforcing contracts within the existing structure of rights, on the other, then the costs of government intervention can also be reinterpreted as transaction costs. The costs of the information needed to take decisions and apply policies are of this type, and the costs deriving from rent-seeking activities designed to redefine the structure of property rights can also be classified in this way. In the real world, both State interventions and market transactions generate costs, so that a comparison must be made between the costs of allocating resources through market transactions and the costs of doing so through State interventions. This gives rise to a new role for the State: the reduction of transaction costs in the economy.

An important function of the State is to establish and enforce a well-defined system of property rights which reduces transaction costs; if it does not achieve this, then those agents whose decisions are interdependent will have to engage in extraordinary expenditure to solve the problem of externalities. Although this does not necessarily have to be a task for the State, the fact that the government is the only body which has the legitimate right to use force means that the most efficient agent for carrying out this function is indeed the State. Another role for the State in bringing down transaction costs is the reduction of macroeconomic instability. When faced with growing macroeconomic instability, agents with limited rationality will devote resources to activities that seek to create suitable conditions for enabling ratio-

nal calculation (for example, by drafting, revising and enforcing long-term supply or subcontracting contracts, or maintaining stocks). As macroeconomic instability is essentially a lack of coordination between the activities of different individuals, this argument can be extended to the problem of coordination in general (for example, the establishment by the State of a system of weights and measures or technological standards).

In order to achieve this coordination, the State does not necessarily have to completely take the place of market transactions. Indeed, such an exercise could be prohibitively costly, as the central planning practices of the Socialist countries have shown. There are ways in which the State can reduce transaction costs without eliminating all market transactions: i) by changing the institutional configuration of society (for example, by giving legal backing to the organization of agents in larger groups and the reduction of the number of bargaining processes needed, as in the case of the social corporativism applied in Scandinavia or Austria): ii) through its influence on the educational system and the communications media, promoting a "national ideology" or system of values which helps to reduce the costs involved in the exchange of information and in negotiations (as in South Korea and Japan, which are considered to be homogeneous societies); iii) by providing a "focal point" or consensus around which decisions can be coordinated (as occurs in investments in complementary projects in France and Japan).

An industrial policy system offers coordination mechanisms which may be lacking in a free market economy. As a coordination mechanism, industrial policy may be more efficient in a context where the interdependence and special features of assets are important considerations. In this case, coordination through the market would involve high negotiation costs, while coordination through centralized planning would involve high information costs, whereas industrial policy would probably have low costs in both cases. Industrial policy also appears to be a superior way of promoting technical progress. On the one hand, it does not eliminate the profit motive, as centralized planning does, and through the socialization of risks it can promote changes over and above those that the market can induce by itself.

In examining the logic underlying industrial policy, it is desirable to separate the roles it plays in the static and in the dynamic dimensions. In both cases, the function of industrial policy is the same: to avoid failures of coordination. As Chang (1994) notes, when the assets have special features, ex post coordination through the market can be anti-economic, since the failures of coordination involving specific assets gives rise to a net reduction in the total amount of resources available for the economy. One of the features of modern industrialized economies is their use of production technologies which require large fixed investments and therefore involve economies of scale. Moreover, a large part of their assets are specific or "sunk". The result is an oligopolistic industry in which there is strategic interdependence of the firms' decisions.

Under certain likely conditions, this interdependence leads to inefficient results which would justify State intervention. In this case, the intervention would not necessarily take the form of an anti-monopoly policy, since the benefits of breaking the oligopoly could be offset by higher costs resulting from suboptimal scales of production. Here, industrial policy can play a distinguished role through measures such as the following:

i) *Coordination of investments:* as overinvestment or underinvestment are problems of strategic uncertainty which can cause a number of firms to go bankrupt and lose the resources invested, the State can intervene in the industry in question to ensure that there is an optimal level of entry into it, assuring possible entrants to this effect;

ii) *Recession cartels:* when there is a temporary fall in demand, it is preferable to organize recession cartels rather than to allow firms to start a price war which can lead, among other things, to the loss of social resources or the survival only of the strongest firms, which will later collect monopoly benefits when the economy starts to recover;

iii) *Negotiated reduction of production capacity:* when a persistent fall in demand makes it necessary for some firms to leave the industry, it may happen that none of them wish to do so because they themselves would benefit from the withdrawal of other firms. This could lead to a war of attrition among the firms which would benefit no-one, thus justifying intervention.

Some opponents of industrial policy claim that although this may solve the static coordination problem, it may be harmful in the long term because it impedes the functioning of the natural selection

mechanisms of the economy and hence the achievement of dynamic efficiency, as the countries with centrally planned economies show. They do not mention, however, that economic changes may also require coordination in order to be successful. Moreover, if the risks must be assumed only by individuals, it may be that the necessary changes do not take place at all. The socialization of risk through State intervention is a way of promoting changes which involve interdependence.

Industrial policy must help to coordinate economic change, to promote experimentation, and to preserve diversity. In a world of interdependent relations, the fact that a better alternative exists does not necessarily mean that there will be a corresponding change. In the real world, many changes involve interdependent decisions. Likewise, infant industries may need certain guarantees (for example, regarding the entry of possible competitors) in order to embark on a path which can lead to the extensive creation of knowledge. It may be desirable to protect such industries and coordinate projects that may compete with each other. When the market in question has matured, all that is needed is to apply static industrial policies in such cases as the organization of "recession cartels". When the market has passed this stage and is over-mature, industrial policy once again has a role to play in the coordination of negotiated withdrawals and elimination of installed capacity. With regard to the relation between industrial policy and the product cycle, it may be observed that dynamic industrial policy is only called for in the first of these stages.

Finally, as Nelson (1989) notes, it is preferable to waste resources through the duplication of innovation efforts than to advance in only a single direction which may later prove to be mistaken. Diversity has its advantages, since no-one can be sure of the future. Industrial policy's place in technological innovation lies in complementing an imperfect capital market, subsidizing the entry of firms into activities with high fixed entry costs, and coordinating university research and its linkages with the world of production. For Chang, growth is due to the fact that agents have experimented with new things and new ways of doing them. To make this possible, many institutions were set up which allowed the risks inherent in innovation to be socialized. The State can provide more of these institutions.

3. Constructing the market

In an effort to construct a conceptual framework for a new approach to industrial policy in an open economy, Bianchi (1993 and 1994) has prepared a number of extremely useful elements. He has taken up once again Adam Smith's idea of the market, which was developed for a situation marked by emerging capitalist societies and runs counter to the qualities of "loyalty and protection" of the feudal mechanisms, which were rigidly based on hierarchical exchanges determined by the social position of the actors. For Smith, the market is a complex social institution and a meeting point for horizontal relations in which relative power is not a given value but is attainable on the basis of the ability to organize productive activity. This market requires collective rules and an authority capable of supervising and stimulating competition among the economic agents, which is the foundation for structural change. The efficiency of production depends on the capacity to organize it so that specific skills are developed and it is continually strengthened by the feedback from specialization and complementarity. In Smith's scheme, social interaction is not only competitive but also cooperative, since the division of labour is based on the complementary specialized capabilities of individuals and firms. It is obvious that the stimulus for social dynamics is all the greater when there is plurality and diversity: that is to say, when there is a large number and variety of subjects interacting in the economy.

Government intervention is justified insofar as it increases the division of labour, expands the market and facilitates the use of the whole power of the market to develop competitiveness. Such intervention is not sufficient if it only takes place at the individual level: it will have more effect if there are progressive coalitions designed to generate reactions towards innovation which cause the individual and social benefits to come closer to each other. Smith reminds us that an economy based on the development of the market forces requires a strong State, not only to guarantee property rights and to legitimize private contracts, but also to ensure those positive externalities that no individual citizen could maintain unaided, such as defence, justice, and the public activities needed for collective growth (including, inter alia, communications and the educational and health systems).

Smith was against any kind of protectionism and was an ardent defender of free trade, which to him meant the broadening of the market and, hence, an increase in the multiplicity of competing agents. In particular, when economic underdevelopment is combined with the deterioration of institutions, what is needed is not to "return to the market" but to "construct the market". This means acting on the institutions of collective life and providing the capabilities that will allow the majority of the subjects to take part in them effectively. Likewise, public policies for furthering industrial development must be designed not only to favour a change in the institutional environment in which firms operate but also to take concrete measures to favour industrial cooperation among firms, so as to make possible individual specialization in a context of complementarity and broadening of the market.

In the event of a change in the situation –for example, the upsets accompanying processes of greater trade openness– the policies needed to speed up structural and institutional changes must be identified, in order to establish the necessary conditions and rights of participation of the economic agents (with full equality of opportunities) and to strengthen their capabilities so as to facilitate active and growing integration into the globalization process. For this, it is necessary to construct a system of consensual interrelations in which the systemic conditions form the backbone of macroeconomic policies supported by feedback from "everyday capability building". This means establishing or strengthening networks, strengthening the links between institutions and firms, and enhancing spatial relations at the local, regional, national and international level.

A situation of autarky is always difficult, as there is the danger of growing domestic dissatisfaction and the emergence of regressive coalitions which block change. In this context, a protectionist movement may be either a regressive result or an intermediate solution for enabling domestic reorganization which could turn potentially regressive coalitions into coalitions capable of identifying ways of collective development through redefinition of the division of labour. A regional-level economic integration agreement can therefore be a means of guiding the processes of openness and structural adjustment in such a way as to sustain them without causing damage through over-hasty action or falling into situations of indefinite protectionism. It is possible to generate dynamic effects if the transition towards a customs union is regulated in time so as to permit the adjustment of the national production structures during the transition: this would give rise to a progressive coalition which will press towards complete openness, increasing the number of agents capable of sustaining it through a rapid structural adjustment process.

IV

The case of the developing countries: a structuralist approach

Many authors have studied the reasons for the very uneven results obtained by semi-industrialized countries in their efforts to ensure a self-sustaining economic growth process and to improve their social welfare. Among them, Lall (1992a and b; 1993; 1994a and b) centers his attention on the industrial policy debate and its links with the concept of technological capabilities in order to try to explain the different degrees of industrial and technological development.

The need for an industrial policy stems from the problem of the efficiency of markets. If markets work perfectly, they will give optimal results which, by definition, could not be improved by any type of intervention. When markets do not work perfectly, there could be a need for intervention to improve the economic performance. This will depend on the nature and magnitude of the market failures and the capacity of governments to design and implement the necessary intervention measures (while at the same

time appraising the possible costs of government failures). Lall puts forward three alternative approaches to the role of industrial policy: the neoclassical approach, the market-friendly approach, and the structuralist approach. The differences between them derive from the assumptions each of them make on how markets operate in the developing countries and how capable governments are of overcoming market failures, when these exist.

According to the **neoclassical approach**, all markets are perfect and any intervention would distort resource allocation; the static optimization of resource allocation obtained through the functioning of free markets also leads to the maximization of growth.

According to the **market-friendly approach**, the developing countries do suffer from market failures and functional, selective interventions are therefore needed to overcome them, but in practice only the former are feasible and desirable, either because those failures which call for selective remedies are of insignificant importance for industrial development or because selective interventions are inherently more costly than the flaws they are supposed to correct (government failures are always worse than market failures in this type of situation). This approach abandons some of the assumptions of the neoclassical approach. It acknowledges that factor markets may not operate perfectly, and that education markets, in particular, may call for interventions in order to create the human capital base required by industrialization, but these interventions must be market-friendly (i.e., non-selective) because of the implicit assumption that skills are generic. It recognizes that there may be market failures in the coordination of investment decisions in industry due to various reasons: absence of information markets, shortcomings in the capital market, economies of scale, interdependent investments in vertically related activities, externalities in the creation and learning of skills, and multiple linkages.

The **structuralist approach** holds that both functional and selective interventions are needed to promote development, and that governments are capable of carrying them out. Industrialization may still take place in the absence of selective interventions, but its pattern and depth will be affected, and in the developing countries it will tend to be fragile in most circumstances. As market failures differ in their incidence and intensity in different activities, the interventions to correct them must necessarily be selective. Without them, this approach predicts, resource allocation would be sub-optimal and growth would be restricted. The distinction between market-friendly and selective interventions is a false dilemma. There is no economic basis for drawing a distinction between functional and selective interventions: any intervention which corrects a market failure is automatically market-friendly. Nor does economics find any justification, *a priori*, for the argument that except in the case of functional interventions the government will probably do more harm than good. This is a political argument of dubious empirical value.

On the basis of this structuralist approach, Lall develops a series of arguments centered on the acquisition of technological capabilities and the flaws encountered in this process. He notes that in manufacturing, these capabilities are not limited to the technology embodied in physical equipment or in manuals, plans and patents acquired by the firm, although these do indeed represent the means through which these capabilities are put to work. Nor are they limited to the educational qualifications of the workers, although a base which is receptive to the acquisition of skills does depend to a large extent on the education and training of the workers involved. Nor are they limited to the skills and training that individuals receive in the firm, although these do represent the bricks with which capabilities are built at the micro level. Instead, capabilities are the way in which an institution –such as a firm, for example– combines all the foregoing in order to function as an organization, with ongoing interaction among its members, effective flows of information and decisions, and a synergy which is greater than the sum of all the individual skills and knowledge. It is conceptually useful to consider the development of competitiveness at the level of the firm as investment in embodied technology, accompanied by investments in skills, information, organizational improvements, and relations with other firms and institutions.

Exposure to international markets provides various stimuli for the development of capabilities. International competition stimulates efforts to reduce costs, to improve quality and to introduce new products; makes it possible to obtain economies of scale, and provides constant information on improvements in designs and processes that speed up the achievement of higher productivity (gains in dynamic technical efficiency). In order to reach international

levels of efficiency in complex technologies –with dissemination of externalities and feedback to strategic activities–, however, time, investments and efforts are needed. It would be very hard for firms to cover the costs involved if they are exposed to global competition from the start, and moreover the capital markets are not generally prepared to back them. Consequently, there are arguments connected with the treatment of infant industries which are valid for the protection of new industries, but not in the usual sense of low and uniform protection. The duration and scope of protection cannot be uniform when different technologies have different costs and learning curves.

Not all market failures require intervention. The need to intervene arises when solutions do not appear or need some kind of stimulus to appear. The risk of a government failure must be faced whenever political solutions are recommended for market flaws. The government, like the market, can have different degrees of success or failure and, like the market, governments can improve with time and effort. In some cases, there may be no alternative to State intervention. In others, a reasonable balance needs to be drawn between the costs and benefits of intervention, on the one hand, and the market flaws on the other. It is generally agreed that the provision of basic education and infrastructural services connected with industrial and technological development should be in government hands. In this respect, the need to strengthen the capabilities of the government and improve its performance seems to be unavoidable. The most serious problem arises when the forms of intervention adopted are more selective. Such policies require great skill, information and discipline on the part of the government, since they usually foster rent-seeking forms of conduct and the appearance of pressure groups. They could prove very costly if they are badly formulated or applied, but if they are carried out properly they will determine the nature and success of the industrial development process.

Firms from developing countries have to face various market failures. The nature of these failures is not always the same. They depend on each country's specific objectives as regards the activities they wish to enter, the growth in incorporation of local inputs that they are pursuing, and the level of technological competence and endogenous innovative capacity they wish to develop. The need for intervention must be determined within this context. Industrial development does not only mean embarking on new activities. As economies progress and mature, this means a deepening of the process in some or all of the following four ways: introducing technological improvements in products and processes in industry, embarking on new activities which are more complex and demanding, increasing the proportion of local content, and mastering more complex technological tasks in firms (ranging from assembly operations to those required for activities involving greater added value, adaptation, improvement, and finally design, development and innovation). Each of these has its own learning costs. Progressive deepening is a natural part of industrial development, up to a certain point, but it is not automatic and inevitable. Its pattern and incidence differ widely, depending on the strategies followed by the societies in question.

The process of forming capabilities can come up against various market flaws. With regard to products, free markets may not give the right signals for resource allocation, while with regard to factors, they may not lead to an optimal supply of inputs, especially in the case of skills and information.

Free markets may suffer from two different types of flaws: i) those that affect optimum allocation of investments between simple and complex activities, and ii) those that affect such allocation between physical investments, purchase of technology, and domestic technological efforts. The first-named provide the arguments in favour of the classic case of protection for infant industries. When there are costs involved in learning, a late entrant into an industry necessarily faces greater disadvantages than those who embarked on the learning process earlier. In view of the uncertainty, the lack of information and the imperfections in the capital market which are endemic in the developing countries, full exposure to competition from imports can inhibit entry into activities involving relatively complex technologies. Because learning costs differ from one activity to another, intervention to ensure efficient resource allocation must be selective rather than uniform.

The second type of allocation problems, which affect the deepening of capabilities in industrial activities, can also be affected by market flaws. Arrow (1962) noted quite a long time ago that the free market can fail to ensure optimal innovative activity because of the imperfect appropriability of information and skills. The developing countries also face another problem. It is generally easy to import techno-

logical "packages" from abroad, where the process has already been commercially tested: the vendor supplies the equipment and programmes, puts them into operation, carries out the necessary training and adaptations, and runs the operating and marketing aspects. In its most extreme form, this procedure is tantamount to foreign direct investment (FDI). Although it represents an effective and relatively less risky way of gaining access to technology, it does not cause developing countries to acquire greater capabilities, other than the skills needed for the production activities. Moving on from those activities to innovation involves a different strategic decision which foreign investors in those countries are not very willing to take. There is thus a risk of market failures in the process of deepening capabilities because of the learning costs, which are of a very similar nature to those involved in the case of an infant industry. In order to ensure socially optimal allocation it may be necessary to selectively restrict the importation of technological "packages" and promote that of "externalized" technologies (licences or equipment). Many technologies, however, are only available through FDI, or else they are too complex for local capabilities, and must therefore be imported in the form of packages. It may also be necessary to promote the emergence of larger-scale firms. Technological deepening can be a legitimate objective of industrial policy, however, as the development of endogenous design and innovation capacity has various positive externalities.

These considerations are also applicable to the deepening of local integration through the development of local suppliers and subcontractors. As well as bringing benefits in terms of production, the resulting interrelations speed up the spread of technology, increase specialization, and enhance industrial flexibility. In particular, the development of local equipment suppliers can increase the generation and spread of technologies. Because of these externalities, there may be justification for the promotion of clusters of related activities which would otherwise not be capable of coordinating their investments and the selection of groups of activities considered to have greater learning potential because they use advanced technologies. Once again, the nature of the possible market failures will depend on the particular economy in question and its technological ambitions.

As the needs for skills and information differ in the different industrial activities, interventions in these factor markets must be integrated with those designed to promote the activities in question or to further technological deepening. Interventions to facilitate the functioning of the market must therefore necessarily be selective, inasmuch as the skills and information become specific rather than generic. Finally, as protection reduces the incentive to invest in the development of capabilities, industrial policy must offer compensatory incentives in the form of performance requirements (entrance into export markets in a short space of time).

The development of industrial competitiveness and its dynamic evolution over time mean that firms must continually invest in learning new capabilities and improving existing ones. The learning process comes up against various market flaws which conventional theory overlooks. Once these are taken into account, the scope of industrial policy for creating and sustaining comparative advantages becomes much clearer. In most developing countries the problem is not the establishment of new industries –since they already have significant industrial structures– but the fact that the existing ones are inefficient. Such countries have invested relatively little in the formation of industrial capabilities or have developed capabilities of the wrong type (designed to produce with the available materials or to adapt products for protected domestic markets, rather than to reduce costs, raise quality and constantly introduce new products). Consequently, they need to restructure the existing industries and reallocate resources efficiently. This involves the liberalization of the rules governing trade and competition, the disappearance of activities which cannot become competitive within a reasonable length of time with an acceptable level of investment in restructuring, and the progress of activities which could be efficient if they improved their technological and management capacity and renewed their equipment. A careful programme of liberalization by stages, together with a coherent set of support measures in the areas of technology and skills, could enable certain activities to reach international standards.

In short, the promotion of industrial development may call for interventions to overcome market failures in resource allocation between activities and within firms. These interventions may be selective and fit in with the learning processes of the firms. They may cover certain activities or sets of activities, and they may require action to promote the emergence of larger-scale enterprises. They may be inte-

grated with selective interventions in the factor markets, including measures affecting the way technology is imported, and they must be offset by incentives to invest in the formation of capabilities.

The scheme shown in table 2 was developed by Lall (1993) to analyse the determining factors of industrial and technological development, the market failures that may exist, and possible corrective policies. The long process of development of capabilities comes up against an important set of market failures for which very varied forms of intervention may be suggested. Experience indicates that differences in performance between countries are associated with institutional policy design, and it also indicates that policy failures are one of the dangers of not properly applying the corrections needed from the economic point of view.

Justman and Teubal (1991), coinciding also with Bianchi, note that structural changes are a necessary condition for growth, so inability to generate them may impede subsequent development. They also concur with Lall about the fundamental importance of specific capabilities and skills and the need for a "critical mass" of efforts for their implementation. The combination of these two factors gives rise to a infrastructure of specific skills, while their absence encourages a form of resource allocation by the market which may not be efficient. This infrastructure may make it necessary to decide between alternative growth paths, which may be mutually exclusive if resources are limited and the critical mass required by one or the other of them is relatively large. There is no reason why such a choice should be more efficient if made in a decentralized manner. It may be that a coordinated effort among different economic agents is needed in order to ensure that the most desirable path is followed.

This structuralist approach means that the capacity to generate "technology-driven" structural change is a source of comparative advantages in itself, and it brings out the importance of accumulating both physical capital and intangible resources. It also suggests that the government has a new and more complex role to play in the pursuit of industrial growth, due to the possibility of generating comparative advantages through the promotion of structural change. Although structural change is difficult, it can speed up economic growth once it is materialized. This speeding-up is associated with a "violent reallocation" of resources that accompanies such change.

According to the structuralist approach, the generation of comparative advantages is a complex process in which the accumulation of physical capital interacts with the accumulation of specific skills and the development of specific elements of the technological infrastructure. This specificity leads to policy aims that go beyond achievement of the optimal rate of saving or the optimal growth rate of any aggregate variable: instead, it involves the identification of structural changes which would be desirable for the economy and the definition of the type of infrastructure (including the types of capabilities) that must be developed for bringing on such changes. These issues are of an inherently strategic and long-term nature and mean deciding on one of the possible development paths, which are relatively indivisible. The consequent investment decisions are practically irreversible and affect a broad spectrum of present and future economic agents.

Structuralist authors note that market failures are characteristic features of development and occur particularly in the "nodes" of structural change, so that they cannot be considered as isolated or exceptional phenomena. In these nodes, structural change is feasible but the economy may fail when trying to implement it. In order for such change to take place, it is necessary to carry out a violent reallocation of resources ("creative destruction"). Coordination is therefore essential in order to ensure that the desired form of reallocation takes place without leading to excessive social and political upsets. In the structural change nodes, a critical mass of more than one of the resources may be needed (for example, skills plus capital investment). Without increased investment in physical capital, it might not be beneficial to acquire advanced skills, while without a critical mass of trained labour the yield on the capital invested might not be sufficient. The indivisibilities that exist suggest that the market will not always coordinate automatically in an optimal manner. This is not a problem that only exists in the first phases of development: it arises in all the structural change nodes that require the concerted accumulation of critical masses of specific resources. The formation of this type of technological infrastructure is "strategic", because particular configurations may determine the group of industries in which future comparative advantages are being generated. The problem facing the economy is how to select indivisible investment programmes, each of which leads to a different

TABLE 2

Intervention for promoting industrial and technological development (ITD)
(Proposals by Lall)

Determinants of industrial and technological development (ITD)	Market failures	Policy remedies
Incentives:		
Macroeconomic policies.	Not applicable.	
Foreign competition.	Full exposure to competition leads to underinvestment in ITD because of externalities, unpredictable learning, lack of understanding of ITD process, investment complementarities, information gaps, risk aversion.	Infant industry protection for difficult new activities (very selective, monitored, limited in duration, with safeguards, integrated with development of skills and institutional development). Phased liberalization, taking account of relearning costs.
Domestic competition.	Market power, economies of scale and scope, complementarities, need of large size to enter world markets and undertake advanced training and R&D.	Ensure competition, regulate monopolies, but create large firms where necessary to exploit scale economics in ITD and marketing.
Skills:		
Of workers and supervisors Technical. Production engineering. Design and development. Scientific and basic research. Managerial, organizational, marketing.	Investments in formal education suffer from lumpiness, missing markets (lack of supply of teachers and facilities), risk, imperfect foresight, lack of information. Quality control and curriculum content suffer from information gaps. Investments by firms in training suffer from externalities (lack of appropriability), lack of knowledge of benefits of training, risk aversion, and capital market failures.	Government support of schooling, higher level education and special training. Control of education quality and content. Selectivity in creation of high-level skills, geared to industrial strategy. Information, incentives, subsidies for in-firm training. Support for foreign training, importation of foreign trainers.
Information and technical support:		
Knowledge of need for ITD efforts Knowledge of kind of efforts needed to promote ITD Access to information from other firms, institutions, universities, etc. Standards, metrology, testing facilities. Technical extension services Contract research, design, training. Information services on technical sources, trends. Basic research support. Access to technological information worldwide.	Information gaps and fragmented information markets (on sources of technology); "learning to learn" delays; lumpiness of infrastructure facilities; public goods features of some information (externalities and lack of appropriability); skill gaps; risk aversion; absence of technological intermediation. Underdeveloped interfirm linkages, leading to poor diffusion of technology. Inadequate cooperative efforts by firms to enforce standards and quality. Absence of links with foreign research.	Information and persuasion on need for technical activity. Strengthening of intellectual property rights. Provision of infrastructural services; setting up R&D institutions for selected industries (and ensuring linkages to enterprises). Technical extension services for small firms. Information services on sources of technology. Support for cooperative R&D by industries. Some mission-oriented R&D support. Encouragement of subcontracting and local procurement. Links with foreign R&D.
Finance for ITD:		
Availability of finance on appropriate rates and in sufficient quantity for R&D or the commercialization of innovations. Equity sharing finance for innovators. Special finance for small and medium sized enterprises.	Capital market failures due to asymmetric or missing information, adverse selection, moral hazard, cost of evaluation or enforcement of ITD loans; risk aversion or over-conservative policies by financial intermediaries. Lack of relevant financial intermediation skills.	Creating technology financing capabilities in banks, with training subsidies (to start with only); special financial provision for ITD efforts that link up with R&D institutes; financial instruments for SMEs; venture capital and other schemes to provide special instruments for risk sharing. Targeting of sectors with exceptional technical potential.
Technology policies:		
Technology imports, FDI, promotion of local R&D, other interventions to strengthen ITD.	Insufficient investment in local R&D (due to the above factors). Transfer of technology suffers from international technology market imperfections, monopolistic or oligopolistic suppliers, asymmetric information. Absorption of imported technology limited by local absorption capacity, plus other failures above that deter ITD.	Fiscal and other incentives for R&D; procurement of products incorporating local innovations; information service on sources of technology; selective control of FDI and negotiation to ensure local "know why" development. Selective support for R&D projects with large potential benefits and externalities.

Source: Lall, 1993, pp. 746-747.

growth path and is associated with static and dynamic economies of scale. While there is no reason why the market will necessarily select the most appropriate alternative, this does not mean that the government has the capacity to do so. It is increasingly clear, however, that the government must play a role in coordinating the change. Firstly, it can provide a forum for debate among the interested parties in the economy, and it may serve as a means of strengthening mutual commitments for embarking on a process of change. Secondly, it can be a link between professional analysis and the political forces which is necessary in order to solve the problems of distribution and equity which invariably accompany structural change.

The debate on government failures occupies a leading place in the literature on industrial policy, since such failures largely determine the results of the policies adopted. Shapiro and Taylor (1990) have made a review of the arguments put forward in this respect in which they note the difficulties that exist but at the same time highlight the cases where it has been possible to carry out interventions in this direction.

V

Macroeconomic/microeconomic interaction

When we look at policies for promoting development, we see that the problems of macroeconomic coordination occupy a secondary place, merely serving as a context for more specific policies. However, the interaction of the macroeconomic and microeconomic configurations largely conditions the growth potential of an economy.

In analysing the problems of coordination at the macro level, the contribution made by Leijonhufvud (1981) is of fundamental importance for trying to understand some features of the behaviour of developing economies in situations of imbalance. His view may be summed up as follows: the economic system will behave differently, depending on the type of shift away from the path of "full coordination"[3] that takes place. If the shift is moderate and the system is within a range that Leijonhufvud calls a "corridor",[4] the homeostatic mechanisms will come into play and correct the tendencies. Outside the corridor, these mechanisms are weaker, and the system is increasingly exposed to "effective demand failures".[5] Within the corridor, the multiplier repercussions are weak and are dominated by neoclassical market adjustments; outside the corridor, they are strong enough to amplify themselves endogenously as a result of the effect of shocks on the previous state. Consequently, the multipliers will increase with the distance from the ideal path.

Conventional macroeconomics considers that shifting away from the path leads economies to locate themselves within the corridor, so that the imbalance will only be temporary and the policy problem consists of seeking instruments that will make it possible to reduce the length of time that the economies are out of balance. As Fanelli and Frenkel (1995) note, however, this is not the right approach to take when analysing macroeconomic problems in the Latin American economies, because of the magnitude, duration in time and recurrence of their macro-level imbalances. These economies tend to be

[3] "Full coordination" means that the existing markets are cleaned up; it refers to the state in which all excesses of demand and supply are eliminated. It does not mean "efficient allocation".

[4] The breadth of the corridor is variable and is mainly determined by the stock of liquid assets maintained by the economic agents. These stocks act as buffers when shocks hit the economy. When these shocks are very large and unexpected, the buffers are exhausted, thus further heightening the problems of coordination.

[5] "Effective demand failure" is the failure of the markets to transmit messages on desired transactions from one place to another.

located systematically outside Leijonhufvud's corridors, so that their imbalances are further increased.

There is a feature which sums up the variety of factors that help determine an economy's propensity to give rise to coordination failures: the degree of stochastic volatility and unpredictability in the evolution of the basic variables. The greater this volatility, the more difficult it will be to anticipate its evolution and the economy's propensity to generate macroeconomic imbalances. An economy with these features will give rise to forms of conduct at the microeconomic level which are absent when these elements are not found and which may even go in the opposite direction to that which might be expected if the phenomenon were sporadic. It is one thing to pass through a stage of imbalance, but quite another thing to have to live in an economy likely to generate such a state systematically. In this latter situation, the influence of the macro configuration over the micro structure will be much more permanent and visible. There are features in the economic structure which cannot be explained solely in micro terms, without reference to the macro context in which they take place. The mutations observed are related in one way or another with the fact that, in an economy marked by high macroeconomic uncertainty, flexibility for changing past decisions has an economic price. "Extreme preference for flexibility" has fundamental consequences for real resource allocation, the financial morphology, and –through its effects on investment and innovative capacity– for growth.

Just as different macroeconomic configurations determine different forms of behaviour and structures at the micro level, so the structural characteristics of each economy (the micro factors) are important in determining the degree of macroeconomic instability. On the one hand, the greater the number and severity of market failures and the lower the degree of development of the institutions related with economic activity, the greater will be the level of weakness –or even complete absence– of market mechanisms which can act as buffers against imbalance and hence the greater the tendency of the economies in question to generate imbalances and follow dynamic adjustment paths which tend to reproduce or amplify those imbalances instead of correcting them. This is because the self-regulation capacity of the economy depends on the degree of development of its markets and institutions, which are responsible for handling the uncertainty inherent in all economic activities. On the other hand, the lower the degree of diversification and sophistication of production, the less capacity there will be to reallocate resources quickly to new activities when lasting shocks take place, and hence the longer the period during which the economy will operate in a state of imbalance. Both these situations are typical of developing Latin American economies.

VI

The debate in the World Bank

In the 1980s, the position adopted by the World Bank on the role of government intervention in the economy, and especially in industrial development, was clearly expressed in the set of policies based on what Williamson (1990) called the Washington Consensus. According to this approach, countries should adopt the measures indicated in the neoclassical growth model, which claimed that the market forces alone would permit optimal resource allocation, discarding the fundamental role that the less developed countries had previously been assigning to selective intervention by the State as the "motor of development". Thus, for the Washington Consensus industrial policy was definitively ruled out as a way of improving any economic situation. Policy criteria were linked together through economic openness, deregulation and the privatization processes which formed the foundations for the structural reforms proposed by the World Bank and were essential requisites for obtaining loans.

In the course of the World Bank's own operations, however, little by little different points of view arose within the institution on the role of the State in economic development, so that the pure neoclassical view which had prevailed in the Bank's prescriptions was questioned in relation to both its theoretical and its empirical bases. Thus, within the World Bank itself, staff members' reports began to appear which

reexamined the Bank's arguments; at the same time, changes were made in the conditions that countries had to fulfill in order to obtain loans and receive positive appraisals from the institution. One of the first challenges to the Bank's position came in documents prepared by its Industry and Energy Department.

An example of this is a study requested from that department and carried out by Atiyas, Dutz and Frischtak (1992), the objective of which was to establish a conceptual framework for the problems of industrial reconversion. The analytical framework prepared in that report is put forward as an instrument for guiding government actions designed to create an environment that will stimulate efficient industrial reconversion. It identifies the main obstacles to the adoption of the right reconversion decisions, grouping them in three main categories: discipline, mobility/versatility, and resources. Obstacles to discipline are those which protect firms from the effect of competition, prolong their survival, and allow managers to put off reconversion decisions. Obstacles which restrict mobility reduce the capacity of firms to reallocate factors in response to a changing environment. It has been observed, however, that discipline and mobility are not enough to give rise to relatively efficient reconversion processes when the necessary resources (experience, information and finance) are not available. For each group of obstacles, the report classifies the government actions needed to eliminate distortions in the policies applied, provide rules and mechanisms that make up for market failures, and create institutions to apply those rules.

In another report, Frischtak (1993) claims that labour flexibility and the ability to relocate capital quickly are the most important requisites in the initial or defensive phases of reconversion. In order to achieve labour flexibility, it is necessary to eliminate restrictive labour regulations, to introduce adequate unemployment compensation, and to support activities for relocating and retraining labour. In trying to relocate capital quickly, the most burdensome restriction is usually shortage of credit, so that useful measures are those providing subsidies for withdrawal from certain activities, financed with taxes on the industries that remain in those activities, or subsidies for change of activity which make it easier for firms to give up the least profitable lines of production. When reconversion is successful, it usually increases the productivity and profitability of firms. Maintenance of the position thus attained requires a good deal more effort on the part of the entrepreneurs and the application of various measures designed to secure successful reconversion, however. These include adopting an aggressive attitude in the technological field, obtaining finance for investments and innovation and, above all, a new organizational culture emphasizing the long-term benefits of such investments and innovations.

The performance of a number of East Asian countries over the last quarter of a century has caught the attention of the whole world. This group of nations kept up high and sustained growth rates for a long period of time, accompanied by an appreciable improvement in their populations' income and in the distribution of that income. In the 1980s, the success obtained by these countries was considered to represent confirmation of the neoclassical recipes advocated by the World Bank, in contrast with the experience of those nations which had followed the import substitution path through protection of the domestic market and active government intervention. However, the differences perceived between the policies applied by the East Asian countries and those prescribed by the World Bank led the Japanese delegation to that Bank to suggest the execution of a study designed to review the role played by the government in the economic –and especially the industrial– development of the region (see OECF, 1991).

The suggested study was duly made (World Bank, 1993).[6] Among its most important conclusions is that in the East Asian economies, in one way or another, the government intervened –systematically and through multiple channels –to promote development. It classifies the policies applied in two main groups: basic macroeconomic balances and selective interventions. Among the first-named, the most important include macroeconomic stability, major investments in human capital, stable and reliable financial systems, limited price distortions, and openness to foreign technology. Selective interventions include moderate financial repression (maintaining low but positive interest rates), managed credit, selective industrial promotion, and export-oriented trade policies.

[6] The study was entitled *The East Asian Miracle: Economic Growth and Public Policy*. It was carried out by the World Bank in 1993, under the direction of J. Page, and was designed to study the development process of the East Asian nations.

The study centers on a type of economic problems –failures of coordination– which may lead to market failures, especially in the early stages of development, and it interprets some of the interventionist policies applied by East Asian countries as a response to these problems of coordination. Such policies place emphasis on cooperative forms of conduct among private firms and transparent standards for measuring success, based on performance.

Some of the East Asian countries covered by the study went one step further and created economic contests combining competition with the benefits of cooperation, both between firms and between the government and the private sector. The key feature of each contest is that the government distributes rewards (allocations) according to the performance of the firms, which is verified by the government and by the competing firms. Such contests need competent and impartial judges: that is to say, strong institutions. A high-quality civil service capable of verifying performance and immune to political interference is therefore an essential element in allocation based on contests like those described. Naturally, a high-quality civil service also strengthens the government's ability to design and implement policies not based on contests.

The rapid growth of the East Asian countries had two complementary elements. The first, and most essential, of these was attainment of the basic macroeconomic balances. Their macroeconomic management was unusually good and their macroeconomic performance was unusually stable, thus providing a favourable setting for private investments. Policies designed to increase the integrity of the banking system and make it more accessible to non-traditional savers increased the levels of financial saving. Educational policy, which was focussed on primary and secondary education, generated rapid increases in labour skills. Agricultural policies forced changes in productivity, while not overburdening the rural economy with taxes. Finally, all the countries kept price distortions within reasonable limits and opened up to ideas and technology from abroad. The second element was cautious policies of intervention. The prerequisites for success, however, were so stringent that policies formulated in other developing countries which have tried to follow similar paths have often failed. In this respect, the study in question emphasizes the importance of the institutional base in attaining these levels of performance.

The conclusions reached by this World Bank study on the reasons for the East Asian miracle gave rise to a new debate which is still under way and was recently reviewed in a special section on this subject in *World Development* (1994), edited by A. Amsden, which reproduces a number of reports summarizing some of the critical analyses made in this respect.

The first of these reports is by A. Amsden himself, who notes that, by concentrating on the basic macroeconomic balances, the World Bank study suggests that economic growth is quite a simple process. This is at variance with all the new growth models, which emphasize that, because of imperfect information, rising yields, dependence on the particular path chosen, self-reinforcing mechanisms, and other dynamic properties, the growth process does not have a single explanation. This disagreement is due to the World Bank's mistaken belief that it is possible to consider the basic macroeconomic variables (investment, education, exports) in isolation from their underlying microeconomic bases or institutions. When these variables and bases are integrated with each other and the basic microeconomic variables are placed within the context in which policies are formulated and implemented, growth becomes a more complex matter, as the new formal models indicate. The World Bank's attempt to ascribe most of East Asian development to "market fundamentalism" is misleading. For example, if East Asia has had high rates of saving and investment, these only arose in conjunction with a particular structure of enterprises and of the financial system (all banks in South Korea and Taiwan were publicly owned).

Lall, for his part, believes that the World Bank study fits in with the market-friendly view set forth in the *World Development Report* (World Bank, 1994). After making a number of criticisms on the study in the light of his "structuralist" view linked with technological capabilities (arguments which we set forth earlier in the present article), he indicates that the success of the industrial policies of the East Asian countries must be judged as a function of the different strategies that they followed. What a government considers to be a market failure depends on its own objectives: what might have been viewed as satisfactory progress in Hong Kong might be seen as unsatisfactory (and hence subject to market failures) in South Korea. The appraisal of market failures calls for an examination of the technological learning process at the micro level. There were crucial differ-

ences of technological objectives among the countries studied. The consequent strategies lead to substantial differences in terms of industrial structures, the types of exports in which to specialize, the degrees of local content, endogenous technological capacities, dependence on different forms of technology transfer, and government involvement (continuous or not). The effects of industrial policies cannot be evaluated without reference to the strategies followed. In order to judge such policies properly it is necessary to take account, among other things, of the complexity of industrial activities within and across industries, the composition and technological sophistication of exports of manufactures, the extent of local integration, and local technological deepening. These were the facets of East Asian industrialization where the strategies of the various countries differed; they identified their market failures, and their interventions were aimed at correcting them. The countries which made most progress were precisely those which applied strong policies of selective intervention, such as Japan and South Korea, and which registered the greatest distortions in relative prices, as the World Bank data show.

Recently, there have been fresh symptoms of change in economic thinking. In September 1996, the Inter-American Development Bank (IDB) organized in Washington the Conference on Development Theory and Practice, and it was in this context that John Williamson presented his study "The Washington Consensus revisited". This new study by Williamson is not an official revision of the original "Consensus" but rather reflects a change in the international economic policy scene. Subjects which were previously taboo are now at the centre of discussion. Among the new ideas put forward by Williamson are: an increase in saving, while maintaining fiscal discipline (which of itself is not sufficient); the reorientation of public spending towards well-targeted social expenditure; tax reforms that incorporate the externalities of the environment; supervision of the banking system by the State; a competitive exchange rate; use of the bargaining power of economic blocs in trade liberalization; promotion of competition in markets; well-defined property rights within the reach of all (reduction of inequalities in land distribution); the creation of State or mixed institutions for carrying out social and promotional activities, and the improvement of education by increasing expenditure and redirecting it towards primary and secondary education. Finally, a recent article by Joseph Stiglitz (1996) sums up the reappraisal of the East Asian experience, with emphasis on the role played by government interventions.

VII

The systemic approach of ECLAC

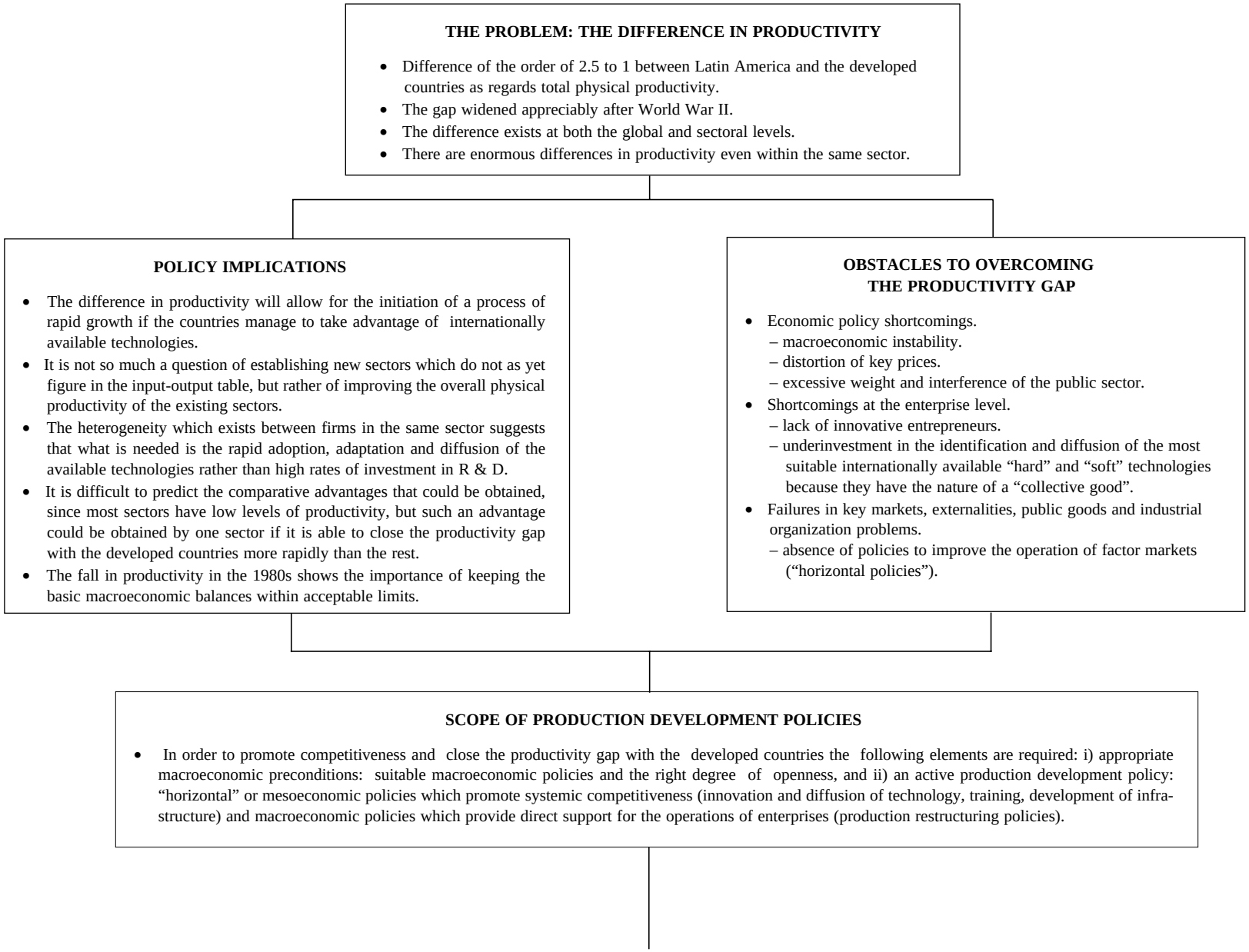
A recent ECLAC document (ECLAC, 1995) analyses the exogenous factors in the international setting, with special emphasis on the exploration of interrelated policies: i) macroeconomic policy, especially financial flows; ii) trade policy, and iii) microeconomic and mesoeconomic policy. Within the framework of a systemic approach, it seeks to group together the different proposals in a coherent manner, while noting the difficulty of generalizing in a regional context marked by an enormous diversity of different situations.

The mesoeconomic and microeconomic policies for production development put forward by ECLAC start from the basic assumption that it is necessary to have suitable macroeconomic, institutional and trade policies and to investigate the causes of the productivity gap between the Latin American and the developed countries and to seek policy recommendations for overcoming it. Figure 1 shows ECLAC's current proposals, indicating their policy implications, the obstacles to overcoming the productivity gap, and the theoretical and empirical grounds for pursuing an active production development policy.

Likewise, Ramos (1996) notes that, as the economies of Latin America have been stabilizing, there has been a resurgence of interest in the region in designing longer-term development strategies which will make it easier to progress from a slow growth path to a much faster one, like those achieved by the

FIGURE 1

Bases for a production development policy: the current ECLAC view [a]



THEORETICAL GROUNDS FOR AN ACTIVE POLICY

- Incomplete markets.
  Asymmetric information, externalities and lack of appropriability, problems of scale, etc. This is reflected in the existence of different conditions in the markets for technology, human capital, capital (especially long-term capital) and foreign exchange.
- Problems of industrial regulation and organization. These conditions are reflected in special features of each of the economic agents in the industrialization process (SMEs, economic groups and transnational corporations).
- Increasing returns and strategic complementarities.
  The existence of increasing returns to scale at the level of each firm generates pecuniary external economies at the aggregate level and, ultimately, strategic complementarities which justify action to ensure coordination between private agents and the economic authorities.

EMPIRICAL GROUNDS FOR AN ACTIVE POLICY

- In most of the late-developing countries the State has played an active role in completing or perfecting markets, providing substitutes for them when necessary and generating an environment that stimulates investment and innovation.
- The efforts of the public sector should extend as far as its real capacity permits. Experience suggests that its participation will be effective when i) it seeks to facilitate the operation of the market rather than trying to take its place, and ii) it acts in a selective and transparent manner with an awareness of its own limitations and tries to obviate private rent-seeking activities.
- Experience indicates that there is a wide range of alternatives with regard to intervention: development led by conglomerates (South Korea) or by SMEs (Taiwan); growth led by local firms (South Korea, Taiwan and Japan) or by public or transnational enterprises; development based on natural resources with subsequent linkages (Denmark, Sweden and Finland in the past; Thailand, Malaysia and Indonesia at present) or on direct initial manufacturing development (Japan, South Korea, Taiwan); initial openness based on export promotion with limited import liberalization (most of the recently industrialized Southeast Asian countries) or free trade almost from the start (Hong Kong and Singapore).
- Although much of Latin America's import substitution strategy was devoid of economic rationality, it nevertheless made possible important advances in industrial development, even in technologically sophisticated sectors (the motor industry in Brazil and Mexico).
- Experience suggests that competitive advantages can be acquired through industrial policy if: i) the incentives provided are only transitory; ii) scales of production are sufficiently large (because of a large domestic market, promotion of exports from the very beginning, or the production of natural resource-based intermediate goods which can easily be exported in the event of insufficient domestic demand); iii) the use of either outdated technologies or those which are still in an experimental stage is avoided.

Source: Prepared by the author on the basis of ECLAC (1995).

[a] This figure does not include other aspects (macroeconomic, trade, finance, etc.) which form a systematic part of the global proposal set forth in ECLAC (1995).

successful East Asian late-developing countries. His analysis highlights two central aspects: first, the process of greater openness and restructuring in which the Latin American countries have been engaged since the mid-1980s, and second, the enormous difference in productivity which exists between the enterprises of the region and those of the developed world which use the best international practices.

VIII

Final remarks

Any new industrialization proposal requires a suitable appraisal of the positive aspects of the learning process generated in the past and the problems associated with the errors committed. One of the first great challenges is to generate suitable conditions for taking advantage of the experience accumulated. This has given rise to considerable stocks of technological, economic and skilled human resources, but at the same time it is essential to overcome its shortcomings and limitations in order to advance towards the acquisition of dynamic comparative advantages.

The possibility of attaining increasingly high levels of competitiveness and maintaining them in the long term cannot be limited to the action of a single individual economic agent. International experience shows that successful cases are due to a whole set of variables and that it is the overall functioning of the system which makes it possible to achieve a solid base for developing competitiveness. Thus, the systemic notion of competitiveness takes the place of individual efforts, which, although they are a necessary condition for attaining this objective, must necessarily be accompanied by innumerable other aspects which form the surrounding environment of firms (ranging from the physical infrastructure, the scientific and technological apparatus, the network of suppliers and subcontractors and the systems of distribution and marketing, to cultural values, institutions and the legal framework). Competitiveness which is sustainable in the long term can only be attained through systematic efforts to acquire comparative advantages and to consolidate an "ongoing endogenous process" covering all the above aspects, simultaneously defining the responsibilities of the entrepreneur within his industrial plant and the conditions making up its environment, including both other private agents and the public sector.

This systemic notion of competitiveness is valid for each of the markets concerned. Consequently, it must be applied both to potential export and import markets. Latin American experience has shown that it has been possible to expand various types of production, but sometimes on clearly weak bases. These forms of competitiveness have been described as "spurious" (Fajnzylber, 1990) because they did not progress in the acquisition of comparative advantages but were based instead on one or more of the following factors: low wages, processing of natural resources without preserving the environment, excessively high exchange rates, recessions in the local market, excessive protection of inefficient local production sectors against imports, high export subsidies, etc. These faulty forms of competition gave rise to fragile individual successes but were incompatible with benefits of a social nature. Such successes could not be maintained in the long term and eventually ran into crises due to the performance of the firms in question and/or the high social costs involved.

Industrial progress and the attainment of the strategic objectives pursued will depend on the capacity and creativeness of governments in designing and implementing actions best adapted –in terms of time, intensity and coverage– to the patterns of behaviour of the various economic agents. The design, formulation and implementation of active, explicit and transparent government policies, together with their necessary incorporation in a long-term strategic concept, will call for harmonious and coordinated action by public bodies, as well as suitable linkages with short-term policies. It will also be essential to redefine the necessary "institutional engineering". The weakness and even technical fragility of the State structures means that efforts must be focussed on actions whose transparency facilitates the necessary subsequent evaluation of their results. In this sense, the possibilities of developing and implementing selective policies are limited and conditioned by the fragility of the public sector.

A consistent macroeconomic framework is an indispensable condition for the implementation of industrial policies, which must themselves include some clear basic criteria. In particular, such policies must be explicit, active, and as general and neutral as possible. They must also give priority to actions which will have the greatest effect in terms of propelling the economy as a whole and spreading positive externalities through it. With regard to this latter point, the consolidation of infrastructure and the upgrading of human capital are two of the most important aspects (Ffrench-Davis, 1990; Teubal, 1990).

The proposal of an explicit policy must necessarily be associated with a prior and subsequent social evaluation, the calculation of the corresponding budgetary implications (especially who is to receive resources and who is to finance them), the assurance of total transparency, the clear and precise definition and quantification of objectives, and a clear time sequence with promotional elements which should preferably go down over time. It is therefore necessary that there should be a system of rewards, but also one of penalties if the promised objectives are not attained.

These aspects are of vital importance for achieving the desired objectives. There are countless examples of countries which began to support the process of maturity of infant industries, but without achieving final success. There is no doubt that the problems involved in selecting the right sectors and techniques are by no means insignificant, but appraisal of these cases has shown that one of the most crucial aspects is connected with the fact that learning processes do not take place automatically with time but are instead the result of deliberate and explicit efforts to generate stocks of technology and train human resources. It is therefore necessary to implement a suitable technological and production strategy associated with investments aimed at generating or adopting ongoing technical changes in order to bring about a process of maturity which is neither automatic nor instantaneous but calls for ongoing deliberate efforts.

When there are economic problems as well as fragile institutions, what is needed is not to "return to the market" but to "reconstruct the market": i.e., to take action to change the institutions governing collective life and to endow them with the capabilities needed to allow the majority of the population to participate effectively in them. Likewise, public industrial development policies should be aimed not only at promoting changes in the institutional context in which enterprises operate, but also at carrying out concrete actions designed to further industrial cooperation among firms and thus make possible individual specialization within a context of complementarity and further extension of the market.

Industrial policy regimes can provide coordination mechanisms which are lacking in free market economies. Where the interdependence and special nature of assets are important, industrial policy can be more efficient than the market. Industrial policy must help to coordinate economic change, to promote experimentation and to preserve diversity. In the real world, many changes involve interdependent decisions. When analysing the logic of industrial policy, a distinction must be drawn between the role it plays in two different dimensions: the static and the dynamic. In both cases the function of industrial policy is the same: to avoid lack of coordination.

(Original: Spanish)

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MERCOSUR: its challenges *to small and medium-sized* industrial enterprises *in terms of competition*

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This article seeks to contribute some elements and considerations that may help to understand the challenges faced by small and medium-sized enterprises (SMEs) in terms of competition as the integration process in MERCOSUR is consolidated. Although many of the views expressed here are applicable to the small and medium-sized enterprises of the MERCOSUR countries in general, this study deals in particular with the situation of the Argentine and Uruguayan SMEs. It begins by summarizing some basic data on SMEs in MERCOSUR (section II). It tries to identify the main challenges that these enterprises must cope with (from the entrepreneurial standpoint) if they are to take advantage of the integration process to further the growth of their business activities and the international expansion of their firms (section III). It reviews some basic common features of industrial SMEs, some of which are central elements in determining the transformation of enterprises faced with the challenges in question (section IV), and finally it makes some brief comments on support systems in this new state of affairs. The needs of the SMEs may be grouped in four areas: i) improvement of the regulatory and operational framework for their business activities; ii) access to specific information and advisory assistance for its interpretation (trade information, technical standards and technological consultancy services); iii) the formation of in-house capabilities (human resources, especially in the areas of entrepreneurial and management skills) and easier access to the technical services infrastructure, and iv) access to finance on terms which really are comparable with those of larger firms, which in some cases involves the implementation of new financial instruments and products. The strategic challenge of industrial policy for SMEs is to create and promote a climate of positive change. Public policy cannot define or bring about such change in firms, as it was once believed in a voluntaristic and omnipotent manner. Instead, public policy must stimulate and create the best possible conditions for ensuring that this change takes place efficiently, favouring the establishment of lasting collective synergies. Otherwise, public policy would be guilty of taking a passive stance (not doing anything) or actually holding back progress (by encouraging actions in the opposite direction).

I

Introduction

This study seeks to promote a better awareness of the competitive challenges faced by small and medium-sized enterprises (SMEs) as the MERCOSUR integration process advances. Although many of the ideas set forth here apply to the SMEs of the MERCOSUR countries in general, we will be referring in particular to the situation of Argentine and Uruguayan small and medium-sized enterprises.[1]

The economic and productive activities of the industrial SMEs since the early 1990s have taken place in the midst of a process of great macroeconomic and regulatory changes. These changes at the national level have also been accompanied by changes in the international economic, trade and technological context. The MERCOSUR integration process is one of the new factors conditioning the regional economic scene, and although it is not the factor which has most seriously affected firms during the early 1990s, it is having structural repercussions on the conduct of firms in terms of production, on the definition of their future business strategies, and on their investment decisions. Thus, MERCOSUR has gradually ceased to be seen only as a factor of greater competitive pressures and has begun to be considered as a broad range of new trade opportunities and production options (business complementation agreements, subcontracting possibilities, business mergers, extension through licenses).

The central hypothesis of this article is as follows: for a great many of the SMEs –especially for those in Argentina and Uruguay which produce tradeable manufactures for which demand is differentiated, segmented and subject to the influence of international technological and consumption patterns, or for producers of intermediate goods, parts or components for use by assembly or terminal industries– the present stage could be described as one of "redesigning business", that is to say, re-founding or rethinking production activity and business strategies. This is because the conditions in which these enterprises were set up and managed by their owners in the past have undergone substantial changes and because the firms need to re-insert themselves into a new productive, technological, trade and business situation which is not only much more internationalized but is also beginning to organize itself on the basis of an expanded market with special treatment.

Although the SMEs had already been adapting themselves to the economic and market conditions facing them, the changes in the macroeconomic, regulatory and technological context –including of course the MERCOSUR integration process– have now placed them in a completely different situation which affects the very roots of the firms, their objectives, their way of operating and taking decisions, their competitive advantages, and the capabilities and resources required, among other things. The present challenges to manufacturing SMEs are not those typical of a mere transitory adjustment (such as is required by a trade recession) but are challenges calling for change and innovation which define a new starting point with all the future consequences deriving from it. The fact that there is practically no question of a return to the previous situation without incurring very high costs, because of the decisions and investments already made, is reflected in the great concern over the appearance of trade disputes, disagreements over customs procedures and macroeconomic uncertainty among entrepreneurs who have made successful progress in MERCOSUR and have gradually adopted it as the environment for their business activities and competition. This change will mean altering traditional forms of behaviour and operation which are deeply rooted in firms and setting

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[1] As will be noted from section II, Brazilian enterprises account for almost 80% of all industrial SMEs in MERCOSUR: Brazil is also by far the biggest national market in MERCOSUR (several times the size of the rest of the member countries) thus creating a very uneven situation as regards such enterprises as a whole: for many of them -i.e., the Brazilian enterprises- the MERCOSUR market is largely the same as their own previous domestic market. For the rest of the member countries, in contrast, the potential market created by the integration process may represent over ten times their previous domestic market.

afoot a deliberate process of construction of new competitive capabilities which must be based on the know-how and learning (intangible assets) available in the firm and access to technical support systems and must be accredited in the new conditions and dynamics of demand and markets.

II

Industrial SMEs in MERCOSUR. Some basic details

In view of the different definitions of SMEs used in each country (table 1) and the absence of updated and compatible statistical information, it is very difficult to make an estimate of the number of industrial firms of this type in MERCOSUR, of the size and evolution of employment in them, and of their share in manufacturing output and industrial exports (Gatto and Ferraro, 1993). In this article, we will consider manufacturing SMEs to be manufacturing enterprises employing between 5 and 150 workers, thus excluding micro-enterprises and informal and clandestine urban activities. In view of the big differences between the production structures of the different countries, an industrial enterprise with 50 workers, for example, could be considered to be large in a country with a small economy and might even account for a significant share of the respective sector of the domestic market, whereas in another country it might be just another economic agent and not occupy a leading position.

According to available partial information, a reasonable estimate for the mid 1990s would indicate that the total universe of industrial SMEs in MERCOSUR (defined as independent enterprises with between 5 and 150 employees) comprised between 120 000 and 130 000 manufacturing enterprises generating some 2 700 000 direct jobs; it may be assumed that around 80% of these enterprises were located in Brazil and around 15-17% in Argentina.[2]

Out of this universe, rather more than half are in sectors that manufacture tradeable goods at the regional (MERCOSUR) and international level. The rest are engaged in satisfying the local demand for non-durable consumer goods. In other words, some 60% of the SMEs located in MERCOSUR are exposed to the consequences of the integration process, both through the opening of new trade and production opportunities and through the increased threat and competitive pressures from companies in other countries.[3] The degree to which they are positively or negatively affected varies greatly between different sectors and countries; obviously, the situation of an SME located in a country whose market grows by a factor of 10 or 15 thanks to MERCOSUR is not the same as that of a company located in Brazil, where the impact of MERCOSUR may be much smaller.

The industrial structure of small and medium-sized enterprises is concentrated on labour-intensive manufacturing activities, especially natural resources based industries (wood and furniture), agroindustries, agro-food industries and mature manufacturing activities (clothing and footwear, plastics, and metal products and machinery). SMEs in the food sector account for a larger share of the total in Uruguay than in the

[2] According to the 1994 National Economic Census, in that year there were 25 000 enterprises with between 6 and 150 workers in Argentina, out of a total of 90 088 industrial production units (INDEC, 1997). In 1985, which is the year of the last available census for Brazil, industrial establishments of this size numbered around 90 000 out of a total of almost 180 000 production units registered. This figure had very likely risen to around 100 000 by the mid-1990s.

[3] According to the available statistical estimates, at the sub-sectoral level the Brazilian SMEs account for over 70% of total MERCOSUR production in all the manufacturing subsectors except food and beverages, hides and skins and textiles, where Argentina and Uruguay together account for over 30% of total production. In other words, the big difference between the size of Brazil and the other member countries means that at the level of the main industrial sectors there is no differentiated production specialization. At higher levels of sectoral and regional disaggregation, however, patterns of specialization of SMEs begin to emerge.

TABLE 1

Latin America: Definitions of microenterprises and small and medium-sized enterprises

A. ARGENTINA

Sectors (maximum amount for sector)	Number of persons employed	Annual sales [a] (millons of dollars)	Productive assets (millons of dollars)	Remarks
Industry, mining and fisheries	300	18.00	10.00	Formula maintained unchanged from the original
Commerce and services	100	12.00	2.50	
Transport	300	15.00	-	
Agriculture [b]	-	1.00	3.00	

B. BRAZIL

Sectors (maximum amount for sector)	Number of persons employed	Net operating income [c] (millions of dollars)	Remarks
Industry			Criteria are alternative and are not applied jointly
Microenterprises	Up to 19	0.13	
Small-scale enterprises	29 to 99	1.30	
Medium-sized enterprises	100 to 499	4.00	
Commerce and services			
Microenterprises	Up to 9	0.13	
Small-scale enterprises	10 to 49	1.30	
Medium-sized enterprises	50 to 99	4.00	

C. URUGUAY

All economic sectors except financial inter-mediation (maximum amount for sector)	Number of persons employed	Maximum sales (millions of dollars)	Maximun assets (millions of dollars)	Remarks
Microenterprises	1 to 4	0.06	0.02	The three limits must all be fulfilled
Small-scale enterprises	5 to 19	0.18	0.05	
Medium-sized enterprises	20 to 99	1.00	0.35	

D. MERCOSUR

All economic sectors (maximum amount for sector)	Number of persons employed	Sales (millions of dollars)	Coefficient of size [d]	Remarks
Microenterprises	Up to 20	Up to 0.40	Up to 0.52	Number of points assigned depends on a formula (see note below)
Small-scale enterprises	Up to 100	Up to 2.00	Up to 2.58	
Medium-sized enterprises	Up to 300	Up to 10.00	Up to 10.00	

Source: Gatto and Ferraro (1993).

[a] Net of VAT and other domestic taxes.

[b] For the agricultural sector, annual gross income is used instead of annual sales and productive capital instead of productive assets.

[c] Aggregate amount used by the National Development Bank (BNDES) and the Banco do Brasil for financial assistance purposes.

[d] Coefficient of size $= 10 \sqrt{\frac{PO}{POm} \frac{V}{Vm}}$

where PO = number of persons employed; PO_m = reference number of persons employed; V = annual sales of the enterprise; Vm = reference annual sales. The maximum values used are as follows: PO_m = 300 persons; Vm = US$ 10 billion.

rest of the countries.[4] In contrast, those engaged in manufacturing activities with a high technological content (defined as a function of the type of good produced rather than of the processes used) have a low share in the composition of production, since they account for less than 5-7% of the total value of production of the SMEs. This percentage may even be lower, since in the allocation by census category it is not possible to distinguish exactly the type of process carried out in such enterprises (such as the final assembly of telecommunications equipment).

A significant part of the activities of SMEs are connected with the manufacture of intermediate products, parts, components, processes or sub-assemblies incorporated in other manufactured goods. The lack of updated statistical information prevents us from precisely quantifying the share of subcontractors or parts manufacturers, but there are indirect indications that their activities have grown considerably in recent years. Furthermore, they have been particularly affected by the process of external openness, since there has been an increase in imported intermediate inputs[5] and in final products incorporating such intermediate goods.

This universe of small and medium-sized enterprises (with between 5 and 150 employees) is closely integrated into the industrial structure of each country, so that its level of efficiency, quality and productivity is a decisive factor in the competitiveness of complex industrial sectors.[6] Unlike what happens in the case of other economic agents (very small rural and urban producers), the production of industrial SMEs is not directed towards marginal activities or exclusively towards low-income market segments. Although some of these spaces have served as transitory refuges when SMEs have been displaced from their original markets, most enterprises operate in areas of production which are internationally linked by trade and technological innovation.

However, this situation has not yet had much effect on the particular and specific features of the MERCOSUR SMEs, which probably evolve more slowly and steadily. In other words, the process of macroeconomic change, external openness and integration has not necessarily or automatically led to a situation of growing entrepreneurial homogeneity, although the enterprises have pursued similar general objectives (such as improving quality or coming closer to the technical frontier reached by more advanced competitors).

As repeatedly noted in the international literature, SMEs are economic agents which are "genetically" different from larger companies, and they display differences which do not stem only from absolute size but also from features of their own nature and aspects of their functioning and economic management (Storey, 1987; Kantis, 1996; Walsh and White, 1981). At the same time, however, SMEs are integrated into the manufacturing production structure and are regulated by the global business environment, have direct (supply) and indirect (technological dissemination) relations with bigger firms, and compete in the market with domestic and foreign industrial or commercial firms of their own or larger size. In this sense, in order to properly interpret the impact of trade openness and MERCOSUR on the production sector made up of small and medium-sized enterprises it is necessary to analyse this impact in the global industrial context, including the dynamics of industrial chains or segments (such as the motor industry), the profile of new industrial investments, and the policies adopted with respect to their suppliers by

[4] The most important activities in the structure and composition of the industrial production of small and medium-sized enterprises are not manufacturing activities which are exclusive to the SMEs or where the latter have a majority share. The branches in which SMEs are particularly prominent (furniture, wood industries, plastics, and leather and furs) are not the most important in the industrial structure of small and medium-sized enterprises in MERCOSUR, and still less so in the manufacturing structure of MERCOSUR. In the industrial activities of SMEs in MERCOSUR, the four main manufacturing branches (foodstuffs, mechanical engineering and transport equipment, ready-made clothing and footwear, and metal products) account for less than 12% of total production and some 15% of employment, which indicates that these activities in which the SMEs are most active also have lower relative productivity within the universe of small and medium-sized enterprises.

[5] A complex consequence of the new foreign investment process within MERCOSUR is that many of the investments involve radical technological changes in the organization of production. The new plants not only have more modern equipment but have also been planned in line with new criteria on factory and production organization. This has a strong impact –not yet studied– on supplier SMEs, since they must relocate themselves within a scheme based on new operating criteria which inherently involve strong competitive pressures.

[6] Without arriving at the extremes of Japanese industry or of some Italian or German manufacturing subsectors, an important group of small and medium-sized suppliers can nevertheless make a significant contribution to the competitiveness and external linkages of other enterprises and sectors.

TABLE 2

Argentina and Brazil: Mutual trade within MERCOSUR

	BRAZIL			ARGENTINA		
Year	Total imports	Imports from Argentina (%)	Imports from Argentina as % of total Argentine exports	Total imports [a]	Imports from Brazil (%)	Imports from Brazil as % of total Brazilian exports
1986	15 557.0	4.5	10.2	4 724.2	14.6	3.1
1987	16 581.0	3.3	8.6	5 817.8	14.1	3.1
1988	16 051.0	3.6	6.3	5 321.1	18.3	2.9
1989	20 016.0	5.6	11.8	4 199.9	17.2	2.1
1990	22 459.0	6.3	11.6	4 077.4	17.6	2.3
1991	21 035.0	7.1	12.4	8 275.0	18.4	4.8
1992	20 593.0	8.4	14.1	14 872.0	22.4	9.2
1993	25 256.0	14.6	28.0	16 784.0	21.1	9.2
1994	32 748.0	11.2	23.1	21 518.2	20.1	9.9
1995	49 860.0	11.0	26.2	20 123.0	20.7	9.0
1996	53 286.0	12.4	27.8	23 810.3	22.4	11.2
1997	61 983.0	12.5	30.4	30 419.7	22.7	13.0

Source: ECLAC Office in Buenos Aires, on the basis of data from the National Institute of Statistics and Censuses (INDEC); ECLAC Office in Brasilia, and other sources.
[a] Millions of dollars of imports CIF.

leading firms in sectors making extensive use of components for assembly.

Finally, the ongoing consolidation of the MERCOSUR integration process is reflected very clearly in the external trade figures. The Argentine and Brazilian firms have managed to increase their shares in the imports of each country, which have grown at very rapid rates over the last ten years: 4% in the case of the imports of Brazil and 15% in those of Argentina (table 2) in the last ten years. Thus, firms have managed to take advantage of the trade opportunities which have been opened up to them more rapidly (more so in the case of Argentina than in that of Brazil) than in other countries, thereby increasing their shares.

This overall picture, which is general for the large firms, is different in the SMEs sector. Although many of them have entered bilateral trade flows, more than doubling the number of small exporters, it has also been observed that there are many which have remained only in the domestic market, in a mainly defensive attitude.

III

The main challenges as seen from the entrepreneurs' standpoint

The impact of MERCOSUR on the SMEs is very varied and unequal, in keeping with the heterogeneity typical of this sector. This feature is not exclusive to SMEs in MERCOSUR but is also observed in industry and business in other countries (OECD, 1997). For this reason, the challenges described here largely reflect the concern of small and medium-sized entrepreneurs directly and appreciably affected by the integration process. For other SMEs (in sectors which do not produce many tradeable goods or are located in regions not affected by MERCOSUR) the entrepreneurial requirements are of a different nature.

In recent years, various studies (IDB, 1995; Ferraro, 1994) have been carried out on the competitive dynamics of SMEs, based on interviews with entrepreneurs and the preparation of specific infor-

mation on the factors determining competitive advantages. These studies made it possible to identify the main medium-term business challenges and group them in four main blocks: i) restructuring the firm's "business" to fit in with the economic and production situation resulting from the MERCOSUR process; ii) repositioning the firm in terms of competitiveness with respect to the expanded market and beginning a process of internationalization; iii) updating technology to face the external competitive pressures of MERCOSUR, and iv) taking advantage of the new opportunities arising in MERCOSUR, especially those deriving from new investments.

1. Restructuring the firm's "business" to fit in with the new economic and production situation

From the point of view of the SMEs in Argentina, Uruguay and Paraguay (note that we are excluding those of Brazil, the largest country), the change in the size of the market and the increasingly close links between the sub-markets in each branch of manufacturing substantially alter not only the morphology of the markets and the optimum scales of production and operation but also the types of products offered, the levels of specialization of production, the supply of associated services, and other aspects. For most of the industrial SMEs, taking advantage of the growth in the market does not mean expanding proportionately but rather defining an expansion strategy on the basis of their effective capabilities, using parameters different from those employed to position themselves in their smaller national or sub-national markets. For many reasons, ranging from the availability of human resources in management to access to sources of finance, the SMEs follow a particular, non-linear growth path in which they must combine and balance the available areas of competence and capabilities –especially those of the owner and his closest management team– with the production and trade opportunities offered by the market. Many SMEs in the countries in question have opted for a specialized expansion strategy based on smaller product lines than those produced for the domestic market and a capacity to meet specific orders from clients (other firms or importers).

In this strategy, a particularly important aspect is the possibility of transferring to the new expanded market the competitive advantages on which the SMEs' production activities for the domestic market were based. The difficulties and limitations in extending those advantages to other contexts and markets (knowledge and information on their product or brand, reputation, flexibility in meeting orders, proximity to clients, direct relations with the market, etc.) mean that the firms must review not only aspects of factory organization but also other key elements in business activity, such as marketing, supply logistics and the ability to satisfy demand.

In a sense, this is one of the crucial items for the future expansion of such firms or even their survival as efficient enterprises. If we could make a table of the strengths and weaknesses of the industrial SMEs in their old domestic markets in comparison with the present MERCOSUR integration process, we would very probably note a certain contrast between their technical and productive strengths and their weaknesses in terms of management. SMEs mostly arose originally as a result of the technical competence of their owners, the tacit know-how and production skills of owners and workers, and skills connected with the manufacture of particular types of goods and the solution (within certain limits) of the technical problems posed by requirements of clients and the market. The firms were "governed" from the shop floor. Especially in recent decades, firms (i.e., their owners) began to learn to operate in situations of economic uncertainty, inflation and very short-term horizons. The response of the SMEs was aimed at strengthening their financial management and concentrating their management efforts on preventing the reigning instability and uncertainty from seriously affecting the economic life of the firm and its owners. In extreme cases, many firms (including small and medium-sized ones) managed to take advantage of the different economic situations and grew by exploiting the uncertain and volatile business climate.

The present situation, however, unlike the two kinds of situations referred to earlier, calls for other kinds of knowledge and competence, a new learning process, and the development of the capabilities needed for the new operating conditions.

External openness, together with the growing intra-MERCOSUR trade in everyday consumer goods (ready-made clothing, footwear, some types of plastic products), also changed the demand profile as a significant expansion took place in the options open

to consumers as regards types of products (design, quality) and prices. The SMEs (especially those of Argentina and also to some extent those of Uruguay) faced a virtual shock situation in a number of these markets: because of the limited capacity and speed of response of local supply to the challenge of imports and the considerable magnitude of the latter, the possible ways of adapting to market changes went far beyond merely "matching" the final prices of the goods offered for sale: they involved investments, lead times and a technical learning process which was not always easy. In many cases, in order to make an active response it was necessary to introduce new products, with inputs, technical qualities and designs different from those normally used by local entrepreneurs; in other cases it was necessary to establish new distribution and marketing channels, different from those already used by the manufacturing SMEs. In some cases it was necessary to change the market segment in which the firm operated, as trade openness and MERCOSUR increased the possibilities of differentiation. In order to compete in the "new" market, these firms had to embark on an extensive innovation process: otherwise they were relegated to marginal markets or had to go out of business altogether. Martin (1993) noted that firms were failing to take full advantage of the new opportunities because they were still trying to get the most out of the old ones.

In a way, it was the greater external openness rather than MERCOSUR itself which modernized the markets for many goods: it not only brought in new competitors but also reformulated the operating conditions by acting directly on the demand profile. For the industrial SMEs, then, the competitive challenge was not limited to manufacturing their goods at prices comparable with those of imports but also involved the restructuring of their businesses by making innovations in other areas of management (such as more precisely defining their target market and forms of marketing). Some case studies reveal that many SMEs which sold almost 100% of their output to final consumers through their own outlets have begun to use wholesale intermediaries in order to multiply their points of sale. For many enterprises this strategy has meant, among other things, modifying their cost, price and markup structure; redefining production times and volumes in order to simultaneously deal with types of demand having different sales cycles, and changing their current financing scheme and debt collection system. In the light of the new market situation, many SMEs have had to choose between various options and capabilities in answering three key questions on their production strategy: i) who really are their clients, market segment and competitors?; ii) what products and services should they offer?, and iii) how should they reorganize their activities in order to meet demand efficiently?.

There are two more elements which should be mentioned in this respect. First, it is obvious that the SMEs in the MERCOSUR countries are not necessarily competing with those of the other member countries. On the contrary, in many industrial branches and niches the main competitors of local small and medium-sized enterprises are much bigger firms operating in the European and North American markets. Many of them have been operating in the international market for many years and have gained a stock of experience and competitive advantages that SMEs –especially those of Argentina and Uruguay– do not possess. Consequently, redesigning their business has become a crucial item on the agendas of many firms in the sector.

Second, the small and medium-sized enterprises of MERCOSUR are not competing only with firms (including SMEs) from other countries. In reality, the local firms –which, as we shall see below, had been operating in great isolation and with very few linkages– are competing with "production systems" in which the firm that actually produces or markets a good bases its competitiveness on a system of production relations and institutional frameworks which significantly aid its position in the market and in the construction of systemic competitive advantages.

2. Repositioning firms in the expanded market and beginning a process of internationalization

In recent years, many SMEs have attempted to broaden their market horizons through the tariff advantages provided by MERCOSUR. Although there has been a big increase in the number of firms exporting on a small scale to neighbouring countries, particularly in the case of Argentina, the external linkages of small and medium-sized manufacturing firms are still at a very embryonic stage, especially because they cannot "copy" or emulate the external development model followed by the bigger firms in their countries, still less when the type of product

and the provision of after-sales service may be decisive factors in their competitive advantages.

Gaining a suitable position in MERCOSUR is not only a key factor for a firm's growth but also a strategy that must be actively pursued in order to remain in its own domestic market. Except in Brazil, relying on the domestic market as the only consumer space may hamper the firm's development, especially when there are advantages of specialization and scale. In future years, the "MERCOSUR market" will be the main driving force and stimulus on the business scene.

The MERCOSUR SMEs have little experience in external trade operations and, with a few exceptions, have had great difficulty in incorporating this market in their strategies. Obviously, there is no "one and only" business strategy for beginning a process of internationalization; even within the borders of MERCOSUR such a strategy will depend on many different factors: type of product, market segment that the firm is aiming at, operational capacity and capacity for remote management, management style, and willingness to develop arrangements for association, among other things.

The incorporation of MERCOSUR as the prime market for a firm raises a number of issues which were not always on the previous business agenda: new clients with new and different needs; access to reliable and accurate information on clients and markets, regarding which the firm may previously have had very little knowledge; the need for a medium-term commitment to invest time, human and financial resources in entering the market; access to new financing schemes; application of a new logistical approach for supplying outside markets, etc. This more complex situation does not necessarily require sophisticated formal planning, but it does call for the effective coordination of a number of different capabilities and types of know-how, several of which directly depend on the SMEs' access to the necessary information. Others depend on the support of local institutions and the links established by the latter.

A key element in this respect is the willingness and openness of entrepreneurs to seek forms of external linkages which involve the active participation of "third" partners, in some cases intermediaries, and of representatives and consultants, and the existence of effective links with support bodies and information centres. The studies made on commercial agents and the exports of Argentine SMEs to Brazil reveal a certain paradox: on the one hand, the owners of SMEs emphasize that independent control of the running of the firm is a central element in their entrepreneurial "culture" and manner of running their businesses, but on the other hand it is essential to establish direct and active links with market agents in order to secure efficient external linkages. This obliges firms to seek forms of business cooperation which represent substantial innovations in business management and, to some extent, affect this attitude of individualism.

3. Updating of technology in order to face external competition in MERCOSUR

When we look at the figures for MERCOSUR imports of industrial goods in recent years, the first point that strikes us is that with their industrial production in general and that of the SMEs in particular, the MERCOSUR countries –rather than competing with each other –are competing with the industrial goods of countries with a higher level of relative industrial development: a situation which involves, among other things, a technological confrontation. For example, if we analyse the main external trade items of Argentina and Brazil in the categories of mechanical goods, capital goods for industry, informatics, communications, tools and industrial equipment we see that in 1995 MERCOSUR imported goods worth some US$ 15 billion, of which only 11.2% (US$ 1.6 billion) came from within MERCOSUR. Some 25% of the imports came from firms in the United States, over 10% from Germany and a similar proportion from Italy, rather less than 9% from Japan, some 5% from South Korea, and similar amounts from Spain and France. Likewise, 90% of the imports of some fine chemicals and petrochemical products were supplied by competitors from outside MERCOSUR: mainly the United States, followed by Germany, Switzerland, Great Britain, Belgium and Japan.

In the economic and business administration literature there has been an extensive discussion on the factors determining competitive advantages. From a non-conjunctural standpoint, some authors hold that the competitive advantage of a firm is the reflection of its owners' or managers' skill in coordinating and organizing a number of key basic capabilities, some of them internal and others deriving from the production environment (Prahalad and Hamel, 1990; Dierickx and Cool, 1989). In the manufacture of their products, firms use both tradeable capabili-

ties (the labour factor and the available infrastructure) and non-tradeable assets (their production experience). Although the availability, quality and low relative prices of the former are a necessary condition for good performance by the enterprise, they are not of themselves sufficient to ensure advantages that will be sustainable in the medium term, since they are freely accessible and potentially capable of being developed (i.e., imitable and offsetable) in any market. Dynamic competitive advantages are also based on capabilities or assets which are specific to the enterprise or the local/sectoral system and which in many cases cannot be purchased or acquired in the market (product innovation, reputation for reliability, image of high quality, etc.). In a changing economic setting which is increasingly competitive and internationally open, these assets largely determine an enterprise's competitiveness, position and performance in the market.

For many SMEs, the intention of coming closer to international standards means evaluating in what aspects of production they have the necessary minimum capabilities and qualifications, how they can concentrate their competitive advantages on their specific assets, and how they can secure the ongoing development of such capabilities.[7] Surveys made among Argentine and Uruguayan SMEs indicate that in general they lack information on the latest international technological advances and also automatically equate "technological level" with the level of equipment. Very few entrepreneurs have international yardsticks to compare their firms with, and most firms depend very much on private suppliers of equipment.

When analysing the process of technological change in SMEs from outside the enterprises, there is a tendency to think in terms of a sequential model with three successive stages: i) the firm is in a more or less stable situation, but for some reason (such as shifts by competitors or clients) it decides to carry out technical or organizational changes; ii) the firm proceeds to implement the planned changes, and iii) it then returns to a stable situation. In the literature on business administration this sequence is called freeze, change and re-freeze. The process of change is treated as a discrete event or object (for example, it takes the form of the acquisition of equipment and lasts for a specific period of time).

In reality, however, the present technological modernization process is much more complex and quite different from the interpretation of the traditional model, not only because the business environment is more turbulent, volatile and rapidly changing, but also because the process of organizational and technological change has no predetermined final point and is open to the particular forms of evolution and implementation of each enterprise. In other words, several of the new needs of enterprises (such as operational flexibility) are associated with the introduction of operational techniques, tools and procedures and economic management decisions which derive from open-architecture technologies that can be adjusted and redesigned according to needs and applications.[8] Organizational and technological change thus represents an ongoing process of implementation and use.

This is a key point for the organization and implementation of the technological modernization that firms must carry out and for the design of support services. Unlike the past, when the purpose and results of technological change were well-defined and delineated, and a single special measure could therefore be taken to deal with each problem ("one problem, one shot"), the present situation means formulating and developing a scheme of work adapted to the new ongoing and recurrent nature of technical change, seen as a "stable" situation in which the need may nevertheless arise for many unforeseen changes.

[7] One of the most serious problems faced by SMEs is the deterioration which has taken place in their capabilities and competitive advantages in recent years and the disinvestment they have suffered. Although intangible strategic assets are not depleted with use, as tangible assets are, they nevertheless need to be constantly replenished. In the terms used in business administration, these assets are eroded, lose their complementarity and become outdated. In past decades many SMEs have only covered their amortization commitments, since their strategies were guided by short-term decisions.

[8] "Successful moves toward "the factory of the future" are not a matter of small adjustments made independently ... but rather have involved substantial and closely coordinated changes in a whole range of the firm's activities. Even hough these changes are implemented over time, perhaps beginning with "islands of automation", the full benefits are achieved only by an ultimately radical restructuring" (Milgrom and Roberts, 1990, p. 513).

4. Taking advantage of the new opportunities arising in MERCOSUR

These opportunities derive from new investments and from the reconfiguration of "regional industrial value chains". SMEs are not "islands of production" divorced from the productive and technological dynamics of the respective production subsectors. Indeed, many SMEs do not produce final goods but instead manufacture inputs, parts or components or carry out processes for other enterprises. As is clearly shown in the economic literature, the functional production linkages (with subcontractors or component manufacturers) of the SMEs have grown in recent times, especially as a result of the processes of tertiarization and de-verticalization of the bigger industrial firms, both those engaged in terminal production and those carrying out assembly activities. All the time, more complex and advanced forms of interaction are being introduced, ranging from long-term contracts including product research and development commitments to the participation of subcontractors within the terminal plant itself, at work stations carrying out part of the final production of the good in question. There are also clear indications that the potential for the establishment of external linkages by SME subcontractors depends precisely on their production links with big national and transnational corporations.

MERCOSUR is a regional economic space which channels production investments of considerable magnitude, designed or decided in the light of internationalization and globalization. Increasing the links of local SMEs with this new wave of investments is a challenge both for entrepreneurs and for the public authorities, since it undoubtedly represents a starting point for the development of small and medium-sized enterprises in MERCOSUR. The emergence of new dynamic sectors as areas of private and international investment (telecommunications and information technology, the motor industry, equipment for privatized services, infrastructure, energy) should make it possible to set in motion a process of reconversion and growth of new enterprises forming part, from the very beginning, of an integrated economic space and an international technological environment.

IV

Some features of MERCOSUR SMEs which make it more difficult to modify their historical tendencies

The challenges referred to in the foregoing pages represent sources of concern for the small and medium-sized enterprises currently operating in the market, which have their own background, history, business culture and economic and non-economic objectives and which have been developing specific features and ways of operation over many years. For many authors, these special features of the SMEs of Latin America and the Southern Cone region sum up to some extent the history of the economic policy and industrial evolution of those countries and of the business sectors involved.

The successive economic conditions and situations of competition which prevailed in the various domestic markets gave rise to certain forms of behaviour and business culture among the firms; certain habits and forms of organization of labour became reflected in management methods and were central factors in defining the business strategies followed. Although the firms have been adapting their models and techniques, business culture is deeply impregnated with the specific local and national conditions. In the new economic and regulatory environment, some of these features represent elements of conflict: in some cases because they are reflected in passive entrepreneurial attitudes, and in others because they make it difficult to incorporate new technologies and forms of operation or because this would mean breaking with traditions which are deeply rooted among entrepreneurs and departing from the management structures which they themselves had been developing over time.

As is well known, a large part of the SMEs are run on a family basis, and the figure of the owner carries great weight in them. These features have repercussions on various aspects of the economic and production activities of the firm and give such firms a special character, very different from that of other productive organizations. Indeed, as Brytting (1990) noted, SMEs are only partially a rational phenomenon, since they reflect the ways of thinking, beliefs, values, feelings and very life of the persons involved in them. The weight of the figure of the owner-entrepreneur-manager is expressed and reflected in many different ways. It even imparts a relative character to the concept of the "success" of the firm (as regards maximizing profits, for example), since this may be connected with the personal aspirations of the owner, which do not necessarily reflect a "typical" rational and optimal form of behaviour, may vary over time, and change with the development of the firm itself.

In the case of the SMEs of Argentina and Uruguay, on the operational level of management these characteristics are reflected in the following features:

a) *High degree of centralization of decision-making in the firm*

This gives rise to a pyramidal operating structure with few levels but severe limitations on delegation of functions and empowerment of staff ("L'entreprise, c'est moi!"). On the other hand, there are very close and personal ("face to face") relations among the various members of such firms, which generally have great motivational value. In many SMEs, however, the roles of the various staff members are indeterminate, and rather than giving rise to a system of management which is efficient, smooth-running and versatile, with strong intercommunication, this finally results in a confused system of makeshift interdependence and overlapping of duties.

b) *Closed structure of ownership*

Because of this characteristic, it is often very difficult to distinguish between the formal property of the firm and the personal property of the owner-manager and his family. This feature is not only clearly reflected in the overlapping of family property, the assets of the firm as such, and management tasks, but also often represents a serious barrier to the development of forms of business association or an increase in the firm's capital through the participation of outside (non-family) partners or institutional investors (such as larger firms). The family nature of the firm is often a serious impediment to the incorporation of capital from financial sources (venture capital institutions), as the owner-managers perceive this as the possible loss of their unilateral control of the business.

c) *Other common elements mentioned in recent studies*

Some recent studies on administrative-strategic management in SMEs (Kantis, 1996; Yoguel, 1995; Boscherini and Yoguel, 1996) highlight the following common elements:

i) SMEs generally lack formal operating procedures and in many cases they do not have written regulations on production operations, quality and other aspects. In many firms there is only a limited level of development of some business functions (such as marketing), and little use is made of management techniques and strategic information.

ii) Although a large part of their business management efforts are concentrated on short-term operational matters –which, apart from being crucial for the profitability of the firm, are the area of decision-making in which the typical owner-manager is most at ease– the "planning" horizons reflect the different styles and cognoscitive abilities of the owner-managers (construction of medium-term expectations).

iii) They operate on the basis of highly concrete projects whose sequence determines the evolution and trajectory of the firm in the medium term. This process (seen ex post) displays frequent advances and retreats and is strongly influenced by short-term factors and random personal considerations, as well as by the instability of the macroeconomic environment.

iv) Much of their strategic management is based on the intuition and personal experience of the entrepreneur and his perceptions on the market dynamics and the options open to the firm in view of its capabilities and basic competitive assets. Disparities between actual market conditions and the perceptions of the entrepreneur may go a long way towards explaining why firms of this type may adopt very different strategies although faced with similar situations.

v) They do not normally use external services or consultants, since they rely very much on their own resources (human and financial). This behaviour re-

flects a culture and attitude which prefers (or has preferred in the past) to solve problems unaided, often spurning the benefits that a more open and collaborative attitude could bring. The entrepreneur running the firm generally takes the view that it has well-defined limits and that some of the arrangements in networks or consortia are confusing.

vi) Their main source of information consists of other individual entrepreneurs, and little use is made of the facilities provided by Chambers of Industry and the public support systems. Indeed, entrepreneurs are often simply unaware of certain support systems or have little confidence in them because they consider them far removed from the everyday problems of the SMEs (which indeed is often true).

vii) Albeit in an informal and somewhat anarchic manner, the SMEs (or rather their owner-managers) are engaged in a constant learning process of which there are few formal records. The process is based on the need to tackle and solve particular unexpected problems, and it gradually builds up the stock of intangible assets of the firm, thus largely determining its capabilities and competitive advantages in the market.[9]

The widely differing perceptions of the entrepreneurs about the directions, rates and magnitude of the changes faced by each SME in its particular market segment as a result of the establishment and initiation of MERCOSUR fostered and conditioned a variety of different decisions by these firms (for example, revision of their production profile and market orientation, rationalization of employment, incorporation of new products and product specialization, acquisition of technology and investments, development of projects on minimum quality standards, increase in imports of inputs, development of trade relations with Argentina or Brazil, sale or closure of manufacturing plants, etc.). The entrepreneurial responses of the SMEs were neither spontaneous nor all in the same direction. Although there are some common elements which predominate in many of their strategic responses (such as efforts to improve manufacturing and management productivity), the entrepreneurial trends of the last few years support the idea that, both in the formulation and the application of their microeconomic actions, the really decisive and important feature of the SMEs is their "singularity".[10]

d) *High degree of intra-firm vertical integration, few forms of collective action (networks and consortia), low levels of subcontracting, and excessive in-house production*

There are various explanations for this excessively introverted production behaviour, ranging from the high transaction costs prevailing in highly unstable macroeconomic environments to factors originating in the firm's own conduct, such as considering that it is more profitable to produce many of the production components and carry out a large part of the production processes within the firm itself. This type of conduct led to many sub-optimal operating results and to inefficiencies in the organization of production and the handling of investments and innovations, which were further aggravated, in turn, by defensive strategies aimed at reducing costs by diversification and expansion of the range of products supplied.

e) *Wide variety of products and low volumes of production*

This feature is due, especially in the case of Argentina, to individual survival strategies at the enterprise level. The idea of broadening the range of

[9] During the first decades of development of SMEs in the various Latin American countries (from the end of World War II to around 1970) these enterprises made technical adaptation efforts in order to reconcile local scales of production with the operational rigidity of the installed equipment and bring the different practices and standards of quality and operating efficiency in line with the demands of domestic intermediate firms or final consumers. They carried out a sustained learning process, starting from a low level, in all aspects: business management, organization of production, labour relations, etc. Taking advantage of their three main sources of knowledge (clients, importers of equipment, and the experience of the owners and their technicians themselves), the SMEs carried out an internal learning process which involved learning by doing, learning by copying and learning by using. The highly individual and in-house nature of these processes gave rise to very heterogeneous experiences which were later reflected in the very unequal histories of the firms in question (Quintar and Castaño, 1992).

[10] This marked individuality of the SMEs' responses is not only connected with personal features of their owner-managers and/or very special operational factors but was also heightened by the introverted, closed and uncooperative entrepreneurial style which kept the firms in a state of marked technical "isolation" in past decades, thus preventing them from taking advantage of the possibilities of synergies and production linkages and the benefits of external economies.

goods produced and often internalizing the production of parts and components is due above all to a desire to reduce costs through fuller utilization of the available physical capital (plant, equipment, human resources). These "supply-side" strategies very rarely result in effective economies of scope; on the contrary, they end up causing commercial diseconomies for firms with structural marketing difficulties and give rise to operational complications in the industrial plants themselves.

f) *Erratic sources of finance*

The level and profile of the investments of SMEs has depended to a large extent on their erratic sources of finance. As repeatedly noted in the specialized literature, SMEs have less access to the capital markets than big corporations. This difference is due to a very wide variety of factors, ranging from a certain degree of informality on the part of SMEs and poor accounting and project documentation to the nature and size of the guarantees demanded by finance institutions to cover the risks of such operations. SMEs mostly finance their investment processes with their own savings: that is to say, they reinvest profits or family funds. Formal long-term bank finance, which has been very scarce and expensive in many countries because of the macroeconomic situations experienced, occupies a distant second place. These enterprises tend to make more use of bank finance (loans or current account overdrafts) for their current operations, as working capital. There has been very little development in Latin America of other more complex forms of bank finance, such as venture investment funds or venture capital.

g) *Markets with a restricted geographical horizon*

The great majority of SMEs operate in markets with a restricted geographical horizon, generally of sub-national scale. Although this situation varies from one country to another, it is particularly true in the case of Argentina and Brazil. In these countries, where there are territorially well-defined sub-markets, the presence of these enterprises in each of them does not necessarily mean that there is competition (at the national level) between them and similar firms in other regions, as such sub-markets have a low level of contacts and are not subject to arbitrage operations. Gaining access to information is not a simple matter for the SMEs, and because of the limited volumes involved there are no compensatory transactions which take advantage of the small rents available in other locations and markets. Paradoxically, there are many SMEs which have embarked on internationalization before making more decisive efforts to progress in the domestic market.

h) *The special forms of operation of the markets in which SMEs operate*

Since much of the output of SMEs consists of goods which are not commodities and are heterogeneous, may be technically different, and display a very wide variety of qualities and prices, the markets in which they operate work in ways which are quite special, rather obscure, and suffer from imperfections of various types which give rise to more personal and subjective attitudes on the part of consumers and entrepreneurs. Moreover, many industrial SMEs which produce final goods have their own retail marketing structure (those engaged in the production of ready-made clothing and knitwear, for example), so that they operate directly in the final consumer market, while others market their goods through independent agents, wholesalers or commercial distributors.

Many of these features have been built up over decades and are obstacles to successfully meeting the business challenges described earlier. Since a return to the old conditions in the matter of regional integration and the trade environment is highly unlikely, these SMEs must reformulate their business, seek new forms of organization, develop new capabilities and advantages, and embark on internationalization based on specialization.

In conditions of trade openness and strong competition, SMEs can only survive if they are specialized and form part of a social and economic context that favours collective growth (Bianchi, 1993). More explicitly, this means: individual productive specialization in order to attain competitive scales and levels of productivity; mutual complementarity and enhanced division of labour as an essential counterpart of specialization; collective or group efficiency as the final basis for competitiveness, and a willingness to engage in innovation and shared growth, as each firm is too small an agent in the process of internationalization to be able to eschew concerted action in conjunction with other firms and institutions.

Obviously, the achievement of some of these objectives is not a simple task and cannot be carried out on a purely individual or unilateral basis. On the one

hand, this is because the design and implementation of some of these actions and activities require services exogenous to the firm (information, advisory assistance, training, finance), but also, and even more importantly, because these changes will not be able to secure higher yields unless they are conceived and linked together as an associative competitive strategy in an atmosphere of inter-firm cooperation (Bianchi, 1993; Hatch, 1991).

Individual actions by firms can of course improve their profitability and competitiveness, but their position in the production structure and the market will be much more solidly based if they are integrated into and share an industrial and entrepreneurial system which develops systemic competitive advantages of a collective nature. Otherwise, the possibilities of reconstructing and expanding basic capabilities will be severely restricted by the limits of the firm itself, from those of a purely financial nature to those connected with technological innovation or negotiations on technical regulations and standards. In this sense, possibly one of the most "costly" features of SMEs in the light of the new situation and the construction of the advantages now required for successful operation is connected with the isolation of these firms from other companies and from their technico-productive and institutional support environment.

V

Final remarks: technical support requirements

It is generally acknowledged, as noted by Keesing and Singer (1991), that adequate technical services are not enough to make up for unsatisfactory policies, so that they are a complement to but not a substitute for suitable policies, resources and infrastructures. The SMEs of MERCOSUR are now facing a situation of industrial competition and technological change very different from that of past decades, and they need a system of support which forms an integral part of a strategy and policy for the sector.

Openness, integration and competition are the salient features of the environment in which an industrial policy strategy must be formulated for SMEs, and if competitiveness is seen as the central element in this it is necessary to foment the formation of a private and public system of technical and financial support to cooperate with firms in the ongoing development of their capabilities and competitive advantages. Although these firms do need measures to take care of their short-term requirements, their needs are not merely the sum of isolated problems. In many cases the most pressing problems are not those which are most crucial or really important. Moreover, the lack of some factors or capabilities in a firm cannot be solved automatically by supplying them from outside, as though the firm were a passive recipient to be "filled up" with a solution; in reality, such shortcomings can represent development potential and areas of learning for the firms if they are perceived as opportunities for creating new capabilities and skills.

This means that policy proposals and instruments must be very closely linked up with the requirements of the firms and their changing needs to improve their competitiveness.

From a more functional standpoint, the needs of SMEs could be grouped in four main areas: i) improvement of the regulatory and operational framework of their business; ii) access to specific information and advisory assistance in interpreting it, including here everything from trade information and details of technical standards to technological consultancy services; iii) the development of in-house capabilities (human resources, especially in the areas of business skills and management) and easier access to a technical services infrastructure, and iv) finance on equal real conditions to those enjoyed by bigger firms, which in some cases would mean the implementation of new financial instruments and products.

The strategic challenge when designing industrial policies for SMEs is to create or promote the establishment of an environment favourable to reconversion. Public policies cannot define or carry

out business reconversion in a voluntaristic and all-powerful manner, as it was once believed in some circles. Instead, public policies must stimulate and create the best conditions for causing such reconversion to take place efficiently, giving priority to the construction of collective synergies that will be sustainable over time. Otherwise, public action would be open to criticism for being passive (for not doing anything) or even retrogressive (for favouring actions going in the opposite direction).

The hub of the reconversion process consists of the enterprises and the industrial production systems (or subsystems): that is to say, the value chain. This process is inherent in the firm itself, and is therefore largely an endogenous process which must be conceived in the light of the culture and objectives of the firm. It goes without saying, then, that the main actors and clients of the corresponding policies are the SMEs, so that their active participation as requestors and users is essential.

In order to create an environment of change we must therefore discard the idea of a closed system, designed a priori from above, which is assumed to know what entrepreneurs' needs are in advance and also possesses the necessary solutions. On the contrary, the strategy for working with the SMEs should be aimed at generating an open, self-regulating and self-sustainable multi-institutional space which allows the users (the SMEs) to obtain what they need for reconversion –technical know-how, training, advisory assistance, information, finance, transfer of technology, business services or qualified suppliers– and allows the suppliers to provide products and services for the reconversion process with similarly entrepreneurial criteria. The role of the national political authorities will thus consist of formulating an industrial strategy, designing and implementing global policies and also measures for more decentralized application, overcoming the existing impediments to making the integration programme more effective, improving the regulatory framework and the business environment, and taking care of external trade negotiations and following-up and evaluating the firms' performance.

Finally, there are some lessons that can be learned from the relations between SMEs and the technical support system. The first of these is that SMEs have difficulty in interacting and establishing cooperative links. For many of them, the first step in the innovation process should involve modifying the practices and behaviour of their owners. Second, their main production linkages (apart from the fact that an SME may operate in relative isolation) are with private economic agents (suppliers, clients, subcontractors, competitors, equipment firms, banks, etc.), and these relations represent their main sources and channels of technical information, implicit or formal advisory assistance, and technological demands, so that every public action or initiative must be established in this technical, productive and commercial area of relations. Third, the services offered cannot be expected to be successful unless they are in line with the requirements, capabilities and special features of the firms and their managers, and these are of course different from those of big firms as well as being very heterogeneous among the SMEs themselves.

The process of changing the firms must be practicable in the short term. For this reason, it is essential to define the policies and activities corresponding to the transitional stage and the following phase very clearly. It is necessary to make a clear distinction between actions and initiatives designed to smooth the transition from one organizational model to another, on the one hand, and the policies to be applied when a number of aspects of the functioning of the firms and the industrial system have already been changed. It must be borne in mind, for example, that the information requirements are different in the two situations; it is no use meeting the needs of the second phase if crucial aspects of the first stage have still not been solved. In some countries, many of the shortcomings in their technical support systems are due precisely to the confusion of these two stages, "during" and "after", which leads to methodological errors in assigning priorities to objectives and activities.

(Original: Spanish)

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Trade and growth *in Chile*

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This study analyses the relations between the noteworthy performance of Chilean exports over the last two decades and the high economic growth rate of the country since the mid-1980s. It concludes that the Chilean experience may be described as a case of "export-led growth" rather than one of "growth-led exports". What were the causes of Chile's export success? Trade liberalization acted as an important stimulus, but this success was also due to other policies, both horizontal and sectoral: the exchange-rate policy followed since 1982, the introduction of drawback arrangements and export subsidies for exports of relatively minor importance in the mid-1980s, the use of a debt conversion programme to stimulate new production activities for the export of specific goods after the debt crisis, the active participation of the State in providing market information, and the substantial subsidies provided for the forestry sector. The next stage in the development of Chilean exports will be more difficult, however, and will call for more complex policies than the previous stage. Among the issues that must be addressed by such policies are the solution of market flaws in key activities (training and education, technical and marketing know-how, and the provision of long-term resources for investments in new activities not previously undertaken).

I

Introduction

Rightly or wrongly, Chile has come to be perceived in academic and policy-making circles as a shining example of the success that awaits countries bold enough to introduce and persevere with reforms to favour the market forces. In the period from 1974 to 1979, the military government which overthrew President Allende in 1973 embarked on an out and out process of trade liberalization, freed domestic financial markets and opened up the balance of payments capital account (see Meller, 1996, chap. 3; Ffrench-Davis, Leiva and Madrid, 1993; Agosin and Ffrench-Davis, 1995). The aim of these reforms was to ring down the curtain on the import substitution industrialization model, which had been the main development paradigm ever since the 1940s and had been kept in being by governments of the most diverse tendencies. The reforms of the 1974-1979 period were guided by the idea that once the full sway of the market forces had been assured, resources would be reallocated (without cost) to the export industries in which the country had comparative advantages, thus leading to rapid growth not only of exports but also of the overall product.

Consequently, in any evaluation of the Chilean policy reforms it is particularly interesting to study the behaviour of exports and the way they relate to the overall growth of the economy. There is no denying that exports grew rapidly after 1974 and have continued to grow up to the present. Thus, it is maintained that one of the prime elements explaining Chile's success has been the exceptionally good performance of exports. However, although the process of expansion and diversification of exports has been very successful, it has only been a driving force for the rest of the economy in recent years. Up to the end of the 1980s, the vigorous growth of exports was not backed up by a significant rise in the investment rate or a concomitant improvement in the overall economic results. On the contrary, economic growth during the period of the military regime was much slower than during the 1960s, and rates of saving and investment fell off markedly. At the same time, the process of export-based growth is relatively recent, and its long-term sustainability remains an open question.

This article analyses the evolution of exports and the overall product over a lengthy period: 1960-1995. It seeks to identify the main trends in the growth of exports and to assign their due responsibility to the various factors that affect export behaviour, providing answers to the following questions:

- Was trade liberalization responsible for the obvious success in export activities that Chile has had since the mid-1970s and continues to have today?
- What importance should be assigned to other government policies that promoted exports in general and to selective policies at the sectoral level?
- Why has the connection between export growth and overall economic performance been much stronger in the 1990s than before?
- What are the prospects for export-led growth in the coming decades?

This study has been organized along the following lines: after the present Introduction, section II asks whether the Chilean experience can best be described as an example of "export-led growth" or of "growth-led exports". In the case of Chile, it is demonstrated that the view that growth was led by exports is more in line with the facts than the opposite view. Since the mid-1980s, export growth and increased investment have been the motive forces behind the growth of the Chilean economy.

Section III analyses the causes of the expansion and diversification of exports: particularly the link between trade liberalization and exchange policy. Although it was successful in stimulating an increase in exports after a long period of lagging growth, the 1974-1979 trade liberalization process was

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needlessly costly, because a large part of the installed manufacturing capacity was destroyed instead of being gradually reoriented towards the export sector. Although there is no factually verifiable theory for evaluating the degree of success of reforms, it is suggested that a different set of policies (with a more devalued exchange rate and lower real interest rates) would have helped the adaptation of the manufacturing sector and ultimately proved more efficient.

Section IV looks at other policies that affected exports and at sectoral-level policies and factors. The analysis shows that one must not overlook other policies and initial conditions which subsequently strengthened the response of supply and were very important for explaining the export success at the sectoral level.

Finally, section V sums up the results of the study and gives a general overview of the policy requisites for ensuring the sustainability of the export-oriented model that Chile has been applying for more than two decades. We maintain that the "easy" export promotion stage is already over. So far, apart from a few concrete interventions which did indeed have a very important effect in terms of export growth, as we shall see below, the main role of the State has been to dismantle the system of incentives that were in force during the import substitution period (from 1938 to 1973). The next stage in export development will involve diversification into more highly processed goods and services and will pose much more complex policy demands. Greater linkages between the private and public sectors will also be essential.

II

The Chilean experience: export-led growth or growth-led exports?

Does the Chilean experience fit in with the theory that exports have been the leading sector in the economy and that export growth has been the motive force responsible for the high growth rates achieved since the mid-1980s? Or has it instead been the rapid growth of the product which has been the main factor in the expansion of exports? The first of these views highlights the role of exports in promoting overall growth. In contrast, the supporters of the idea of growth-led exports emphasize the importance of capital accumulation and the effort to build up national technological capacity as necessary prior conditions for the export boom.[1]

Most economic development theories make no distinction between exports and non-exportable production. In almost all economic growth models, whether they be of a neoclassical character (Solow, 1956), inspired by the ideas of Keynes (Pasinetti, 1974), or based on the "endogenous growth" approach (Barro and Sala-i-Martin, 1995), the fundamental variables explaining economic growth are the rate of investment and technological progress. Those which assign a key role to exports run into difficulties because they face an identification problem: as exports are part of GDP (and often quite a large part), rapid increases in exports automatically have an impact on the GDP growth rate although there is no clear causal relation to explain this.

Is there something special about exports, however? This is our hypothesis here. In a small, late-industrializing economy, the growth and diversification of exports are important for two reasons. First, the domestic market is small and cannot support sustained GDP growth on the demand side. Any economic development impulse based on the expansion of domestic demand is bound to be exhausted quite quickly. In contrast, export markets are (al-

[1] Rodrik (1995) and Akyüz and Gore (1996) attach great importance to the increase in the rate of investment as the fundamental cause of the high growth rates of South Korea and Taiwan. In the opinion of these authors, the rise in the rate of investment is of itself sufficient to explain the high export growth rates of these two economies, without any need to bring trade policies into the picture. On the basis of these analyses, one may nevertheless wonder whether the very marked increases in investment would have taken place if there had not been active trade policies which made the export of new products highly profitable.

most) limitless for a small country and hence do not involve any growth restrictions on the demand side.[2] If the incentives offered have an anti-export bias, however, the expectations of rapid growth will not be fulfilled. Second, as small developing countries do not produce machinery, technological change comes largely from abroad, mainly in the form of imported capital goods. Although such imports can be financed for a time with capital inflows, the sustainability of high economic growth rates normally requires vigorous export promotion. The expansion of exports thus provides the basis for general economic development, with the stability of this process being assured through diversification of exports.[3]

Whichever may be correct, each of these two mutually exclusive concepts has policy implications. If the accumulation of physical and human capital and technical change are key factors for growth, there would be no need to embark on export promotion policies. If, on the other hand, the facts confirm that the export-led growth paradigm is correct, then in order to achieve economic development it would be necessary to encourage an increase in the amount and diversification of exports. It would be important to support the growth process with horizontal policies to correct market failures that impede the diversification of exports, and also, as the developing countries are far behind their technological frontier, policies would be needed to support incipient export sectors.

1. Exports and GDP growth, 1960-1995

The broad lines of the Chilean economic growth process may be better understood if we divide the period as from 1960 into five sub-periods: i) 1960-1970, marked by import substitution and the preponderance of copper, which accounted for 80% of export income; ii) 1971-1973, which corresponds to the Socialist experiment; iii) 1974-1981, when the military government introduced market-friendly reforms that had an impact on trade; iv) 1982-1989, marked by somewhat greater pragmatism in policy formulation, and v) the period from 1990 on, after the return to democracy.

Since 1974, export growth has run ahead of GDP growth (table 1 and figure 1). Only since 1989, however, has the growth of non-traditional exports been accompanied by strong and sustained growth of the GDP and a rise in the rate of investment. In 1974-1989 the gross domestic product not only grew less than exports, but also rates of growth and investment were far below those reached in the 1960s.

Nevertheless, the degree of openness of the Chilean economy has increased significantly since 1974. In 1970 exports of goods and services represented nearly 15% of GDP (at current prices), but by 1995 this proportion had risen to 29%. In a sense, it could be said that one of the objectives of trade liberalization policies has been achieved: the economy has evolved from a situation in which its centre of gravity consisted of the non-tradeable or importable sectors to another in which that centre is made up of the export sectors. In this process, whole areas of the manufacturing sector (such as textiles and the metal products and machinery sector) virtually disappeared, but others later emerged, oriented mainly towards external markets.

TABLE 1
Chile: Evolution of growth and exports, 1960-1995
(Percentages)

	Growth of GDP	Gross investment[a]	Growth of exports	
			Total[b]	Excluding copper
1960-1970	4.2	25.1	5.6	4.6
1971-1973	0.5	16.9	-4.4	-11.9
1974-1981	3.7	22.2	12.0	20.9
1982-1989	2.4	19.8	6.5	8.2
1990-1995	6.7	28.5	9.0	9.8

Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years.
[a] As a percentage of GDP at constant 1986 prices.
[b] Only goods.

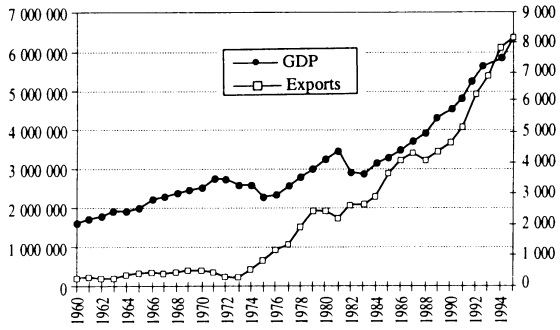
[2] Provided, of course, that their shares in the markets of the importing countries do not become too large. In other words, in order for the export-led growth to be sustained on the demand side, the exporting country must continue to be "small" in world markets. This requires ongoing diversification of exports.

[3] Diversification of exports can also be advisable for other reasons. As an economy rises up the "technological ladder" with export diversification, this can also raise real wages, thus further stimulating growth and improving income distribution. This has by no means been the case in the Chilean economy in the last two decades, however. Although exports have been diversified, with very few exceptions their technological content continues to be unsophisticated and wages continue to be much lower than in the advanced industrialized countries.

FIGURE 1

Chile: Non-mineral exports and GDP growth, 1960-1994

(Exports in millions of 1995 dollars; GDP in millions of 1988 dollars)



Source: Calculations by the author, based on Central Bank of Chile, 1989, and various other years.

Since 1974 the growth of exports has been very rapid and that of non-mineral exports has been quite spectacular. For the purposes of our analysis, exports of goods have been divided into seven categories: copper, other minerals, agricultural products (mainly fresh fruit and vegetables), fishmeal and fishery products, wood and wood products (including a small but growing furniture sector), paper and pulp (especially pulp), and other manufactures. This latter category covers nearly 3,000 articles of the most varied types. It includes, among many other things, confectionery, fruit juices, prepared foodstuffs, canned and frozen fish, industrially-reared salmon, wine, auto parts, sanitary equipment and metal products. All these goods are marked by intensive use of natural resources or the application of conventional standardized technology. Their main markets are in other Latin American countries, but they form an increasingly large proportion of Chile's exports to the United States and Europe.

Exports of non-factor services have also risen dramatically. It has not been possible to disaggregate exports of services by category, but the qualitative information available indicates that some new services industries have begun to export their products successfully in recent years (computer programmes and engineering services, for example). These are sectors in which the country has been able to acquire comparative advantages through long-term human resources development policies, which, it may be noted in passing, suffered serious setbacks during the military regime.

Thus, exports have not only grown, but have become increasingly diversified. In 1971-1973 copper represented almost 80% of total exports of goods, and if other minerals are added, the share of minerals as a whole came to almost 90%. In the first half of the 1990s, in contrast, the share of copper went down to 40% and that of minerals as a whole to less than 50%.[4] On the other hand, the share of "other manufactures" rose from 5% in 1971-1973 to almost 30% in the first half of the 1990s. If we add paper and pulp, fishmeal and wood products, total exports of manufactures account for over 40% of total exports in the most recent period, compared with only 10% in 1971-1973.

For each of these seven categories of products, we estimated price indexes from which we can derive growth rates of export volumes by category.[5] The volumes of non-mineral products exported have grown rapidly since 1974 (table 2). The growth rates of export volumes were particularly impressive during the early years of the military regime (1974-1981), but this was due above all to their low initial levels (which were also depressed in the case of manufactures) in 1973.

The growth of exports of "other manufactures" –which include articles produced both for export and for the domestic market– in this period was largely due to the enormous excess capacity caused by the trade liberalization policies applied. The adjustment

[4] However, the big investments made by foreign copper companies in the 1980s may reverse these trends in the years to come, when the activities generated by these investments come on stream.

[5] The official Chilean statistics do not include long chronological series on export volumes and prices. For the period between 1960 and 1989 we used the export price indexes calculated by Sáez (1991) as deflators of the price statistics. For the period from 1990 to 1995 there are Central Bank estimates for export prices and volumes. Unfortunately, there are no data for 1990 itself which would allow the two sets of data to be matched. The price indexes for 1990 were therefore calculated with the data of Sáez (1991), using an autoregressive scheme with seven lags. Since both the manufacturing price indexes of Sáez and those of the Central Bank included paper and pulp, fishmeal and wood products, and as we wanted to estimate global prices and volumes with the exclusion of those products, we proceeded to calculate our own index of manufactured export prices and constructed a price index for these three articles using mobile annual averages. In spite of the fragility of the price series, the volume series obtained in this way behaves reasonably well.

TABLE 2

Chile: Annual average growth rates of export volumes, by types of goods, 1960-1995
(Percentages)

	1960-1970	1971-1973	1974-1981	1982-1989	1990-1995
Copper	6.2	-1.0	7.8	4.6	7.8
Other minerals	1.6	-2.6	6.7	6.5	3.4
Agricultural products	2.4	-27.5	32.6	11.8	7.0
Fishmeal and fishery products	18.7	-31.1	45.8	11.1	3.0
Wood and wood products	15.9	-25.1	41.0	7.3	4.3
Pulp and paper	16.7	-7.6	18.5	0.8	22.7
Other manufactures	7.1	-28.0	38.6	9.2	12.7
Total non-copper	**4.6**	**-11.9**	**20.9**	**8.2**	**9.8**
Total goods	**5.6**	**-4.4**	**12.0**	**6.5**	**9.0**
Services	...	...	18.8[a]	0.1	8.0

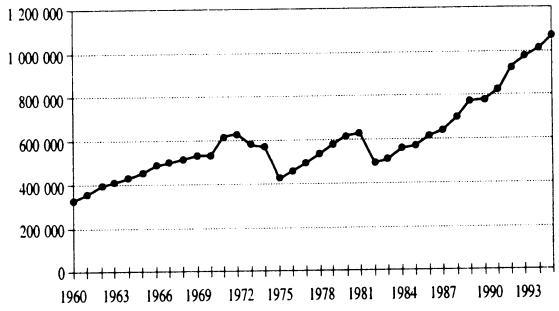
Source: Calculations by the author, based on unpublished data of the Central Bank of Chile and on Sáez (1991).
[a] 1976-1981.

made in order to reduce a fiscal deficit which had grown to the equivalent of almost 20% of GDP, together with the very high interest rates prevailing (which were not only due to tight monetary policies but also to financial liberalization with little or no control over the banks), contributed to the depression of global demand and the contraction of GDP in 1975 by almost 13%. One means of defence open to domestic producers was to seek external markets for the goods they could not sell at home (Ffrench-Davis, 1979). The manufacturing sector contracted in absolute terms, its output did not recover its 1972 level until 1987 (figure 2), and the share of manufactures in GDP fell from 26.6% in 1972 to 20.8% in 1987.[6]

The excess of production capacity was also a factor in the growth of exports of manufactures in the period from 1982 to 1989. There was a further severe economic contraction in 1982-1983, when GDP fell by nearly 15%. Only after 1985 could one speak of export-led growth and positive net investment in this sector. Consequently, export-led growth only became firmly established from the mid-1980s. Non-traditional exports have become the most dynamic component in the economy, rates of investment have risen from typical Latin American levels to those of East Asia, and the growth rate of the economy as a whole has been high and sustained. Since 1989, the real product has been close to the potential product and the excess of production capacity in manufacturing (and in the economy as a whole) has been close to zero, so that this latter factor cannot be the explanation for the increase in exports of manufactures. For these reasons, exports became one of the motive forces for growth with the recovery from the debt crisis; in previous years the excess of production capacity had prevented them from carrying the rest of the economy with them.

FIGURE 2

Chile: Real manufacturing product, 1960-1995
(Millions of 1995 pesos)



Source: Calculations by the author based on Central Bank of Chile, 1989 and various other years.

2. Evolution of growth and exports from 1960 to 1995: an analysis of time series

In order to answer the main question posed at the beginning of this section we constructed an

[6] Data from Central Bank of Chile (1989). The proportions mentioned in the text were calculated with data at constant 1977 prices.

autoregressive vectors model, using Johansen's estimation technique.[7] This is fully justified because in a system which simultaneously determines GDP and exports we do not know which variable is exogenous and which is endogenous. In reality, the aim of the exercise is to determine the direction of causality between exports and GDP. In the system, it is assumed that the process of generation of data (Z) is of the following type:

$$Z_t = [Y_t, K_t, X_t, t] \qquad (1)$$

where Y is GDP, K is the capital stock, X is real exports and t is a trend over time. This system contains an equation in which GDP is a function of the inputs of capital and exports (which may be interpreted as a production function in which exports represent increases in productivity associated with the inputs of capital). The solution of the system naturally includes the possibility that there may be more than one direction of causality. The production function we want to estimate is the following:

$$Y_t = \alpha_0 + \alpha_1 K_t + \alpha_2 X_t + \alpha_3 t + u_t \qquad (2)$$

where u is a well-behaved error term. It is easy to demonstrate (see Appendix 1) that, as the capital stock is the sum of net investment, equation (3) can be transformed into an equation in which the capital stock is replaced by investment (I). This gives us the production function which will be used for purposes of estimation:

$$Y_t = \beta_0 + \beta_1 I_t + \beta_2 X_t + \beta_3 t + u_t \qquad (3)$$

In the econometric analysis, the proxy used for investment is gross fixed capital formation. As the only long series for export volumes that it was possible to obtain with the available data was for exports of goods, this is the series that was used. In the system, all the values are expressed as natural logarithms. All the variables used in the exercise have unit roots (see the augmented Dickey-Fuller statistics in table 3). A dummy impulse variable was added for 1982 (*d*82) in order to take account of the largely unexplained drop in GDP in that year. The estimated system contains the following equation for GDP:

TABLE 3
Unit root tests
(Critical MacKinnon values)

Variable	ADF statigraph [a]	Number of lags	Constant and trend
ln Y	-0.985	0	Yes
ln I	-1.067	0	Yes
ln X	-2.498	0	Yes
ln M	-3.982[b]	1	Yes
ln TR	-3.506[c]	3	Yes
ln PM	-3.406[b]	1	Constant
ln EX	-3.297[b]	1	Constant
d ln Y	-4.316[d]	0	Constant
d ln I	-4.307[d]	0	Constant
d ln X	-5.777[d]	0	Constant

[a] Augmented Dickey-Fuller statigraph.
[b] Significantly different from zero at the 5% level.
[c] Significantly different from zero at the 10% level.
[d] Significantly different from zero at the 1% level.

$$\ln Y_t = \gamma_0 + \gamma_1 \ln I_t + \gamma_2 \ln X_t + \gamma_3 t + \gamma_4 d82 + u_t'' \qquad (4)$$

where Y = *GDP*, I = gross fixed investment, and X = volume of exports of goods.

A two-year lag was used for all the variables because this was determined to be the optimal lag according to the criteria of Schwarz and Hannan-Quinn. The criteria of the Bigen maximum values and of the trace values of the stochastic matrix revealed that the system contains only one cointegration vector. Tests were carried out for the weak exogeneity hypothesis and for the zero-value null hypothesis of the coefficients of the long-term equilibrium production function. The results of these tests showed that short-term imbalances in GDP (reflected in the error correction variable obtained in the long-term equilibrium GDP equation) affect short-term movements of GDP but do not affect short-term movements of gross fixed capital formation or exports. In fact, it was not possible to obtain reasonable short-term equations for gross fixed investment or for exports. In other words, GDP is endogenous and fixed investment and exports are weakly exogenous in the system. The hypothesis tests for the coefficients of the production function reject the joint hypothesis that the coefficients of fixed investment and exports are zero (at the 1% level) but do not reject the zero-coefficient hypothesis for the time trend. Thus, the final long-term equilibrium production function obtained was:

[7] Figueroa and Letelier (1994) obtained very similar results using quarterly data for the 1979-1993 period.

TABLE 4
Stripped vectorial error correction model [a]
(Dependent variable: d ln Y(t))

Variable	Coefficient	t statistic	t probability
Constant	2.742	4.48	0.0001
d ln Y(t-1)	0.249	1.67	0.1070
d ln I(t)	0.240	5.47	0.0000
d ln I(t-1)	-0.136	-2.35	0.0270
d ln X(t-1)	-0.121	-2.01	0.0560
d82	-0.098	-2.68	0.0130
ECM(t-1)	-0.376	-4.43	0.0002

[a] ECM is the error of equation (5). Diagnosis statistics: AR(1) = 0.567 [0.575]; Chi squared (normality) = 1.666 [0.435]; ARCH 1 = 0.001 [0.982]; X_i squared = 0.790 [0.648].

$$\ln Y = 0.373 * \ln I + 0.324 * \ln X \qquad (5)$$

As we have seen, exports and investment are highly significant variables which explain the behaviour of the long-term equilibrium GDP. The elasticities obtained indicate that, in the long term, an increase of 3% in exports or investment is reflected grosso modo in 1% growth of GDP. The error correction equation corresponding to equation (5), which shows the short-term trajectory of GDP towards its long-term equilibrium, is shown in table 4 in its stripped-down version (i.e., after eliminating non-significant variables). This equation has good diagnostic properties and shows that imbalances in GDP, as reflected by the deviations of GDP from its long-term trajectory (ECM_{t-1}), affect the short-term behaviour of GDP. Almost 40% of the GDP imbalance is corrected within one year, while 90% of the imbalance disappears in five years.

In short, exports have been one of the main causal factors of Chile's economic growth. Increases in the rate of investment have also been important. Both investment and exports are apparently exogenous: i.e., increases in exports did not affect investment but they did affect GDP. Increases in GDP, however, did not have an appreciable impact on exports or investment.

III

Trade liberalization, the exchange rate and domestic finances

1. The analytical framework

a) *Exchange rate management and trade liberalization*

The central idea in our analysis is that in order to promote export-led growth it is necessary not only that there should be well-designed policies for trade liberalization and for supporting the basic macroeconomic variables (exchange rate and interest rates) but also that measures should be taken to do away with barriers that inhibit a strong response by supply to price signals. Such barriers are not eliminated automatically by the market forces but require more specific policies by governments or other institutions which can ensure the internalization of externalities or the correction of market failures which prevent an adequate response by exportable supply.

The aim of trade liberalization is to change market signals that favour sectors producing goods that compete with imports or non-tradeable goods and instead encourage the production of exportable goods and of import substitutes that do not require high levels of protection in order to be profitable. The measures recommended by conventional trade policy (which always advocates liberalization, without taking account of the institutional framework of the country concerned) are generally based on a simple trade model with only two sectors –one exportable and the other importable– with no non-tradeable sector. In such a model it is possible to ignore the exchange rate, since it disappears from relative prices. In the real world, however, non-tradeables are an important part of the economy, and moreover there are many types of tradeables and different levels of protection for importable goods. Likewise, there is a whole variety of potentially exportable goods, ranging from those with lower average costs to those with higher costs.

Other conditions being equal, the real exchange rate should undergo devaluation as a result of the liberalization of imports; consequently, those sectors which initially had levels of effective protection lower than the real devaluation brought about by the reduction in import barriers will benefit from the set of trade liberalization and exchange rate devaluation measures. Thus, it cannot be considered that they were inefficient, and hence worthy of disappearing from the economy, simply because before the liberalization of imports they enjoyed a higher rate of effective protection than after the liberalization process. Moreover, devaluation will generate new exports, albeit with some delay, as the economy begins to occupy a lower place in the list of potential exporters rated by costs. Indeed, some of these new exports may even come from sectors that previously enjoyed higher rates of protection than after liberalization.

It can be shown that the compensatory devaluation[8] that should occur as a result of trade liberalization should be as follows (see Appendix 2 for the formal derivation):

$$\hat{e} = \frac{\hat{t}}{h(\varepsilon_x / \varepsilon_m) - 1}$$

where e is the exchange rate, t is the average tariff, a circumflex over a variable indicates percentage change, εx and εm are the (average) export and import price elasticities, and h is the ratio of the values of exports and imports at the beginning of the tariff reduction programme. In the case of Chile, the average tariff went down from 94% in 1973 to 10% in 1979, which represented an induced decline of 43% in import prices. If we assume a price-elasticity of export supply of 0.5, a price-elasticity of import demand of unity (less) and a balanced current account (there were no capital flows in 1974), the compensatory devaluation should have been 29%. This means that any importable good with an initial tariff of up to 29% was in fact internationally competitive, and with a final tariff of 10% it should have been able to compete with imports and become exportable.

b) *Ensuring a vigorous response by supply*

Even though the price signals may be favourable for exports, there are, as we already noted, substantial restrictions inhibiting a rapid and powerful response by supply. Some of them are connected with information. Local producers do not have adequate information on: i) technologies that would enable them to produce goods or services that they could sell on foreign markets or that could help them to compete with foreign producers on the domestic market; ii) distribution and marketing channels on external markets; and iii) consumer tastes and production requirements on potential markets. The successful countries, such as those of East Asia, have been able to overcome these problems (see Lall, 1994). The special features of information are its high cost and the fact that it is a public good: on the one hand, it is a **non-rival** consumer good, in the sense that its consumption by one agent does not reduce its value for another, and on the other hand it is **non-exclusive,** that is to say, it is hard for individual agents to prevent others from using it.[9] Economic policies relating to this issue therefore have an important role to play in the process of successfully opening up the economy. They include: i) subsidies for the collection of information on technologies, external markets and foreign tastes; ii) subsidies for building up a reputation for local producers (what has been called "creating a country image" in recent years), and iii) helping existing firms to restructure their operations, orienting them towards external markets and becoming more capable of competing with foreign products on the domestic market.

A less direct way of dealing with this type of obvious externality, which makes use of the market, is to create institutions or enterprises to internalize it. For example, exporters' associations might find it worth collecting information on markets or technologies on behalf of their members. If this kind of solution is selected, the government's role could be limited to promoting the formation of such associations.

[8] In this study we have followed the Latin American convention of expressing the exchange rate as the number of units of local currency per unit of foreign currency. Consequently, devaluation represents an increase and appreciation a decrease in the exchange rate.

[9] These features of information tend to be ignored in standard trade theory and in conventional trade policy recommendations, which assume that all the relevant information is available without cost to all the agents. The consequence of making this assumption more flexible would be to make trade liberalization more costly, since the agents would be less capable of reallocating resources to export-oriented activities. It is therefore essential to adopt supplementary policies to ensure a strong and timely response by supply to changes in the price signals.

In most developing countries, the capital markets are shallow or non-existent. As noted in the abundant literature on this subject (see, for example, Stiglitz and Weiss, 1981), there are serious problems of asymmetry of information which cause flaws in capital markets in all parts of the world, and in developing countries these flaws are further magnified (Stiglitz, 1994). The supply-side response is dulled and inhibited if potential entrepreneurs do not have sufficient access to long-term finance for their investment projects. Consequently, policies to deepen domestic financial markets and improve their operation (through greater regulation and transparency, for example) are an important complement to trade liberalization. Indeed, such policies will probably not be enough: the formal financial markets, no matter how developed they are, tend to discriminate against small producers and firms which do not have an established reputation or lack collateral. It will therefore be necessary to supplement the private financial markets with suitable public action.

Other bottlenecks on the supply side are connected with the low levels of human capital formation and the lack of suitable infrastructure. Public policies are indispensable in these areas, too. Education and training have strong externalities, so the private market will tend to neglect them. Indeed, human capital formation is an investment for which there is practically no private finance. The planning, design and –despite the current fashion– construction of infrastructure continue to be priority tasks for governments in their efforts to improve supply responses.

If this view of the situation is valid, then trade liberalization takes on a more limited (although nevertheless important) role in the promotion of an export-oriented growth process. Trade liberalization is a means of changing the relative prices of an economy and making it more likely that producers will allocate resources to activities where the country has current comparative advantages. As it does absolutely nothing to try to correct market flaws associated with the factors mentioned above, however, it is rather a clumsy tool for encouraging producers to create new comparative advantages. Indeed, some countries, such as South Korea and Taiwan, have promoted highly successful processes of export-oriented growth without liberalizing their trade (Wade, 1990; Amsden, 1993 and 1994; Rodrik, 1995). In Chile, in spite of its much-vaunted free-market approach, there have been some instances of the application of industrial policies since 1974, especially in the forestry sector. Moreover, before 1974 past developments and the policies applied had already created the necessary climate for adequate responses on the supply side.

2. Trade liberalization, exchange rate policy and interest rates: a chronology

One of the first measures of the military government after the September 1973 coup was to announce a reform of trade policy. Trade policy could indeed have been justly described as chaotic at that time. The (simple) average tariff was 94%. There were 57 different tariff rates, ranging from 0% to 220% (plus tariff surcharges for some goods), many non-tariff measures (prior import deposits, prohibitions, quotas, etc.), and a system of multiple exchange rates with eight values for the dollar, the highest of which was ten times the lowest value. This very peculiar system of protection was not due to any development objective. The disorganization reigning in the period of the Allende government had led to the stagnation of manufacturing production, the disappearance of economic growth, and severe contraction of the infant non-traditional export sector (which included a number of manufactures).

The trade liberalization announced late in 1973 involved the elimination of all non-tariff barriers, the gradual reduction of customs tariffs and their consolidation into three levels (with a maximum rate of 60%), unification of the exchange rate, and **a devaluation to compensate for the reduction in the average tariff.** The exchange rate was indeed devalued in real terms during the 2½ years following the reforms. In the absence of capital flows, this was the result of the market forces: the opening-up of the economy brought with it a flood of imports which caused the exchange rate to go down (i.e., devalue) sharply (figure 3).

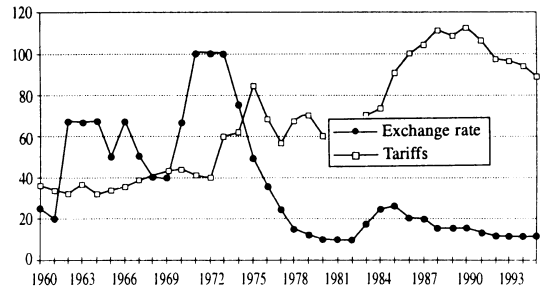
Various events took place which changed the course of the reforms. As it proceeded, the trade liberalization programme became more radical. In 1975 the authorities announced a new range of tariff rates, from 10% to 35%, to be reached gradually by 1978. At the end of 1977, however, the objective of attaining a tariff rate of 10% for all imports by mid-1979 was set, with monthly tariff reductions.

Furthermore, the prospects of gaining access to international financial markets changed for the better in the middle of the decade, and this allowed the au-

FIGURE 3

Chile: Real exchange rate and customs tariffs, 1960-1995

(Exchange rate, 1988=100; tariffs in %)

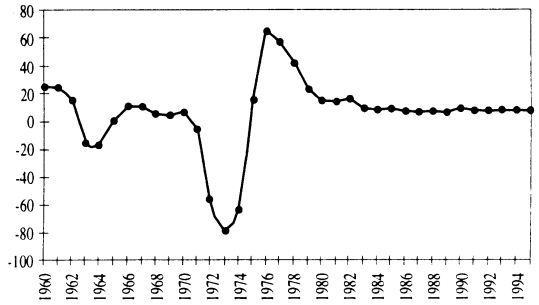


Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years, and De la Cuadra and Hachette, 1992.

FIGURE 4

Chile: Real interest rates, 1960-1995

(Percentages)



Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years.

thorities to give exchange policy the objective of reducing inflation (essentially through appreciation of the real exchange rate). Consequently, as from 1976 limitations on international capital movements were systematically eliminated.[10] At the same time, the crawling peg exchange rate regime was abandoned and changes in the nominal exchange rate began to reflect past inflation with a lag. Finally, a fixed nominal exchange rate was adopted in mid-1979. As inflation only went down slowly, considerable appreciation of the peso took place between 1976 and 1981, furthered of course by the heavy inflows of capital. The appreciation in the real exchange rate, together with the liberalization of imports, was a negative disturbance for the whole of the tradeables sector. Instead of setting about the reconversion and orientation of their activities towards international markets, the tradeables sectors of the economy shrank, while the non-tradeables sectors expanded.

The way in which the local financial markets were liberalized was also an important factor in the meagre initial results of the trade liberalization programme. Before the 1973 coup, the domestic financial markets were marked by extreme financial repression: the banks had been nationalized; ceilings had been placed on interest rates which had no relation to domestic inflation, resulting in highly negative real interest rates and the decline of financial intermediation; and the monetary authorities intervened very strongly in the allocation of credit, with a proliferation of special credit lines which, taken together, bore no resemblance to an industrial policy. The 1975 reforms included the privatization of banks, the elimination of the ceilings on interest rates, reduction of the compulsory reserve requirements applicable to banks, and the elimination of all restrictions on credit. At the same time, in an effort to promote competition, the barriers to entry into banking and financial activities were markedly reduced. There was no prudential regulation of the activities of banks or other financial institutions: the reformers were not moved to caution by any considerations of moral hazard in banking and financial activities. As a result, the financial sector grew enormously, financial operations took the place of real investments, and interest rates soared from highly negative levels to levels which were extremely high in real terms (figure 4).[11] In these circumstances, the readaptation of firms producing for the domestic market, or their transformation into export enterprises, was virtually impossible.

As the inflows of foreign capital dried up and the domestic crisis rapidly began to get worse, in mid-1983 the single tariff was raised to 20%, and in September 1984 it was raised again to 35% (the consolidated level that Chile had registered in 1979, at

[10] Ironically, this process concluded in 1981, shortly before the beginning of the debt crisis, with complete freedom of international capital flows.

[11] In his last published article, Díaz-Alejandro (1985) gives a masterly description and makes devastating criticisms of the Chilean financial liberalization process.

the end of the Tokyo Round of the GATT multilateral trade negotiations). Tariff surcharges were imposed on automobiles and consumer electronic goods. When the crisis waned, the single tariff was once again gradually reduced as from 1985. In 1989, at the end of the military regime, it had stabilized at 15%, from which it was reduced to 11% by the new democratic government in 1991. During the 1980s, some policies were adopted to favour export growth: tariff drawbacks for exporters, a subsidy for new exports, and foreign direct investment policies which ultimately favoured non-mining exports. In addition, thanks to rigorous prudential regulation of financial institutions, interest rates settled down at more reasonable levels in real terms, favouring investment and the acquisition of technology. Last but not least, a persistent shortage of foreign exchange was reflected in a series of real devaluations between 1982 and 1988.

Figure 3 provides some information on the evolution of the real exchange rate and average tariffs.[12] Broadly speaking, the relation between the real exchange rate and the average tariff (a crude but probably accurate indicator of trade policy for the period before 1979) behaves as might be expected: the much lower tariffs since the mid-1970s have been accompanied by higher real exchange rates. As the theory would predict, this relation is sustained in the long term. Between 1976 and 1981, however, the dramatic tariff reductions were accompanied with a sharp appreciation of the real exchange rate.

During the 1990s, up to the end of 1997, the Chilean economy again enjoyed an abundant inflow of foreign capital. This time, the management of the capital account was more flexible than in the period of abundance in the 1980s. The authorities responded to the growing inflow of external capital by taking measures to discourage the inflow of short-term capital while keeping the doors wide open for foreign direct investment (Agosin and Ffrench-Davis, 1997). In essence, this was done by imposing a 30% non-interest-bearing compulsory reserve requirement (to be maintained for one year, regardless of the term of the financial instrument involved) on loans or financial investment from abroad (including investments on the Chilean stock market). This system is very costly for short-term flows but has only a low cost for those with a time horizon of more than one year. Although this system was effective in reducing short-term credits and inflows between 1993 and 1995, in 1996 and 1997 capital inflows were nevertheless very large, essentially because of Chile's high rating on international financial markets. Consequently, with the policy instruments used the authorities were unable to prevent considerable appreciation of the exchange rate which once again imperilled the export-oriented development strategy. Indeed, since 1995 the volumes of non-mining exports have been growing much more slowly than before.[13] In proportion as the inflow of foreign capital has been declining due to the international financial crisis, the tendency towards appreciation has been checked. The lesson to be drawn from recent experience is clear, however: if greater stability of the real exchange rate is desired, it is essential to manage capital flows more energetically.

3. Explaining the growth of manufactured exports: an econometric model

Perhaps the most important feature in the success story of Chilean exports is the appearance of a diversified group of manufactures for export covering a wide variety of products, most of them easy to manufacture or making intensive use of natural resources. And it is this group of products (through their subsequent growth and ongoing diversification) which

[12] The real exchange rate is calculated as the nominal price of the U.S. dollar, deflated by the consumer price index (CPI) and multiplied by an index of external prices significant for the Chilean economy calculated by the Central Bank. The Central Bank series was used for the period from 1977 on. For previous periods, we constructed our own series using an external price index calculated by Ffrench-Davis (1984). Our figures for the 1974-1976 period correct the official under-estimation of the CPI growth rate. With regard to average tariffs, from 1974 on the series is a simple average. As there were no non-tariff barriers after 1975, the average tariff is a fairly exact reflection of the restrictiveness of the trade regime. No data are available for the period before 1973, which was marked by high tariffs, considerable dispersion of tariff rates, and numerous non-tariff restrictions. We used a trade liberalization index developed by De la Cuadra and Hachette (1992, p. 79) and applied the quotient of that index at its 1980 value to the average tariff for that year (10%) in order to obtain the tariff rate equivalent to all the trade restrictions in the period from 1960 to 1973. The use of the 1980 tariff is justified by the fact that that was the first full year of application of the 10% unified tariff.

[13] This is exactly what might have been predicted using our econometric analysis of manufactured exports (see the following section).

holds out the greatest hope for future growth of exports and of the economy as a whole. It would therefore be very interesting to identify the factors explaining the growth of such exports.

Two studies have been made on the behaviour of Chilean exports in the past. Through a partial adjustment analysis, De Gregorio (1984) estimated the supply functions for non-copper exports, finding statistically significant price-elasticities for export supply. Using an error correction model, Moguillansky and Titelman (1993) estimated supply functions for various categories of non-copper exports. They concluded that the long-term price elasticities are consistently higher than the short-term elasticities (and that both are statistically significant). In their supply functions for exports of manufactures, tariffs (which were incorporated as an additional explanatory variable) proved to be negatively associated with such exports. Moguillansky and Titelman used a more advanced econometric technique than De Gregorio, but they did not include a variable for idle capacity, although in the context in question recession and idle capacity played a dominant role in setting off the process of export growth in the mid-1970s.

Like these authors, we analysed the role of various factors in the framework of a supply function: tariff reduction, real exchange rate devaluation, and idle capacity. Using the "small country" assumption, which is appropriate in the case of Chile, it can be safely posited that the manufactured exports of that country do not affect the prices of such goods on the world market, so that we can ignore possible feedback effects by export volumes on international prices.

In this exercise, exports of manufactures (*XM*) are a function of the real price of manufactures for the export market (*PM*, defined as the price index for manufactures, in dollars, multiplied by the nominal exchange rate for the dollar and deflated by nominal wages in manufacturing); the simple average tariff (*TR*), and an index of idle capacity in manufacturing (*EX*, defined as the percentage by which potential manufacturing output, calculated by linearly joining the procyclical values, exceeds observed output).[14] The basic idea of the model is that there are two groups of manufactures: i) products which are manufactured for the domestic market but which could be exported in certain circumstances, and whose relative price is the tariff rate, and ii) goods produced primarily for export markets because of the narrowness of domestic markets. The relative price of these goods is expressed in terms of non-tradeables, for which the proxy used here is the nominal wage level. All the variables except idle capacity are expressed as logarithms.

According to the augmented Dickey-Fuller statigraph, the logarithm for exports of manufactures (*ln XM*) and the logarithm for the average tariff (*ln TR*) were stationary variables with deterministic tendencies. The rest of the variables (*ln EX*, *ln PM*) were also stationary, but without tendencies (see table 3). We thus proceeded to explain variations in *ln XM* by the following set of variables: a time trend (to incorporate the deterministic tendency in two variables, *ln XM* and *ln TR*), *ln T*R, *ln PM*, and *ln EX*. The results are shown in table 5.

In table 5 we give two equations, one with the price variable and the other without it. The first equation, which includes all the variables of interest to us, has an autocorrelation problem which it was impossible to eliminate. For this reason, we included the second equation, in which we eliminated the price variable and added two lags in the dependent variable. This gives an equation with well-behaved residues. The reason why two lags are needed for the dependent variable is the high degree of persistence in the volume of exports of manufactures. The two equations show us that reductions in tariffs, increases in the relative prices of manufactures on export markets, and idle capacity give rise to positive changes in the supply function for exports of manufactures but do not affect the trend of the growth rate of such exports.

The two long-term equations are obtained by equalling the lagged and current values of the variables.

$$\ln XM = 2.888 + 0.093t - 0.679 \ln TR + \cdot 0.854 \ln PM_{-1} + 0.064 \ln EX \quad (6)$$

$$\ln XM = 6.52 + 0.097t - 0.598 \ln TR + 0.032 \ln EX \quad (7)$$

[14] We also tried another definition of idle capacity: the difference between the value added in manufacturing, smoothed with a Hodrik-Prescott filter, and real manufacturing output. However, the results obtained with this more sophisticated method were identical to those obtained with the less refined definition of the idle capacity variable.

TABLE 5

Explanation of variations in exports of manufactures, 1960-1995
(Dependent variable: ln XM)

Explanatory variable	Equation (1) Coefficient	t values	Equation (2) Coefficient	t values
Constant	1.268	1.07	5.191	5.84[a]
Trend	0.041	3.04[a]	0.077	5.98[a]
ln TR	-0.298	-2.43[b]	-0.476	-4.32[a]
ln PM(-1)	0.375	3.57[a]		
ln EX	0.028	2.17[b]	0.026	2.20[b]
ln XM(-1)	0.561	4.23[a]	0.781	5.85[a]
ln XM(-2)			-0.577	-4.92[a]
Adjusted R^2	0.976		0.981	
Breusch-Godfrey F statistic	0.019 [0.019][b]		0.108 [0.898]	
Normality (Jarque-Berg) [a]	2.769 [0.250]		1.999 [0.368]	
Heterocedasticity (X_i^2)	0.847 [0.591]		0.471 [0.892]	
Heterocedasticity (X_i*X_i)	0.841 [0.647]		1.031 [0.490]	

[a] Significantly different from zero at the 1% level.
[b] Significantly different from zero at the 5% level.

These equations are reasonably similar. We used the first of them to determine approximate orders of magnitude of the effects that changes in the explanatory variables (tariff reductions, idle capacity and exchange rate devaluation) have on the growth of exports of manufactures. The results, which should be considered as purely illustrative, were as follows:

- Idle capacity in the 1970s: between 1973 and 1975 idle capacity rose from 8% to 46%. This added 8% to the annual growth rate of exports of manufactures, giving a total of 18% for the period as a whole.
- Idle capacity in the 1980s: between 1981 and 1985 idle capacity in manufacturing rose from close to zero to 23%. This contributed 7½ percentage points to the annual growth rate of exports of manufactures (34% over the whole period).
- Trade liberalization in 1974-1979, with exchange rate appreciation in 1975-1982: tariffs went down from close to 100% in 1974 to 10% in early 1979. As a result, exports of manufactures grew for this reason alone by 205% (25% per year). This positive effect on export growth was partly reversed by the adverse effect of exchange rate appreciation, however: between 1976 and 1982 the ratio between manufacturing export prices and wages in manufacturing went down by 75%, causing a 69% drop in the volume of manufactured exports (nearly 15% per year).
- Exchange rate devaluation in 1982-1988: the real price of exports of manufactures (as defined earlier) went up by 118% during this period, causing exports of manufactures to rise by 96% (11.6% per year).

IV

Other policies that affect export growth

In addition to trade liberalization and exchange rate policies, there are other policies which have also aided in the rapid growth of Chile's non-copper exports. These policies may be classified in two main groups: general policies affecting all exports (horizontal policies) and sectoral policies and factors.

1. Horizontal policies

a) *Drawback systems*

Two drawback systems have been used since the mid-1980s. One is a conventional system, in use since 1988, whereby the import duty on inputs used for the manufacture of exports is recovered after the exports are sold. This programme suffers from certain weaknesses. It involves a good deal of paperwork and financial costs for the entrepreneur, since he first has to pay the import duty and only recovers it after a considerable delay. The other system, introduced in 1985, is termed "simplified drawback". For exports of less than US$ 20 million, in a given tariff item, all exporters receive a cash subsidy of 3, 5 or 10% (depending on the value of exports for the whole tariff item) of the value of the exports, instead of the regular drawback. Although this system has been presented as an effort to simplify formalities for small exporters, for whom the regular drawback system is a costly process, it does in fact contain an element of subsidy estimated to amount to a maximum of around 6% for the drawback rate of 10% (applied to exports with a value of less than US$ 10 million for the whole tariff item).[15]

This system has become increasingly important as an export incentive. In 1994 the State paid out a total of US$ 150 million in respect of simplified drawback and only US$ 26 million under the regular drawback system. Approximately 13% of the total value of exports (and 70% of the number of products exported) obtained simplified drawback in that year (Ffrench-Davis and Sáez, 1995, pp. 79 and 89).

Although no detailed econometric studies have been made of the impact of simplified drawback on the appearance of new exports, it cannot be a mere coincidence that since the introduction of that system the number and value of manufactured products exported have grown rapidly. Indeed, this type of incentive is close to being economically optimal: new exports undoubtedly have strong externalities connected with the corresponding stock of information, and when the exports of a good grow, these externalities disappear. Thus, the automatic extinction of the element of subsidy is a particularly attractive feature of this system.

Furthermore, importers of capital goods pay tariffs for terms of up to seven years, but exporters are exempted from these payments, and this undoubtedly stimulates investment in export activities. Both this measure and that providing for simplified drawback are considered as subsidies by the World Trade Organization (WTO) and will have to be eliminated by the end of 2002.

b) *Policies on foreign direct investment*

Policies on foreign direct investment have played both a direct and an indirect role in stimulating exports. The regulations in this respect were completely liberalized in 1974 (see Riveros, Vatter and Agosin, 1996), and although foreign direct investment did not increase until 1987 it has grown steadily since then. Around 60% of all new investments under the regular system have gone to the mining sector, in which Chile has clear comparative advantages.

Other foreign direct investment policies have resulted in the stimulation of non-mining exports. In 1985 the authorities instituted a debt-equity swap programme designed to reduce the external

[15] With the present across-the-board 11% tariff, the 10% "simplified drawback" would not represent a subsidy if the imported inputs accounted for 90% of the value of the final exports. The real value of such inputs is probably around 30-40% of the total price.

debt burden while at the same time promoting foreign direct investment. However, this channel for investing in Chile was neither as neutral nor as automatic as the regular foreign direct investment system. As Ffrench-Davis (1990) noted, although the debt-equity swap programme represented a heavy subsidy for foreign direct investment, the projects had to be approved on a case-by-case basis, with priority being given to new exports. Thus, the authorities made a virtue out of necessity and applied an industrial policy under another name. During the period in which this programme was in operation (1985-1991), nearly 60% of the investments made under it went to manufacturing and agriculture, mainly to the forestry and pulp and paper sectors. Around 40% of all foreign direct investment during this period was made through debt-equity swaps.

c) *Information on foreign markets*

As already noted, collecting information on foreign markets is an expensive business in which the social yield is much higher than the private benefits obtained. Since 1974, the Chilean government has made significant investments in this activity. With the aid of 32 trade offices abroad, a trade promotion department of the Ministry of Foreign Affairs ("ProChile") has been carrying out market studies and collecting trade information of interest to exporters. It recently launched an aggressive campaign to create a positive image of the country and is on the point of being transformed into an autonomous semi-public corporation with substantial private sector participation. During the 1990s there has been a further increase in officially subsidized trade promotion activities. Firms have been encouraged to group together in associations to promote their products and carry out joint activities to gain a better knowledge of their markets. The overseas activities and management costs of these Export Committees are subsidized on a decreasing scale for a maximum of six years.

d) *Technological development*

The problem of the shortfall in investment in technological development has been handled in an ingenious manner. Fundación Chile –a profit-making institution which has nevertheless (so far) enjoyed a government subsidy and whose equity belongs in equal shares to the Chilean State and ITT –[16] has developed appropriate new technologies for export products and has launched new firms which were subsequently sold to the private sector. Like any other venture capital organization, it has had plenty of failures, but it has also had some notable successes, especially the development of the salmon export industry. Promotion of applied research in the broadest sense (including the development of new products for export markets) is an important component in a comprehensive export promotion effort, and there are grounds for maintaining that the sustained growth and diversification of exports in the future will require the allocation of much greater resources for applied research and that the combined efforts of the private sector, the government and institutions like Fundación Chile will continue to be absolutely insufficient.

e) *Development of infrastructure and human resources*

Chile's infrastructure in terms of roads, ports, airports, tunnels, etc. is currently a serious bottleneck hampering the further intensification of its process of export-led growth, but in the mid-1970s the fact that it had an adequate infrastructure by the standards of the time was undoubtedly an important element which facilitated the rapid growth of its exports. In other words, without the infrastructure which already existed at that time (several large ports, an international airport inaugurated as recently as 1967, and a North-South highway completed in the 1960s, largely with external aid) the mere changes in the price signals would have elicited a much feebler response on the part of supply.

Furthermore, the human resources available at the time were appropriate for the task of reorienting the economy towards export markets. In the early 1970s, Chile had a large number of engineers and managers trained in public (or State-aided) universities in previous decades. The period of import substitution and the active entrepreneurial spirit displayed by the State since the 1940s had also left a legacy of industrial and management professionals who could serve the export effort. For example, the universities

[16] The story of the creation of Fundación Chile is quite interesting. When the military government had to compensate ITT for the nationalization of the Chilean Telephone Company, it was agreed to set up the Fundación Chile, with the government paying ITT's share.

had already begun to turn out graduate forestry engineers in the 1950s, and in the 1960s there were major programmes for creating specific human capital for the agricultural sector, which later proved crucial for the development of fruit and vegetable exports. In 1964 a semi-autonomous agricultural research institute (INIA) had been set up with public funds, and in 1965 a ten-year programme was established between the University of Chile (the country's main public university) and the University of California at Davis to train Chilean agronomists. This relationship became an important means of transfer of technology between two regions with similar climatic and soil conditions (Meller, 1994).

2. Sectoral policies

Important sectoral policies have also been applied and there have been special factors which have had a direct influence on the expansion of particular export products. Some of these are described below.

a) *The forestry conglomerate*

The forestry conglomerate has made an important contribution to export growth (roundwood, chips, lumber, paper and pulp, and more recently, furniture). At 1995 prices, exports of this group of industries increased by a factor of 17 between 1973 and 1995, rising from US$ 105 million to US$ 1.8 billion. In spite of the advantages of this natural resource-based sector in Chile, an industrial policy was needed to provide the "big push" that would make it into an important industry. This is perhaps the only example since 1974 of a large-scale and undoubtedly very successful industrial policy. It included special incentives for the development of the sector and a legal framework favourable to private enterprise and exports which did away with liquidity restrictions on investment and furthered the accumulation of specific human capital in the sector.

Public afforestation and reafforestation programmes go back to the 1960s. In 1974 a subsidy of 75% of the cost of planting trees was introduced (Decree-Law 701). At the same time, privately planted land was declared inexpropriable, the ban on cutting down trees less than 18 years old was eliminated, and the export of unworked timber was authorized. These changes in the law made vertical integration possible and highly profitable (see Rossi, 1995). In addition, between 1975 and 1979 the Central Bank granted the private commercial banks and the Banco del Estado (a public commercial bank set up to attend to the needs of small depositors and entrepreneurs) a special credit line for financing forestry development projects, with particularly favourable conditions for natural persons and small enterprises.

It had long been known that Chile has comparative advantages in forestry activities. The weather and soil conditions ensure rapid growth of certain species, especially Monterey Pine. In view of this natural resource endowment, in the 1950s the University of Chile (a public institution) and the Catholic University (which received heavy State subsidies) began to offer courses leading to a degree in forestry, so that, when the sector began to develop, the industry already had a significant corps of specialists in this field. When conditions became favourable, quite a number of these professionals became forestry and lumbering entrepreneurs. Since then, the courses for degrees in forestry have further increased in the public universities and have also begun to be offered in many private universities.

b) *The salmon-farming industry*

Exports of industrially raised salmon, which were insignificant in 1986, amounted to some US$ 700 million in 1998. Chile now supplies nearly 15% of the world output of industrially raised salmon and trout and is currently the second biggest exporter in the world after Norway. The salmon industry is a real success story in which the adaptation and development of technology played a leading role.

Fundación Chile began to experiment with the industrial raising of salmon in the second half of the 1970s. In the early 1980s it organized an enterprise to raise salmon in Lake Llanquihue using floating cages: a technique developed in Norway and Scotland which, it was considered, could be well adapted to the natural conditions of the Chilean "Lake District". This enterprise, Salmones Antártica, was later sold to Nippon Suisan, a Japanese firm which is one of the biggest fishery corporations in the world. The example of Salmones Antártica attracted many more investments by local and foreign firms (Achurra, 1995).

This industry is very interesting for a number of reasons. One is that it combines technological change induced by a semi-public institution with the natural advantages of the country. Secondly, salmon

exports represent the exploitation of an export niche. Their success shows that it is not necessary to follow the Asian model of penetrating mass markets with consumer goods in which the main comparative advantage of a developing country is low wages. Such sectors are very vulnerable to protectionism, and other approaches may now be much more profitable. Finally, the salmon industry has many positive backward linkages. Thus, it has given a boost to local industries producing floating cages, salmon feed, fishing nets, packing materials and transport services. Since it employs highly qualified professionals (engineers, aquaculture technicians, biologists) it has also had a beneficial impact on the demand for construction services, education and retail trade in the region.

c) *Wine*

Chilean wine exports have registered a meteoric rise over the last ten years or so, from US$ 10 million in 1985 to around US$ 550 million in 1998. Winemaking is a traditional economic activity in Chile, going back to colonial times. However, the types of wine produced by Chilean winemakers up to the mid-1980s were not to the taste of consumers in the developed countries: big changes in technology were needed to enable Chilean wines to be sold on a large scale abroad. These changes included the introduction of stainless steel vats, the use of small casks made of new wood instead of the large old barrels previously used for ageing the wine, and investments in new refrigeration plant and equipment for grinding and pressing the grapes. Although it was known that Chilean wines could be produced more advantageously with the new technologies used in Europe and the United States, a demonstration effect was needed. In 1981 the Spanish winemaking firm Miguel Torres bought extensive areas of land near Curicó in the Central Valley and began to produce wine using the new technologies, and its success led to the rapid adoption of the new methods by Chilean firms.

The opening up of the economy made it easier to import new machinery. Furthermore, many of the traditional Chilean wine producers are large firms compared with European winemakers and also operate in other export sectors (particularly fruit exports), so they do not suffer from liquidity constraints which restrict their investments. More recently, investments have also been made by other large firms from Europe and the United States, such as Rothschild, Larose Trintaudon, Grand Marnier, Roberto Mondavi and The Christian Brothers. Furthermore, a number of small specialized winemakers are bringing out new products for the export market and are seeking to sell wines of higher prices and quality than those offered by the traditional winemaking firms. These producers, who have less capital than the big winemakers and the foreign investors, rely on the associations of new wine producers to sell their products abroad (Bordeu, 1995). The marketing services offered by ProChile and the new joint export programmes mentioned earlier have also been actively used by the smaller producers.

d) *The motor industry*

Automobile parts have been a small but significant component of exports of manufactures for over a decade. They have been stimulated by the only performance requirement still in force in Chilean investment policy. A special programme called the Automotive Statute allows assembly firms to import CKD or SKD [17] kits tariff-free provided such imports are covered by exports of domestically produced components with the same value. The Statute also gives assembly firms tax credits for components produced domestically or exported. In order to be eligible for such credits, a component must have at least 70% of local added value if it is for domestic use, or 50% if it is for export. These incentives are not compatible with the Trade-Related Investment Measures of the World Trade Organization and will have to be eliminated by the end of 1999. In fact, the tax credits expired at the end of 1998.

[17] Completely knocked down (CKD) and semi knocked down (SKD) are terms used in the automobile assembly industry and refer to kits of parts without any degree of assembly in the first case and to kits with some partial degree of assembly in the second.

V

Looking ahead

There can be little doubt that the expansion and diversification of exports, which began in the mid-1970s but took on a decisive role in development as from the mid-1980s, has been the main driving force in the growth of the Chilean economy. The next stage of export-oriented development will be much more difficult, however. The easy stage of export promotion is now over, and it is unlikely that continuing with the recipe as before will allow the high growth rates of exports and of the GDP to be maintained. Firstly, Chile will have to abandon some policy instruments which have been very profitable in the past (the simplified drawback system, duty-free imports of capital goods for exporters and the Automotive Statute, for example). Secondly, becoming internationally competitive in more sophisticated goods involves more complex requirements than those demanded by the export of primary commodities or the like, ranging from human resources development, improved business capabilities, the acquisition of information and greater applied research efforts by local firms to improvements in the country's ports, highways and tunnels. This will require a more active –and efficient– State than in the past.

In order to further heighten export-oriented growth it will also be necessary to give up the dogmatic insistence on a uniform tariff and take a more aggressive attitude to tariff reduction. There is no reason to keep tariffs on capital goods and the wide range of intermediate goods that are not produced within the country. Export-oriented growth requires a zero tariff for these goods, particularly in the light of the restrictions that Chile will soon be facing on measures designed to compensate for the distortions caused by the tariffs applied to such goods.

Progressing with the export-oriented growth model also calls for better access to markets. The potential that intra-Latin American trade has for Chile, as an exporter of light manufactures and agroindustrial goods and an importer of foodstuffs, makes MERCOSUR a strategically important trading partner.

Foreign direct investment policy can be used to attract investments. While maintaining a liberal attitude to foreign direct investment, the Chilean authorities should make a bigger effort to attract transnational corporations with desirable technological or management assets and with access to markets for manufactures. Association with MERCOSUR could be important for attracting such corporations to the manufacturing sector, where they have so far been conspicuous by their absence.

Finally, Chile will have to reinvent development banks. Such banks should provide long-term credit at market interest rates to firms which have good export projects but, in most cases, do not have access to private capital markets. They could also be used to channel funds towards loans for higher and technical education and for financing expenditure on applied research. Development banks do not need to intervene directly in the provision of loans for firms or individuals: they can function as second-tier banks, making credit lines available to private financial institutions for specific purposes. They can also act as intermediaries between the international financial markets and small and medium-sized firms whose activities are in keeping with the development strategy but who do not have access to such resources. It is also important that development banks should ensure that pre- and post-shipment credit is available to the export sector at internationally competitive rates.

This is the most efficient way of supporting infant industries, and moreover it is not prohibited by the rules of the World Trade Organization. It could in fact become the main instrument for promoting specific sectors and activities. Carlos Díaz-Alejandro (1985, pp. 20-21), in a far-sighted article published after his death, said that the experience of Latin America, and also that of continental Europe in the last century, arouses some skepticism about whether the private markets, unaided, will generate financial intermediation flows big enough to support a long-term capital formation rate sufficient to take full advantage of the high social yields available from long-term investments. By providing long-term credit for new, non-traditional activities, development banks would do away with one of the arguments often adduced to justify exaggerated protection against imports.

(Original: Spanish)

APPENDIX 1

Derivation of the production function to be estimated

Let us assume that the "real" production function has the following form:

$$Y_t = \alpha_0 + \alpha_1 K_t + \alpha_2 X_t + u_t \quad (1)$$

where Y is the global product, K is the capital stock, X is total exports and u is an error factor with the usual properties.

The capital stock can be expressed as the sum of an infinite flow of net investments:

$$K_t = \sum_{I=1}^{\infty} (1 - \lambda) I_{t-1} \quad (2)$$

where λ is the rate of depreciation.

If we note L as the lag operator and replace (2) in (1), (1) can be expressed as:

$$Y_t = \alpha_0 + \frac{\alpha_1(1-\lambda)L}{[1-(1-\lambda)L]} I_t + \alpha_2 X_t + u_t \quad (3)$$

Multiplying the terms by the denominator of the I_t coefficient, (3) can be expressed as:

$$Y_t - (1 - \lambda)Y_{t-1} = \alpha_0 + \alpha_1 (1 - \lambda)I_{t-1} + \alpha_2 [X_t - (1 - \lambda)X_{t-1}] + u_t - (1 - \lambda)u_{t-1} \quad (4)$$

As in the long-term equilibrium all the lagged values of the variables are equal to their current values, (4) is reduced to:

$$Y_t = \beta_0 + \beta_1 I_t + \beta_2 X_t + u_t \quad (5)$$

where

$$\beta_0 = \alpha_0 / \lambda;$$

$$\beta_1 = \alpha_1(1 - \lambda) / \lambda;$$

$$\beta_2 = \alpha_2$$

APPENDIX 2

Derivation of the compensatory devaluation

Let us assume that, to begin with, the economy has its balance of payments in equilibrium. If we make F^* equal to the equilibrium capital flows, the balance of payments equilibrium may be expressed as:

$$p^*_m \; q_m(p_m) - p^*_x \; `q_x(p_x) = F^* \tag{1}$$

where the asterisks denote international prices (assumed to be independent of the country's levels of trade).

We can differentiate (1) to get:

$$p^*_m \; dq_m - p^*_x \; dq_x = 0 \tag{2}$$

Under the small-country assumption, the prices of importable and exportable goods are, respectively:

$$p_m = e\,(1 + t)p^*_m \tag{3}$$

$$p_x = ep^*_x$$

where t is the tariff (ad valorem) and e is the nominal exchange rate (pesos per dollar).

Through the elasticity definition, we obtain the following expressions for dq_m and dq_x:

$$dq_m = q_m \, \varepsilon_m \, (\hat{e} + \hat{t})$$

$$dq_x = q_x \, \varepsilon_x \, \hat{e} \tag{4}$$

where a circumflex over a variable denotes a percentage change.

Replacing (4) and (1) in (2) we get:

$$\hat{e} = \frac{\hat{t}}{h(\varepsilon_x / \varepsilon_m) - 1} \tag{5}$$

where h is the quotient between the value of exports and the value of imports expressed in foreign currency in the initial period before trade liberalization.

If the current account is balanced to start with, (5) is reduced to:

$$\hat{e} = \frac{\hat{t}}{\varepsilon_x / \varepsilon_m - 1} \tag{5a}$$

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Argentina's Industrial *Specialization Regime:* new-generation industrial *policy, or merely a* transfer of resources?

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The combination of rapidly increasing trade openness with sharp exchange-rate appreciation formed the context in which Argentine industry had to carry out its production restructuring process from 1991 on. The inability of the spontaneous market forces to spark off this process led the Argentine government to adopt a number of measures designed to correct the problem of relative prices and further the restructuring process through fiscal means. In this context, the Industrial Specialization Regime (ISR) was established with the main objective of promoting export specialization by industrial firms. This regime was based on a subsidy for incremental exports which took the form of access at preferential tariff rates to the importation of goods similar to those exported or forming part of a given production chain of complex goods. The aim of the present article is to make a theoretical and empirical analysis of this policy instrument (in its dual dimension of restructuring policy and export subsidy), examining its underlying theoretical bases, questions relating to its design, application and control, and finally, its effects on the industrial sector.

I

Introduction

As from the early 1990s, the Argentine government simultaneously applied a macroeconomic stabilization plan and a broad-ranging structural reform process, including in particular rapid and indiscriminate trade openness. At the same time, the turnaround in international capital flows and the rapid growth of expenditure (especially of consumer goods) fostered by those flows were reflected in strong exchange rate appreciation.

Faithful to the principles of the Washington Consensus, the policy-making authorities trusted implicitly that the spontaneous action of the market forces would bring about the necessary adjustments both at the macroeconomic level (deflation of nominal prices) and in terms of resource allocation (development of sectors with comparative advantages, generalized increases in productivity).

The conversion process did not take place either as completely or as promptly as expected, however. The trade balance quickly became negative, and the deficit began to increase without respite. The tradeables sectors of the economy (especially textiles and clothing, footwear and capital goods) were subjected to strong competition due to the combination of trade openness and a low exchange rate.

Towards the end of 1992 this situation became unsustainable and the Argentine government began to apply a series of measures aimed at correcting the problem of relative prices by fiscal means and furthering the restructuring process. Firstly, the trade openness process was partially reversed by raising the duty on imports from 3% to 10% and applying various para-tariff measures (specific duties, quotas, etc.). Secondly, the real effective export exchange rates were raised by increasing the export drawbacks and reducing some taxes affecting the tradeables sector (including employers' contributions).

Lastly, the government set aside its ultra-orthodox attitude and launched a number of trade and industrial policy programmes designed to facilitate the production restructuring process. The main pillars of this new industrial policy were measures to make the incorporation of capital goods less expensive and promote production specialization. For the first of these objectives, a new capital goods policy was introduced which combined the elimination of tariffs with drawbacks for local producers of capital goods,[1] together with interest rate subsidy arrangements to help finance the acquisition of capital goods by small and medium-sized enterprises.

In pursuit of the second of these objectives, the Industrial Specialization Regime (ISR) was established, with provisions that were similar (although they offered fewer benefits) to those of the Argentine Automotive Regime. Until it was suspended in August 1996, this programme became one of the mainstays of the industrial policy applied under Minister of the Economy Domingo Cavallo.

The general aim of the ISR may be defined as the promotion of a sequence of economic processes: specialization in the production of a more limited number of goods by each enterprise (reduction of the variety of products entering into their manufacture) → exploitation of economies of scale and organization of work → reduction of costs → increased competitiveness on domestic and international markets → greater linkages in international trade → access to new technologies.[2]

In contrast with its multiplicity of objectives and aims, the ISR provided for only one incentive: a subsidy for additional exports operating in the form of access with preferential tariffs to the importation of goods similar to those exported or forming part of the same chain of production of complex goods.[3]

[1] For a critical analysis of this capital goods policy, see Sirlin, 1997a.

[2] In the preambular paragraphs of the measure setting up the ISR these objectives were set out in a disordered and disjointed manner.

[3] This form of incentive is similar to that provided under the Argentine Automotive Regime (the only instrument of a sectoral nature kept in being by the new economic authorities), and in its propaganda for the new regime the government asserted that it represented the generalization of the special treatment already being given to the motor industry. There are substantial differences between the two regimes, however. Although the motor industry also enjoys heavy protection through import quotas, it is required to enter into specific commitments in terms of investment and organization of production which are not demanded in the ISR.

The purpose of this article is to make a theoretical and empirical examination of this policy instrument (in its dual dimension of restructuring policy and export subsidy) and analyse its theoretical bases, issues connected with its design, application and control, and its effects on the industrial sector. Even though the ISR is no longer in effect, we consider its critical analysis essential in order to help to improve the capacity for the design, execution and control of industrial policy in general.

In section II below we will study the theoretical bases for production specialization incentives and export subsidies in general, demonstrating also how the design and form of implementation of such policies vary considerably depending on the general conception of industrial policy held by the authorities. Section III describes the features of the Argentine Industrial Specialization Regime and analyses the extent to which it is in line with the theoretical grounds set forth in the preceding section. Section IV makes an appraisal of the impact that the ISR had on industry in its first three years of existence, and section V presents the main conclusions.

II

Export subsidies and incentives for industrial conversion and production specialization: grounds, benefits and costs

1. Production specialization

The aim of the ISR was to bring about the restructuring of industrial enterprises through their specialization in more specific aspects of production. The first question that arises is why, if production specialization is considered to be so efficient, it is not induced spontaneously by the market forces. In other words, what are the flaws in the market or the regulations that lead to vertical integration and lack of production specialization?

In order to answer these questions we must draw a distinction between what we might call "efficient" and "non-efficient" determinants of company decisions on the structure of production, that is to say, distinguish between those cases where non-specialization is due to a desire for the microeconomic optimization of production processes and those where it is the result of distortions that affect the efficiency of production and call for the application of corrective policies.

Among the efficient determinants are those production processes in which the production functions determine the existence of economies of non-differentiation. As well as those deriving from the production function in the strict sense, this kind of economies may also be seen as coming from the indivisibilities and economies of scale existing in other activities of the enterprise in question, such as the design, transport and marketing of goods and the exploitation of trade marks. In all these cases, production specialization does not improve microeconomic efficiency.

The non-efficient determinants of company decisions on production structure, for their part, may be due to inappropriate price signals or microeconomic adaptation to highly unstable macroeconomic contexts or inefficient legal systems.

Macroeconomic instability encourages excessive vertical integration because the agents try to minimize the transaction costs implicit in a more specialized production system supplemented with outside subcontracting.[4] Furthermore, it is noted in the abundant literature on institutions that when property rights are not clearly specified and protected, agents tend to refrain from carrying out all the contracts and specific investments required by a more specialized production structure (North, 1993; Williamson, 1994).

[4] With regard to the interaction between macroeconomic imbalances and patterns of microeconomic behaviour, see Fanelli and Frenkel, 1994.

Inappropriate price signals may also be due to distortions induced by the public sector or to market flaws. The main (although not the only) source of erroneous price signals is the existence of an anti-export bias.

When domestic demand for a good is saturated, this gives rise to the option between extending the company's field of operations to the external market or embarking on horizontal expansion by broadening the structure of production and occupying new domestic market niches (Katz, 1993). The existence of an anti-export bias creates an environment in which it is more attractive to sell products on the domestic market and encourages horizontal expansion strategies which lead to excessive diversification of the product structure.

Such a bias is due to:

i) Trade policy instruments (tariff and para-tariff measures) which raise the effective import exchange rate above the effective export exchange rate.

ii) Tariff dispersion, when this tends to protect sectors with comparative disadvantages. Even if it tries to offset the tariffs for each good with export subsidies, a tariff structure of this type gives rise to an anti-export bias, because by discouraging the importation of goods in which the country has comparative disadvantages it tends to depress the real equilibrium exchange rate.[5]

iii) Regulatory and tax measures which involve the export of taxes and extra costs and which operate, in practice, as export taxes.

iv) The differential impact of market shortcomings. Thus, the shortcomings in terms of information and the credit market encountered in export operations are usually much greater than those faced by companies in their sales on the domestic market (Bekerman and Sirlin, 1995).

It may also be wondered how far export subsidies represent the most suitable way of correcting or eliminating the non-efficient factors that adversely affect company decisions on production specialization.

The classical response of second-best theory is that the optimal approach to these problems involves attacking them at their source (Corden, 1978): i.e., stabilizing the economy at the macro level, expediting the functioning of the legal system, eliminating distortive policies (such as trade protection), and developing optimal industrial policies (assistance in the areas of finance and information) which correct market flaws that affect export activities. When this is not possible in the short term, or when the distortive policies nevertheless act as second-best instruments for solving other market flaws, export subsidies may be used to reduce the implicit social costs.[6]

In turn, these subsidies should have some degree of sectoral selectivity, for when the anti-export bias in question is generated by extra costs due to taxes or tariffs the rates of subsidy should reflect the sectorally differentiated impact of those costs.

An export subsidy which seeks to offset an anti-export bias generated by market flaws should also have some degree of selectivity, determined in this case by the nature of the flaws in question. It can thus be asserted that export subsidies should be concentrated in the sectors producing the most differentiated goods (which are those facing most shortcomings in terms of information) and in small and medium-sized enterprises (because the economies of scale inherent in the collection of information and the commercial and financial management of export operations make the export efforts of these firms even more complicated). Furthermore, some of these extra costs act as (individual and sectoral) barriers to entry into export activities rather than as permanent extra costs. This means that the incentives should give priority attention to sectors with the least export tradition and should also go down with time.

[5] This is none other than an example of the application of Lerner's well-known symmetry theory, whereby - in a general equilibrium context - import duties operate in a manner equivalent to export taxes. Several heterodox studies on the Southeast Asian experience (such as those by Wade, 1990, or Amsden, 1989) fail to take account of this question when they claim, without further clarifications, that the governments in that region simultaneously promoted exports and import substitution in different industries (Rodrick, 1995).

[6] The difference between trade protection which is not offset by export subsidies and trade protection which is offset in this way has been described by Little, Scitovsky and Scott (1970) as the difference between mere protection and true industrial promotion. This conceptual distinction is of fundamental importance for understanding the very different results obtained by the outward-looking industrialization policies of the Southeast Asian countries and the inward-looking industrialization policies adopted by many Latin American countries.

It would also be desirable to investigate the possible effects of the particular form assumed by export subsidies in the ISR, that is to say, the tariff reductions for the imports of the firms involved.[7]

A typical export subsidy has a neutral effect as regards promoting production complementarity (through specialization by the firm) with other local or foreign firms. The export subsidy through tariff reductions, in contrast, gives rise to an artificial bias in favour of complementation with foreign firms. In other words, firms have more incentives to specialize and complement their production with imported inputs than with local inputs. This bias can be a source of serious inefficiencies, not only because it constitutes yet another distortion in resource allocation but also because it runs counter to one of the most important factors of systemic competitiveness: strengthening local production chains and local subcontracting networks.

On the other hand, subsidies through special tariff reductions give rise to further anarchy in the effective sectoral protection structure.[8]

2. Export subsidies

Although the ISR was presented as an industrial policy instrument designed to promote the restructuring of production, its main raison d'être was really to correct the distortion in relative prices which existed in the economy as a result of the increase in the effective export exchange rate. For this reason, it is desirable when analysing this policy to make a global study of the different theoretical grounds for the use of export subsidies.

The arguments in favour of the use of export subsidies are along two main lines, one microeconomic and the other macroeconomic. The microeconomic line is based on general equilibrium models in which it is assumed, at least implicitly, that adjustment mechanisms through prices (in this case, the real exchange rate) make it possible to exclude the coordination failures of an aggregate nature which are reflected in unwanted global trade balances. Attention is thus concentrated exclusively on questions of allocation.

The first and most important case is that of the use of export subsidies as a way of offsetting an anti-export bias. A second justification of a microeconomic nature for export subsidies may be drawn from the arguments highlighting the advantages of a bias in favour of trade. The reasons for such an extension of subsidy policy to exports lie in the externalities generated by greater integration of world trade. Prominent among them is the possibility of securing a greater inflow of technology, and especially of "soft" technologies, since export activities implicitly involve learning processes in terms of quality control, design capability and packaging, which subsequently spread to the domestic market through the influence of improvements in locally sold products, and the dissemination of these new technologies to the rest of the production apparatus through relations with suppliers. As these externalities are very important in the initial stages of an export model –which is when enterprises must embark on the process of productive and organizational restructuring– export subsidies justified on these grounds must also be of a transitory nature.

A third microeconomic argument may be found in new international trade theory. In the models based on this theory,[9] export subsidies are supposed to allow local enterprises to make greater gains than would normally be possible in international markets with high degrees of concentration and serious entry barriers. Although this argument would hardly be applicable to underdeveloped countries (which do not have big enough enterprises to enter into strategic competition for markets with foreign firms), competition within a regional market may be very impor-

[7] The main advantage of a system like this is really its lower visibility as a subsidy, in view of possible complaints from outside (e.g., from the WTO or the United States Government). There is also another advantage from the government's point of view: the ISR did not involve actual outlays of public money but only the sacrifice of some tariff revenue (Magariños, Díaz Pérez and Sierra, 1995). Although of dubious conceptual validity, this advantage must be understood in the context of the pressures to reduce public expenditure exerted by the international agencies and incorporated in the so-called Washington Consensus.

[8] While at the same time liquidating the tariff preferences granted under MERCOSUR and thereby allowing Brazil to strengthen its bargaining position in other problem areas (such as the automotive regime, para-tariff restrictions, etc.).

[9] A good summary of these arguments may be found in Brander, 1987.

tant (Bekerman and Sirlin, 1994). In these cases the subsidies must be highly selective and suitably measured in the light of the particular characteristics of each market.[10]

All these arguments are posited within a theoretical framework based on general equilibrium principles in which the real exchange rate adjusts spontaneously to its equilibrium level, the trade balance is determined exclusively by macroeconomic variables, and a reduction in imports due to trade protection or an increase in exports brought about by subsidies cause an appreciation in the real exchange rate which leaves the trade balance unchanged.[11]

We believe, however, that imbalances of a global nature (and their interaction with microeconomic policy instruments) are too important in theory and practice to be left out of the analysis. Here there are two major arguments that justify the use of export subsidies as a complement to macroeconomic policies.

Firstly, there may be rigidities which prevent relative prices (such as the real exchange rate) from adjusting to their equilibrium values. In an extreme case of rigidity, adjustment to negative external shocks is reflected in changes in the level of domestic activity (or compensatory capital movements). In this context, the discussion goes beyond the sphere of the allocation effects of trade policy to include the more general problem of the degree of utilization of production resources. Expenditure reform policies (such as import tariffs and export subsidies) recover their macroeconomic effectiveness in this case, for these instruments make it possible either to raise the local level of activity in view of the level of external imbalance or to correct that imbalance while leaving the level of domestic activity unchanged. They thus become second-best instruments for correcting macroeconomic relative price problems (Bekerman and Sirlin, 1995).

Secondly, specific interactions can be established between real flows and financial flows which also make trade policies effective on the macroeconomic level. The clearest examples of this are trade credits tied to the purchase of goods. For example, if the importation of capital goods is reduced (by an increase in tariffs) this will at the same time reduce the inflow of foreign capital to finance such transactions (thus deactivating the currency appreciation pressures that would arise in the case of the neoclassical models analysed earlier). Likewise, an export subsidy accompanied by the export of capital (incorporated in trade credits or foreign direct investments, for example) will also have an effective impact on the trade balance.

It could be argued that in this latter case the result would be to alter the trade balance but not the balance of payments as a whole (since the real and financial movements would cancel each other out), so that the macroeconomic effects would be insignificant.

However, this compensation between the trade account and the capital account becomes particularly significant when the international financial agents view exports and the trade balance as decisive factors in their expectations regarding the ability of highly indebted economies to meet their external commitments. In other words, these variables become influential indicators used by the agents when analysing the external sustainability of economic stabilization and structural reform programmes. In this sense, it can be maintained that the shadow price of each dollar entering through the trade account is higher than that of a dollar entering through the capital account.

Export subsidies may be justified on different grounds in the microeconomic and the macroeconomic spheres.[12] In the second case, trade policy acts as a second-best instrument for correcting general problems of relative prices, so that any kind of sectoral selectivity should be avoided. In the first case, in contrast, trade policy acts as a first- or second-order instrument for correcting microeconomic distortions. The resource allocation effects of the policy are therefore important, and it should have a degree of selectivity determined by the particular objectives of each measure.

[10] The activist derivations of the new theory have been the subject of heavy criticism. Grossman (1987) sums up the main shortcomings in the argument, including its lack of robustness (in the event of marginal changes in the assumptions), its failure to include the possibility of trade reprisals, the information problems implicit in policy implementation, and the serious problems of political economy raised by such discretional forms of intervention.

[11] See Krueger (1990) and, for a local version, Rodríguez (1994).

[12] A second area of interaction between the microeconomic and macroeconomic aspects implicit in the use of export subsidies is connected with their fiscal effects in contexts of fiscal constraint. This issue has been analysed in Sirlin (1997a).

3. Supply-side or integral industrial policy approaches

In the previous two sections we set forth the theoretical arguments justifying the use of export subsidies as industrial policy instruments or as a complement to macroeconomic policy.

But what is the right level for the incentives? Should they be accompanied by some specific commitment on the part of the private agents, to be supervised by the government? Should the incentives provided be supplemented with other types of policies? The answers to these questions will be very different, depending on the theoretical conception the authorities have of the functioning of the economy and, hence, of the role to be played by industrial policy. In this respect, we consider it necessary to distinguish between two main concepts of industrial policy, which we may call the supply-side and integral approaches (table 1).

In the first approach, which is well represented by the second-best theory and the new international trade theory, the private agents are assumed to be perfectly rational and the problem stems from the erroneous price signals they receive. If these are corrected, the agents will spontaneously adjust their decisions in such a way as to achieve socially optimal results.

If the system of incentives is well designed, the question of the measures needed to ensure compliance with them is no longer important: there is no point in demanding a programme to increase exports or demanding and supervising the production restructuring processes of the beneficiary firms, because these results will be ensured by the maximizing response of the private agents themselves.

Under the other approach, which we have called the integral approach, the answers to the questions asked at the beginning of this section are significantly different. This approach is based on different

TABLE 1

Alternative industrial policy approaches

	Supply-side	Integral
Critical assumptions	Neoclassical micro-bases: entrepreneurs respond spontaneously to changes in price signals. Transaction costs do not exist.	Evolutionist micro-bases: entrepreneurs may be incapable of perceiving, processing and responding to changes in price signals. Transaction costs do exist. Importance of the institutional framework.
Problems observed which justify intervention	Price signals distorted by market flaws and policy-derived distortions.	Distorted price signals, plus: Failures of coordination due to transaction costs. Limited entrepreneurial capacity. Need to modify socially inefficient patterns of microeconomic behaviour.
Types of policies applied	Modification of price signals.	Modification of price signals, plus: Binding commitments required in return for the incentives provided. Industrial extension activities designed to strengthen entrepreneurs' decision-making capacity and to promote coordinated solutions within the framework of collective conversion processes.
Institutional requirements	Low institutional requirements (design, application and auditing of supply-side policies).	High institutional requirements: Greater importance attached to controls in order to reduce transaction costs. Public and mixed institutions linked up with production networks.

Source: Sirlin (1997b).

micro-bases according to which entrepreneurs have only limited rationality and may therefore have difficulty in perceiving, assimilating and responding to changes in price signals. There is no longer a situation of global and absolute maximization, but rather one of local maximization in which the agents tend to take decisions that improve their situation but do not necessarily take the fullest advantage of all the possible alternatives.

Among the consequences of this change of assumptions are the following:

i) It may prove to be necessary to exaggerate the incentives in order to indicate more clearly the types of responses it is desired to induce.[13] In the case under discussion this would mean, for example, generating a positive bias in favour of exports and not merely eliminating the anti-export bias.

ii) The local maximization measures taken by entrepreneurs may not coincide with the socially optimal reactions which it was desired to induce through the policy. An incentive like that provided by the ISR, for example, may be used to obtain windfall rents in the export market rather than to finance a production restructuring process that would structurally strengthen firms' export capacity. Requirements for export and investment commitments and suitable supervision of their fulfilment may prove to be essential in order to achieve the policy objectives.[14]

iii) Entrepreneurs may have difficulty in carrying out the changes promoted by the public sector incentives. This difficulty may stem either from the existence of other price distortions (capital market flaws, for example) or from shortcomings in terms of the capabilities and knowledge needed in order to carry out the restructuring process. Supplementing changes in the price signals with other policies that strengthen entrepreneurs' response capacity may be the key to the success of the incentive systems applied.

In an integral approach, the institutional requirements increase considerably, especially with regard to the need to supervise fulfilment of the conditions imposed.

III

The Argentine Industrial Specialization Regime (ISR)

1. Description of the Regime

The ISR operates as follows:

Enterprises conclude agreements with the Ministry of Industry on (annual or multi-year) schedules for increasing their exports of specific industrial products. Each enterprise may submit more than one programme and include various products in each of them.

In all cases the base year is 1992. The value of the exports is net of imported components.

The enterprises become eligible for tariff rebate certificates, in an amount equivalent to the increase in their exports, which allow them to import goods at a differential tariff of 2% and a "statistical rate" of 3%.[15] As from 1997, a gradual process of reduction of incentives was begun, designed to bring them in line with the prevailing tariffs by the year 2000.

The commitments entered into are not binding, and the enterprises receive incentives for the total amount of their increase in exports, regardless of whether this is lower, equal to, or higher than the amount promised. Moreover, enterprises can refrain from applying for incentive payments in years when they do not make more exports than in the base year, but can apply for them again in subsequent years when they do comply with this condition.

Enterprises can import at differential tariffs products which correspond to the same production sector as the goods they export and are in the same

[13] Such clearer indications take on greater importance in contexts of great uncertainty, since they provide information on the course the authorities want the transformation process to take.

[14] This is so if industrial policy is seen as a mechanism for inducing entrepreneurs to take social efficient decisions rather than merely as a means of providing them with extra benefits.

[15] At the time when the ISR was established the "statistical rate" had been raised from 3% to 10% for most products.

chapter of the foreign trade nomenclature. Likewise, in programmes involving complex goods that can be broken down into various components, they can include imports of the same type of goods or of their component parts or assemblies. When programmes involve the export of parts and components, the imports can include complex goods incorporating such components.

When complex goods are exported it is necessary to comply with an additional requirement: the product exported must contain a minimum of 25% of inputs or parts obtained from an independent supplier (the original decree laid down that these suppliers must be local firms, but this requirement disappeared as a result of a later amendment).

In all cases firms must seek the approval of the relevant chambers of industry for the goods to be imported. The key criterion for granting such approval is the possibility of damage to local producers of such goods, if they exist. In some cases, through the mediation of the Ministry of Industry, compromise agreements were reached on the amounts, prices and destinations of the imported goods.[16]

The benefits provided by the ISR are in addition to those available under the systems of drawbacks and exemption and repayment of the value added tax on exports. Adding together the average levels of drawbacks and tariff reductions under the ISR programmes, the total incentive per unit of additional exports came to over 30% (i.e., 13% for the average drawback on exports plus 18% for the average tariff reductions). This total indicates the existence of a bias in favour of exports, since the taxes and extra costs borne by export activities hardly came to such a large amount.

2. The ISR as an incentive for production restructuring and an export incentive

Towards the beginning of the 1990s there was generalized agreement on the microeconomic shortcomings of Argentine industry: technological backwardness, small scales of production, excessive diversification of production, and insufficient development of inter-firm networks (especially for subcontracting).[17]

The Cavallo administration tried to address these problems from the start by reducing what it saw as one of their main causes: the anti-export bias. Tariff reductions, the elimination of distortive taxes, economic deregulation, making export drawbacks equal to import tariffs, and the reintroduction of temporary duty-free admission were the main measures adopted in this respect.

The Industrial Specialization Regime (ISR) was presented as a natural extension of this strategy and an effective instrument for promoting restructuring through production specialization. It was acknowledged that the ISR could not of itself transform the Argentine production structure, but it was considered that it could "give rise to valid models of business conduct that should be followed by the rest of the industrial community" (Magariños, Díaz Pérez and Sierra, 1995).

But how was it intended to set this process in motion?

On the one hand, the authorities had eliminated –and even reversed– the anti-export bias which was seen as one of the structural factors responsible for the excessive diversification of production. On the other hand, it was believed that the ISR would enable entrepreneurs to capture trading rents (by extracting them from distributors of imported products) which would be used to finance the necessary investment and restructuring processes.

The design of the ISR reflected some aspects of the "integral" industrial policy approach mentioned earlier: the desire to "signpost" the transformation process, and the provision of somewhat exaggerated incentives (which, as noted in the previous section, were bigger than any possible anti-export bias).

As an incentive for restructuring, however, the ISR was basically a biased, supply-side instrument.

i) No commitment to make investments or modify the product structure was demanded (this represented a crucial difference from the Automotive

[16] The consultations with the Chambers of Industry were not binding, however, since they did not include the previous stages (because of the problem of substitution of inputs). Private sources claim that the results depended on the relative strengths of the negotiating parties and that there have been cases of programmes that have been approved despite their rejection by the Chambers (Interview with F. Martínez, representative of the Textile Industries Association).

[17] Significant contributions to the establishment of this general consensus were made by the studies carried out in the ECLAC Buenos Aires Office by J. Katz and B. Kosacoff. A summary of these studies is given in Katz, 1993.

Regime). On the contrary, it was simply assumed that firms would "maximize" their activities, using the rents generated by the ISR to optimize their production.

ii) There was no requirement that the items to be imported by firms should have effectively formed part of their product structure before, so that production specialization could be carried out at the expense of local subcontractors. Furthermore, firms could obtain benefits by exporting all the goods they produced earlier or, still worse, by exporting one set of goods in one year and a different set of products in another (provided they were registered in different programmes of the same firm). In neither case was production specialization a necessary requirement for fulfilling the conditions for the receipt of incentives.

iii) The ISR was not accompanied by other instruments, specially aimed at small and medium-sized firms, which would help to facilitate and materialize the restructuring processes that it was desired to induce. Thus, the main beneficiaries of the ISR were big companies whose process of production restructuring and insertion in the international market was already consolidated and did not need this kind of incentives. This shortcoming was detected by an early appraisal study by the Ministry of Industry itself which noted the need to establish a programme of ongoing attention to the needs of small and medium-sized firms in order to promote their inclusion in the ISR, linked up with the promotional activities of the Fundación ExportAr and the Banco de Inversión y Comercio Exterior (Argentina, Dirección de Estudios Industriales, 1994). These recommendations did not result in any solution for the problem, however.

iv) Scant attention was paid to the institutional facilities needed for spreading (especially among small and medium-sized firms), managing and supervising the ISR. For example, some of its requirements (such as obtaining at least 25% of the parts and components from independent suppliers) were simply not supervised at all.[18]

The ISR was applied as a fiscal incentive for exports rather than as a conversion policy. Towards the end of 1992 the simultaneous processes of exchange rate appreciation and the boom in consumption gave rise to a rapidly growing trade deficit. For this reason, the government embarked on a strategy to correct relative prices by fiscal means, one of the main instruments of which was an increase in export drawbacks. The ISR was just one of the mechanisms in this strategy.

In its role as an export incentive, however, the ISR also displays a supply-side approach, with severe design flaws:

i) The export commitments were not binding. In reality, they served no real purpose at all.[19]

ii) For firms with more than one approved programme it was perfectly possible to receive benefits even without increasing their total exports.[20]

iii) Firms could apply for incentive payments in the years when they exceeded the exports of the base year but were not subject to any penalty in respect of the years when they did not meet their commitments. Thus, the Regime rewarded not only genuine export efforts but also good results of a purely conjunctural nature.[21]

iv) The fixed base year 1992 gave rise to some undesirable biases. It penalized firms which had already made a substantial export effort (even at a loss) in that year. Furthermore, it gave bigger rewards to firms which registered a spectacular but once-only increase (since they received the same incentive for all the years of the programme) than firms which made a sustained export effort and increased their exports year by year. This problem could have been solved by using a movable base year.

[18] The shortage of institutional resources for implementing the policy was also reflected in the lack of updated and accurate information on the functioning of the ISR. Furthermore, the weakness of the supervisory arrangements may have permitted fraudulent misuse of the Regime, such as the re-importation into national territory of exports which had received benefits under it.

[19] In reality, except for their publicity value, the commitments only served for the proportional payment of benefits during the first year of each programme. As from the second year, the incentives were only granted on the basis of the exports in the base year, in respect of the amount of additional exports (regardless of whether these were less, equal to, or greater than the figures stated in the commitments.

[20] Take, for example, a firm that submits two programmes for products A and B, of which it exported $ 50 in each case in the base year (i.e., a total of $ 100). If in the following year this firm exports $ 60 of product A and $ 0 of product B, it can nevertheless claim benefits of $ 10 (in respect of the programme for product A), even though its total exports have gone down by $ 40.

[21] Moreover, firms can inflate their export results for one year at the expense of another by altering the billing dates.

v) Firms could submit their programmes after having begun or increased their exports.

vi) Tariffs were not reduced in proportion to the existing import duties but were all reduced to the same amount of 2%. Thus, the higher the original tariff on the goods to be imported, the greater the incentive, and in the Argentine tariff system the highest tariffs tend to correspond to goods with the highest degree of processing.

The foregoing means that in many cases the ISR operated as a superfluous reward for those who had made a sporadic increase in their exports rather than as an incentive to make greater export efforts.In view of its various design flaws, there are grounds for presuming that many of the increases in exports under the ISR programmes would have been made in any case, even without the incentives of the Regime in question.

IV

The impact of the Industrial Specialization Regime (ISR)

When it was suspended, in August 1996, the ISR had over 300 approved programmes, of which some 190 had already resulted in the issue of tariff rebate certificates. The increase in exports in the period from 1993 to 1995 came to US$ 440 million, so that with an average tariff preference of 18%[22] the presumed fiscal cost came to some US$ 80 million.

As already noted, the ISR only acts as a very indirect incentive for industrial conversion and production specialization. The absence of binding commitments by the beneficiary firms makes it more difficult to verify possible microeconomic changes due to the ISR.

In a survey made by the Ministry of Industry in the first half of 1996, three years after the initiation of the ISR, it was found that 87% of firms had made investments after their inclusion in the ISR, and that most of those investments were for re-equipment. A large proportion of the firms (61%) made changes in their process and organizational engineering, while 48% increased their scale of production. A similar percentage of the firms intensified their quality control activities in view of the new demands posed by external markets, while 35% said that they had carried out processes implying a tendency towards greater specialization and 39% reported specialization towards more complex products or goods with greater added value (Argentina, Secretaría de Industria y Comercio Exterior, 1996).

These results do not allow us to come to any important conclusion, however. In the period from 1992 to 1996 there was a generalized process of investment and re-equipment in Argentine industry, together with changes in process and organizational engineering and increases in scale of production (as witness the increase in the global levels of industrial activity). Furthermore, the 35% of firms which tended to specialize is only a modest figure for a Regime which was explicitly designed to promote production specialization. In no case was it possible to determine the type of causality between the microeconomic behaviour of firms and their inclusion in the ISR.

Independently of the various criticisms levelled at the ISR as an industrial policy instrument, a consensus has tended to grow up on its effectiveness as a means of promoting exports of manufactures, thanks partly to the massive publicity that the Ministry of Industry has made of its results. It has also been claimed that the increases in exports have been greater than those promised in the commitments (table 2).

The information proffered by the Ministry of Industry highlights the fact that, since the initiation of the ISR, US$ 430 million of exports were generated between 1993 and 1995. However, this information is hardly a reflection of the relative results of the firms registered under the ISR. It would therefore be desirable to compare the growth rates of exports under the ISR with those for the rest of manufactures.

[22] This average margin of preference included the reduction of seven points in the "statistical rate". As from 1995, when the "statistical rate" went back to its original level of 3%, the margin of preference under the ISR went down proportionately.

TABLE 2
Argentina: Exports of the programmes which obtained tariff rebate certificates each year under the Industrial Specialization Regime (ISR)
(Millions of dollars)

Exports	1993	1994	1995
In base year 1992	389.8	163.2	337.5
Annual total	*492.0*	*344.7*	*508.*5
Annual increase	92.3	172.0	175.9
Exports under ISR/ All exports of manufactures of industrial origin	13.4%	7.4%	7.8%

Source: Argentina, Secretaría de Industria y Comercio Exterior (1996).

Table 3 shows that the growth rate of exports under the ISR programmes was almost equal to that of industrial manufactures as a whole in 1993, much higher in 1994 and much lower in 1995.[23] If we deduct from exports of manufactures of industrial origin those corresponding to the motor industry (which has a special Regime of its own) and gold and manufactures thereof (which were inflated by a multi-million dollar fraud against the State), the picture changes and the growth of exports under the ISR in 1993 and 1994 becomes rather more marked. Even so, however, if we take the average for the period from 1993 to 1995 the results for those exports are below those of industrial manufactures as a whole (excluding the motor industry and gold).[24]

The appraisal of the ISR's results is much more unfavourable if one bears in mind that the official figures on export increases under that Regime only take account of the external sales of the firms which applied for tariff rebate certificates in each year. In other words, they only take account of the firms which had exports greater than those of the base year 1992 and were therefore able to apply for benefits under the Regime. In contrast, they fail to include the firms that did not receive benefits in each year, presumably because they did not reach the goal of exceeding the level of exports of the base year.[25] Unfortunately no information is available on the export performance of firms which are registered in the ISR but did not submit applications for benefits in each year.

An indirect idea of the proportion of programmes which did not become eligible for benefits in each year is given by the ratio between the initial level of exports of the programmes which received benefits and the initial level of exports of all the programmes presenting commitments for each year. This ratio was 72% for 1993, only 24% for 1994, and 48% for 1995.

This information indicates that a large proportion of the programmes (estimated on the basis of their share of initial exports) were not able to receive benefits. The proportion is very high for 1994, which was precisely the year when the ISR was supposed to be at its most dynamic. The erratic levels of submission of applications for benefits tend to confirm the hypothesis that the ISR has rewarded sporadic export results rather than systematic export efforts.

Some special comments are called for on the distribution of ISR programmes by sector, geographical area and company size. From the sectoral point of view, the most prominent sectors are iron and steel, with 27% of the increase in exports; tyres, 15%; chemicals and auto parts, 9% each; and footwear, 7% (Bermúdez, 1996). Still greater concentration is to be seen in the geographical origin of these exports: Buenos Aires accounts for 64%, Santa Fe for 12%, and the Federal Capital for 7%.

With regard to the breakdown by company size, 57% of the firms which received tariff rebate certificates were small or medium-sized enterprises, many of which embarked on export activities for the first time under the ISR. They have displayed greater dynamism than the big companies registered under the Regime, though this is partly explained by the low level of their initial exports. Their share of total additional exports only came to 15%, however, which indicates that the ISR was mainly an industrial policy instrument for large firms.

[23] The valid point of reference would be manufactures of industrial origin rather than total manufactures, since the sectoral profile of the ISR programmes shows a relatively low proportion of manufactures of agricultural origin.

[24] Because of the inadequacy and tardiness of the official data on exports under the ISR, an influential study by Cepeda (1995) overestimates the contribution of the ISR to the growth of industrial exports in 1994. The indirect estimates made by that author suggested that the ISR was responsible for 20% of the growth of exports of manufactures of industrial origin between 1993 and 1994, but the definitive information available indicates that the share attributable to the ISR was only around 10%, both between 1992 and 1993 and between 1992 and 1994.

[25] This takes away the validity of the assertion that the export commitments were surpassed, since it only refers to this limited and biased set of programmes.

TABLE 3

Argentina: Growth of total exports of manufactures and of those which have received tariff rebate certificates under the Industrial Specialization Regime (ISR)
(Percentages)

Exports of manufactures	1993-1992	1994-1992	1995-1992	Average 1993-1995/1992
With tariff rebate certificates under ISR	26	110	51	49
Of industrial origin	29	61	126	72
Of industrial origin, with exception of motor industry and gold [a]	17	34	105	56

Source: For data on the ISR: Argentina, Secretaría de Industria y Comercio Exterior (1996); for exports of manufactures: prepared by the author on the basis of data from the Institute of Statistics and Censuses.
[a] The categories excluded were SITC, Rev. 2 groups 781, 782 and 784 (motor vehicles and parts) and groups 772 and 897 (electrical apparatus for making and breaking electrical circuits, etc., and jewellery and goldsmiths' wares).

V

Conclusions

The Industrial Specialization Regime formed part of a small group of active policies implemented from 1993 on in order to cope with the strong pressures being exerted by the growing trade deficit and the difficulties firms were facing in their efforts to carry out production and technological restructuring processes.

The inadequacy of the incentives offered, their lack of linkages with the other industrial policy instruments, and the failure to demand binding production conversion commitments militated against the efficacy of the ISR as an instrument for promoting restructuring.

Nor does the Regime seem to have functioned properly as an export incentive, since the dynamism of exports under the ISR programmes was less than that of the rest of exports of manufactures of industrial origin. Furthermore, because of various features of the design of the ISR, a substantial part of the benefits provided under it went to sporadically good export results rather than sustained export efforts.

It may be concluded that, in general, the benefits granted have been redundant in the sense that they have rewarded exports that would have been made in any case and have not stimulated a significant additional export flow. The main beneficiaries have been big companies with a long export tradition (notably iron and steel companies).

Finally, the Argentine experience with the Industrial Specialization Regime shows the limitations of the supply-side approach to industrial policy. This case shows how the theoretical biases of orthodox thinking have not only helped to determine the course taken by structural reforms but have also had a negative influence on the ways in which industrial policy instruments have been designed and applied. In particular, nothing was done to ensure the necessary strengthening of the public bodies responsible for policy design, implementation, supervision and evaluation, which appears to be one of the main reasons why the new industrial policies continue to display the same defects as those of the import substitution period.

(Original: Spanish)

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Comparative advantages *and the exploitation of* environmental resources

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This article analyses five types of international trade based on the competitive advantages afforded to under-developed countries by their environmental resources endowment. First of all, specialization of such countries in the production of highly polluting goods and services is studied, recalling the conventional specialization in the production and export of goods making intensive use of natural resources. The commercial exploitation of the recreational services of natural parks and the exploitation of biodiversity in pharmaceutical research is then referred to. The use for profit of some environmental services involving these resources which are in the nature of public goods and which would require some type of bilateral or multilateral international agreement is addressed. The access of these countries on an equal footing to a number of global and common resources is then considered, and finally some conclusions are presented. According to these conclusions, it is hard for trade relations between developing and developed countries, based on specialization in the use of the endowment of environmental and natural resources, to provide any solution to the problems of poverty and environmental degradation. However, more efficient, more imaginative and, in the final analysis, more equitable exploitation of these resources could make a much bigger contribution to the solution of these two serious problems. In this case, in order to attain economic and social efficiency it is necessary to receive the collaboration of the advanced countries, in view of the fact that environmental resources are in the nature of public goods.

I

Introduction

Two of the most serious problems facing mankind at the close of the twentieth century are more and more closely intertwined in an increasingly integrated economy: the problem of poverty, and that of environmental deterioration. Although the relation between the two has been abundantly documented (Goodstein, 1995, chap. 19), it would unfortunately appear that the growth processes of the underdeveloped economies, in so far as they take place, do not guarantee their solution. Indeed, the empirical data show that the environmental indicators display a U-shaped form of evolution: the problems tend to get worse with the growth process until they reach a turning point, at their lowest level, after which the quality of the environment begins to improve. This turning point takes place at different levels of per capita income, depending on the indicator under analysis: in general, it takes place when the countries reach a per capita income level similar to that of Mexico (Grossman and Krueger, 1995). However, this improvement is limited to local environmental problems: in the case of global-level problems, the growth process does not appear to be accompanied by such possible improvements (Shafik, 1994). This is probably due, on the one hand, to factors connected with the patterns of consumption that accompany the growth process itself and, on the other, to the fact that this growth takes place in the context of an increasingly integrated economy in which international trade flows may be facilitating this transfer of pollution from the more highly developed economies to the poorer ones. This is shown, at least from a theoretical point of view, by studies which have incorporated environmental variables in international trade models (Copeland and Taylor, 1995a).

This article aims to show that the present trade relations between underdeveloped and developed countries, which are the result of specialization based on the countries' environmental and natural resource endowments, are hardly likely to provide a solution to the problems of poverty and environmental degradation. In contrast, a more efficient, more imaginative and, in the final analysis, more even-handed form of exploitation of those resources could do a great deal more to solve them. In this case, in order to achieve greater economic and social efficiency the collaboration of the advanced countries would be required, because these resources are in the nature of public goods, but this would ultimately redound to the benefit of all concerned.

We will therefore analyse five different types of international trade based on the comparative advantages given to the underdeveloped countries by their environmental resource endowments. In section II we will deal with the most obvious and questionable of these: specialization by these countries in the production of highly polluting goods and services, that is to say, ecological dumping. In section III we will review the conventional specialization in the production and export of goods that make intensive use of natural resources, both renewable and non-renewable. In both cases, the conclusions reached are not very optimistic with regard to the ability of this type of trade to solve the problems of poverty and environmental degradation, viewed from a global standpoint. In section IV we will bring in a possibility which is assuming growing importance, especially for certain countries: exploitation of the financial gains that can be obtained from certain services related with natural resources and the environment, above all the recreational services of nature parks and the exploitation of biodiversity in pharmaceutical research. In section V, going beyond the limits of private goods[1] –limits

□ Preliminary versions of this study were presented at the Department of Economics of the Universidad de la República (Montevideo, Uruguay), the University of Corrientes (Argentina), the Second International Economics Symposium held at the Instituto Tecnológico de Monterrey (Mexico), and the Institute for the Ecodevelopment of the Amazonian Region of Ecuador (Quito), benefiting greatly from the ensuing discussions. The authors wish to express their gratitude for the comments made by J. M Naredo (Fundación Argentaria, Madrid), P. Biffani (Geneva) and two anonymous referees. This study also received research assistance from the Subdirección General de Formación y Promoción del Conocimiento of the Ministry of Education and Culture of Spain.

[1] For which it is possible to make a charge, since in principle it is possible to exclude those who do not pay from the possibility of enjoying them.

which are already very blurred in the second of the cases dealt with in the previous section– we will address a much more promising matter: the possibility of deriving profit from some environmental services related to resources which are in the nature of public goods but which, in order to allow them to generate financial flows, require some kind of bilateral or multilateral international agreements. In section VI, within the same context of public goods and the need for international agreements, we will deal with what is probably the most promising of the environmental assets possessed by the less-privileged countries: their access on an equal footing to a variety of global common resources. Finally, in section VII we will draw some conclusions from all the foregoing.

II

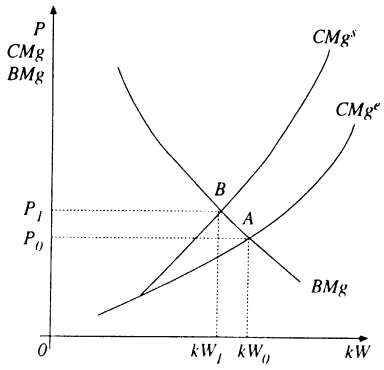
Ecological dumping

Ecological dumping occurs when a particular country allows its industries to sell their products at a price which does not include all the marginal costs involved (in this case, by leaving out certain environmental costs), thanks to its more permissive legislation in this respect. Unlike conventional *dumping*, this form of dumping requires government intervention, but the result is the same: the enterprise in question offers its products at less than cost by, in this case, avoiding a Pigou tax that would have made the private cost equal to the marginal social cost (Rauscher, 1994). In the international sphere, the possibility that the more backward regions might specialize in the production of highly polluting goods should come as no surprise: the theoretical models which simulate the international trade behaviour of two representative countries ("North" and "South") culminate in this type of specialization (Copeland and Taylor, 1995b). Although the rationality of this type of trade policy cannot always be taken for granted in different circumstances –Rauscher (1994) shows that the relaxation of environmental regulations is not always the most suitable policy for promoting exports– there can be no doubt that this is a possibility entertained by a number of countries and is the subject of heated controversy.[2]

The variable that explains this pattern of specialization is none other than the difference in levels of per capita income and, hence, in the respective levels of pollution-related supply and demand. However, it is worth going into greater detail on this point, which is sometimes euphemistically presented as merely the result of a difference in the tastes of the respective societies.

Basically, the origin of pollution does indeed lie in the process of production, distribution and consumption of goods and services. As society does not appear to be willing to dispense entirely with the fruits of progress in order to secure an unblemished environment, the problem of determining the "optimum" degree of pollution arises: that is to say, the point at which the benefits of production (the goods and services it provides) are exactly equal to its costs, including those related to environmental deterioration. This is illustrated in figure 1, where the

FIGURE 1
The optimum level of pollution



Source: Prepared by the authors.

[2] Thus, while some underdeveloped countries consider the concern of the developed countries for the environment in this context as a move to protect their own inefficient production structures and do not hesitate to refer openly to the existence of a new phenomenon, "eco-colonialism" (Rotillon and Tazdaït, 1996), the same term is used to denounce the exploitation of the natural resources of underdeveloped countries by the great transnational corporations (Ross, 1996).

vertical axis measures, in pesos, the costs of producing, say, electric power, and the benefits provided by its consumption, while the horizontal axis measures the total amount of electric power produced. Let us assume that the producer companies have a growing cost structure, so that the curve of their marginal costs (the cost of producing the last *kW: CMg*^{e}) has the form shown in the figure. The marginal benefits derived by society from the consumption of electric power (the benefits provided by the last *kW* consumed: *BMg*), however, are on a decreasing scale, as shown in the figures, so that the needs covered by them are less and less pressing. If this were all that were involved, society should be at point *A*, since dispensing with the production of one *kW* (a point slightly to the left of kW_0) would mean that the cost saved would be less than the benefit forgone, while the opposite would be the case if one additional *kW* were produced.

However, this is not the end of the story: the cost curve analysed so far does not reflect all the costs incurred by society in the production (and distribution) of electric power, but only those that affect the electricity company: it does not include the environmental costs, for example. In conceptual terms, there is no difficulty in introducing them into the calculation. Their effect is all too well known: they are added to the existing costs and shift the marginal cost curve upward (CMg^{s}). The change caused by this is easy to interpret: the new optimum point is *B*, marked by lower production and consumption of electricity ($kW_1 < kW_0$), and hence less pollution, and a higher price to the end-user ($P_1 > P_0$). Obviously, the magnitude of the impact will depend on the distance between the old and new marginal cost curves (which are not necessarily parallel: indeed, they will probably diverge to an increasing extent, since pollution has growing costs). In other words, the divergence will depend on the value of the environmental costs imposed on society by pollution. It is not easy to measure this loss of well-being, even though there are a number of more or less suitable methods for doing so (Azqueta, 1994). The European Union, for example, has completed the first stage of an ambitious research project (Project ExternE) whose object is precisely to express in monetary terms the costs generated by environmental pollution in the various cycles of electric power production (European Community, 1995).[3]

Independently of the difficulties of calculation, however, one thing is clear from these studies: the value of the loss of well-being caused by pollution is seen to be greater in proportion to the level of income of the population affected. This is particularly evident, for example, when it is a question of the impact of pollution on the life and health of the population and there is an increase in the rates of morbidity and mortality of the community affected: generally speaking, the lower the income of the persons in question, the lower the value of a "statistical life". This is precisely the argument used to justify ecological dumping: as more backward countries or regions have a lower level of income, the cost of the loss of environmental quality in them is also lower (the marginal cost curve shifts upward by a smaller amount), and hence the production of highly contaminating goods in them will be cheaper. Ultimately, the idea is that deterioration of the environment will cause less loss of well-being in poor countries or regions than in rich ones, thus giving them a comparative advantage. If this were so, the production and export of highly polluting goods and services would be justified, in principle, provided that the pollution were strictly local (otherwise it would generate negative externalities against those who do not themselves benefit from the process), limited in time, and non-cumulative, since otherwise it would be operating against future generations.[4]

[3] This process of placing values on environmental assets (or the loss of them) means reducing them to the category of goods. There is nothing intrinsically wrong with goods: it is just that many people feel that the relationship that a person establishes with them (reflected in the fact that he would be willing to exchange them for an amount of money which would keep his level of well-being unchanged) is not what they would consider appropriate for representing mankind's relationship with nature (Anderson, 1993, chap. 9). In other words, the conventional form of valuation is based on the idea of the values used in trade and fails to take account, among other things, of the priceless values that could be modelled through a lexicographic but not a monetary order (Lockwood, 1997). We will return to this point at the end of this study.

[4] The argument that future generations could be compensated through the investment on their behalf of an appropriate part of the benefits generated in the process, replacing natural capital with produced capital, is not really valid; such replacement is not always possible, and moreover no-one has asked them –or could ask them– if they are in agreement with this approach. Indeed, there would be no point in doing so, since they are the ones who are going to be replaced: if there is pollution, the group of persons who will form part of the future generation will be different from that which would have made up that generation if pollution had not taken place. This is a "problem of indetermination" (Elliot, 1995, p. 3), which conventional economic analysis circumvents through the fact that, in its underlying utilitarian philosophy, what matters is the total amount of pleasure and pain, not the particular individuals who experience those feelings.

Obviously, however, this argument raises too many problems to be accepted without reservations:

i) The fact that pollution would appear to be "less costly" among the under-privileged strata of the population is explained by the fact that what most of the methods used to determine the value of the harm caused do is merely to try to find out if people are willing to pay to avoid it. However, it is very well known that the amount that one is willing to pay for something depends, among other things, on what one is able to pay (the demand for a good depends on people's income), and as those who have nothing cannot pay anything, environmental degradation appears to be less costly. The problem is therefore analogous to that of child labour in the underdeveloped countries: without seeking to defend attitudes which involve a good deal of hypocrisy, there can be no doubt that basing a growth process on elements like this can only be considered as evidence of our utter failure as a society. Sacrificing both the physical and mental health of the less-privileged strata of the population cannot be the solution to the poverty problem. The "comparative advantage" of the underdeveloped regions in terms of acceptance of pollution is thus based on an ethically indefensible assumption. The same could be said, of course, of those cases where this type of specialization is explained not so much by the difference in the respective social "demands" regarding levels of pollution (we are assuming here that, in contrast with the previously mentioned case, these demands are identical), but instead by the fact that in underdeveloped countries the government does not reflect these preferences in its actions, whereas in the developed countries it does (Chichilnisky, 1994): this too represents an ethically unacceptable starting point, although at least with regard to the first part of the argument it is probably quite realistic.

ii) The approach taken in order to justify this apparently lower cost of environmental degradation in backward countries suffers from the error of not taking into account a whole series of external effects of such degradation which are not picked up in the valuation methods but nevertheless help to determine the cost of the damage done: people may be obliged to accept substandard environmental conditions because they need a job, but this will affect not only their own health (and that of their neighbours), with consequent costs in terms of public health and/or the corresponding loss of human capital, but also the durability of urban infrastructure, the cost of maintaining and cleaning movable and immovable assets, the productivity of nearby agricultural and forestry operations, etc. (Azqueta, 1994, chap. 10). It is highly unlikely that the affected person will take account of all these indirect effects of pollution when evaluating the costs it entails for him: it would be necessary to apply a series of well-calibrated indirect valuation methods which take all of these externalities into account. Thus, when the cost of such specialization for the country as a whole –and not just for those directly affected– is analysed, these apparent "comparative advantages" could turn out to be substantially reduced.

iii) Finally, acting in this way means reducing the health of human beings to the level of a mere good: a good consumed on an individual and exclusive basis, as a function of purchasing power, and exchangeable for a given sum of money –a good whose production and consumption are, in the final analysis, left in the hands of the market (Anderson, 1993). It is unlikely, from an ethical standpoint, that the social consideration of health as a mere item of merchandise would be acceptable; most likely society would prefer, at least ideally, a different kind of solution.

To sum up, then, ecological dumping is no more justifiable than child labour. It is not an ethically acceptable solution for the problem of poverty, and it goes without saying that it does not seem likely to solve environmental problems.

III

The exploitation of natural resources

In this section we group together everything that is usually considered as renewable or non-renewable natural resources in the literature: all attributes of the earth, whether living or inanimate, that mankind exploits as a source of food, raw materials or energy.[5]

Depressed areas which are fortunate enough to possess some kind of natural resource can achieve comparative (and even absolute) advantages in the production of goods and services that make intensive use of that resource. This is something which is so obvious that it is not worth dwelling further on it, except perhaps to recall some equally obvious aspects regarding the limits imposed by considerations of efficiency and equity on the exploitation of these resources. To this end, we will divide the analysis into two main parts:

1. Renewable resources

Renewable resources pose a problem which is simple only in appearance. Two of the most typical cases are probably fisheries and forests, and we will therefore refer to these two examples. Their analysis will, in addition, provide an opportunity to perceive some of the problems involved in institutional arrangements regulating their exploitation.

Under the market system, the management of a fishery will seek to maximize the present value of the net monetary flows generated by its commercial exploitation, from a purely financial perspective; that is to say, by marketing the biomass caught, which is what a market values. Let us assume that the growth rate of this biomass ($x = dx/dt$) is a positive function of its intrinsic growth rate [$H(x)$] and the rate of extraction (y), which is itself a function of the cost of fishing (C) and the expected price for the fish caught (P):

$$\dot{x} = H(x) - y \qquad (1)$$

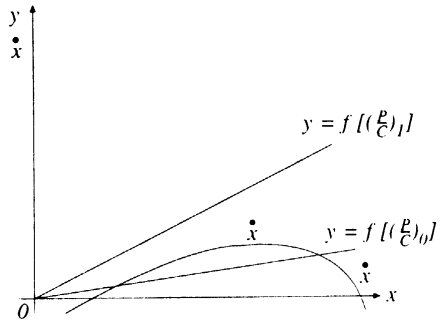
Figure 2 shows this situation.

On the basis of this behaviour equation, if there is free access to the resource, the economic agents (the fishery companies) will try to solve a problem of conditioned maximization in which the control variable is the fishing effort (y), whose optimum value is given as a function of the cost of extracting the biomass (C) and the expected price for the latter (P). When this ratio is not very high [$(P/C)_0$], the resource could be managed in a sustainable manner, since the optimum level of extraction is potentially compatible with positive growth rates of the stock of fish. When this not so, however [$(P/C)_1$], the attempt to secure maximum financial benefits will prevent this equilibrium from being attained and the resource will tend to be depleted, since the high rates of extraction will prevent its natural regeneration.

Let us now look at the case of a forest managed under some form of private or common ownership which, as it prevents free access to it, permits the planning of its rate of exploitation as a renewable source of timber with an eye to the future. The problem of conditioned maximization clearly arises here in an inter-temporal context in which the objective variable is the net present value of the yields that the exploitation of the resource will generate in the

FIGURE 2

Optimum exploitation of a freely accessible renewable resource



Source: Swanson, 1994.

[5] Although Reed (1994) cites this definition, he is not completely in agreement with it, as it does not include "gifts" such as clean air and unspoilt nature. It is a very suitable definition for our purpose here, however, as these "gifts" will in fact be analysed in subsequent sections.

course of its useful life. Maintaining the previous behaviour equations and adapting the nomenclature to the present case, the problem posed is:

$$\max \int_0^t [P(y)y - C(x)y]e^{-rt}dt \qquad (2)$$

subject to:

$$\dot{x} = H(x) - y$$

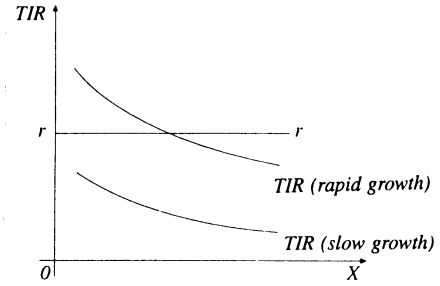
where P is the expected price of the timber, C its cost of extraction and r the yield on capital in the financial system.

The appearance of an opportunity cost for the capital invested (r), which acts as a discount rate for updating the value of the flows over time, may have the undesirable consequence that sustainable management of the resource may be unprofitable if its natural growth is relatively slow, as shown in figure 3 (Swanson, 1994). Indeed, in this second case the internal rate of yield offered by sustainable exploitation of the asset is systematically below the opportunity cost of the capital involved. Unlike the previous case, it is not free access that prevents maintenance of the resource, but the fact that the yield on the natural capital (measured by the biological growth rate of the wood, and assuming that the price of the latter is constant) cannot compete with the alternatives offered by the financial system.[6]

In many cases the macroeconomic circumstances of the underdeveloped countries themselves aggravate these problems. Thus, the shortage of foreign exchange due to the structural imbalance in the balance of payments (reflected in a very high implicit cost of foreign exchange) leads the public sector to adopt a number of measures which encourage the commercial exploitation of natural resources for export, because in the short term this helps to solve the problem, even though it is not the most profitable option from the economic point of view (because of the negative externalities it generates and its opportunity cost), while in the medium term it is harmful to the environment and ecologically unsustainable (Azqueta, 1992).[7] It is therefore worth making a brief analysis of the controversy which has arisen over the adoption by a number of underdeveloped countries of measures restricting trade in certain natural products (Lee, 1996).

FIGURE 3

Optimum rate of exploitation over time of a privately owned renewable resource



Source: Wanson, 1994.

The fact that some developing countries have prohibited the export of wood in the rough, for example, has been questioned by the importing countries on the grounds that the use of such wood leads to greater environmental efficiency (Anderson, 1996). The developed countries, with their better technology and more highly skilled labour, are indeed more efficient in the use of wood as a raw material in the production process, so that the export of wood in the rough makes it possible to reduce the amount of wood used per unit of final product. Furthermore, the likely reduction in the local price of wood due to the export prohibition may increase its consumption and

[6] The results that can be reached in the two cases analysed show the importance of the institutional aspects affecting exploitation; insecure land tenure, for example, reduces the value of the upper limit of the integral (t) in equation (2), by reducing the relevant time horizon for the decision-maker and making investments which bear fruit in the medium and long term (forestry) less profitable than those which produce greater yields in the short term (conversion of land for crop-growing or stock-raising), even though overall the latter option gives lower yields (Gottfried, Brockett and Davis, 1994).

[7] In the case of Costa Rica, for example, the increase in the demand for beef in the developed countries led to an increase of 3.5% per year in the area devoted to pastures between 1965 and 1990, often with support from foreign finance and development assistance programmes. This resulted in a progressive loss of tropical forest, whose area went down by 2.8% per year over the same period, with consequent deforestation, and the loss of 50% of the area devoted to (ecologically sustainable) traditional agriculture, with a corresponding fall in employment and production and an increase in the nutritional deficiencies of the local population (Pearce and Warford, 1993).

make it less efficient, unless it is offset by a suitable policy of licences for cutting down trees. However, this latter view is based on very short-term arguments (almost an analysis of comparative static efficiency) and does not take account of the dynamic effects on development of a policy which makes it possible to retain within the country the operations that generate most added value (Goodland and Daly, 1996).[8] In the medium and long term, the environmental benefits of the process of generation of income and employment that such a prohibition implies are probably greater than the effects of the loss of efficiency in the short term. An export prohibition of this type must be accompanied, however, by some type of economic alternative. Outright prohibition of marketing wood, far from preserving this resource, generally militates against this when the occupation of territory has already taken place or is under way: the profitability of forestry operations goes down compared with agriculture or stock-raising in the same areas, due to the reduction of the value P in equation (2), thus encouraging the clearing of forests to permit cultivation of crops or stock-raising. Consequently, before adopting this kind of measures it is necessary to make a careful institutional analysis of the situation. In this respect, certificates of origin of wood which guarantee the sustainability of the forestry operations from which the wood comes[9] could be a better alternative than outright prohibition. At all events, this possibility should be viewed in its true perspective: as noted by Gottfried, Brockett and Davis (1994), sustainable forest management (which at least saves the secondary forest, if not the primary one) requires a large area of land per family in order to ensure an acceptable income, and this sheds serious doubt on the possibility of giving the whole population of the area a satisfactory standard of living by this means.

In any case, it should be borne in mind that the commercial exploitation of various natural resources on the basis of their market value, even if sustainable, does not take account of the environmental externalities generated by the resource in question, and these externalities, which may have a much higher economic value, are usually incompatible with this type of exploitation. Taking account only of the values provided by the market is therefore no guarantee whatever that the exploitation of the resource will be socially optimal.

2. Non-renewable resources

Non-renewable resources, by definition, cannot be exploited in a sustainable manner. The objective pursued in this case is to share them properly among all concerned: a problem of inter-generational equity. The usual procedure for this purpose is to use what is called "Hotelling's rule", which relates the rate of exploitation of the resource with its price and interest rates (Gómez, 1994). This may not be a very useful rule for solving the problem in practice, but it is useful for expressing it more clearly, since it brings out the fact that non-renewable resources have an opportunity cost which must be added to the cost of their extraction when deciding the rate at which they are to be exploited. This opportunity cost must be calculated and taken into account in order to accurately determine the net benefits from their exploitation, although the conventional national accounts do not do so and therefore provide false figures on the profitability of such exploitation and the resulting growth rates of national income. In this respect, it is worth mentioning the practice which is becoming accepted in the World Bank, which consists of calculating the cost of the investments needed in order to replace, in an alternative project or programme, the services that the non-renewable resources exploited would have provided (Von Amsberg, 1993).[10]

It is also necessary to take account of the environmental impact of the exploitation processes themselves. The study by the European Community (1995) on the

[8] Indonesia, which was one of the largest exporters of wood in the rough during the 1970s (it exported as much as 40% of the world total), introduced such a prohibition in 1985, invoking Article XX of the General Agreement on Tariffs and Trade (GATT). By the mid-1980s, such exports had practically disappeared, whereas exports of wood products amounted to US$ 3.8 billion in 1991 (Goodland and Daly, 1996). A more negative view of the environmental effects of this substitution is given in Anderson (1996).

[9] Along the lines of the Forest Stewardship Council based in Oaxaca (Mexico).

[10] It is interesting to note that the prices of non-renewable resources, which should display an upward trend over time, because of the increase in the rents expected from them on account of their growing scarcity, do not seem to behave in this manner. An interesting explanation which has been put forward for this phenomenon is based on the relation which exists between some of these resources and the global pollution caused by their use (in the case of fossil fuels, for example): the limits placed on the emission of pollutants through their use may cause them to be prohibited before their actual physical disappearance, which would be reflected in this form of evolution of their expected prices (Berck and Roberts, 1996).

environmental costs of electric power generation, referred to earlier in this article, is an excellent example of the path to follow. For example, the extraction of petroleum in certain tropical forest areas has an environmental impact which is not limited to that of the operations of the oil company proper, although that impact is by no means insignificant, but goes far beyond it because of the accompanying establishment of human settlements in those areas, which proves to be a much greater threat to the sustainability of the primary forests. This phenomenon suggests that we should not only calculate this impact, as one of the prices to be paid for the extraction of crude oil, but also try to avoid it altogether. In order to do this it would be necessary to take action on the ultimate causes of this phenomenon by seeking to improve living and working conditions in the areas of origin of the potential emigrants in order to try to check this flow of settlers. The lessons learned in the sphere of development economics from Todaro's migration functions and from analysis of the informal sector, which indicate that the creation of jobs in the urban formal sector probably makes unemployment problems worse rather than solving them, could also be perfectly applicable in this case: certain social and infrastructural investments in the area of operations could actually make the situation worse, by raising the expectations of potential immigrants.[11]

Ultimately, what is involved is the solution of a problem which could be summed up, in a highly simplified form, as the need to calculate the social interest rate to discount from the net flow of benefits from the exploitation of non-renewable resources, which it is sought to maximize. The problem is by no means easy, of course: in the final analysis it is a question of inter-generational equity in conditions of uncertainty and irreversibility.[12]

IV

The exploitation of some environmental services

Some environmental services of the biosphere have the properties of public goods (non-exclusion and non-rivality in their consumption), possibly modified by the presence of congestion. Administrative measures, however, can impose exclusiveness in their enjoyment and thus allow the appearance of a price for them. This is so in the case of the recreational services of a particular environment (a nature park, for example) for which an admission charge is made; the research possibilities opened up by the biodiversity that exists in a particular nature reserve; or the renting-out of a specific area as a dumping ground for wastes (even including toxic and hazardous wastes) that the developed world does not want. In view of the similarities that exist between this latter case and the factors we mentioned when dealing with ecological dumping, which would also be applicable here, the following analysis will be limited to the first two cases mentioned above.[13]

[11] In the case of Ecuadorian Amazonia, the funds that ECORAE receives from the oil companies, which are to be invested in order to secure the sustainable development of the area, would probably achieve this objective more effectively if they were invested in the Loja area (many hundreds of kilometres away) rather than in Amazonia itself. By doing so, an attempt could be made to stop the already very substantial flow of migrants (indeed, one of the main towns of the area where the oil companies are operating, Lago Agrio, is already known as Nueva Loja), which the improvement of living and working conditions in Amazonia would merely serve to foment still further.

[12] See, for example, Sterner (1994) and Weitzman (1994).

[13] Defending the export of waste to underdeveloped countries with arguments like those mentioned in the section on ecological dumping can have highly negative consequences: Krugman and Obstfeld (1995, p. 91) describe how the collision between apparent economic common sense and morality became unpleasantly obvious in 1992 for Lawrence Summers, chief economist of the World Bank. A World Bank internal memorandum signed by Summers supported the idea that it could be reasonable, in economic terms, for the developing countries to apply rather more permissive environmental standards than the rich countries, since this could give them a de facto comparative advantage in some polluting industries. The text of the memorandum was filtered to the press, giving rise to a flood of bad publicity (*People* magazine included Summers on its list of the worst enemies of the environment), and in December of that year it appeared that the controversy over that memorandum was responsible for blocking the expected appointment of Summers as chief economic adviser to President Bill Clinton.

1. Exploitation of nature parks for recreational purposes

Nature parks are becoming more and more important as the centre of attraction for a particular type of tourism which seeks precisely the sort of experiences offered by nature in the wild. The presence of such nature-lovers in the environment they want to visit has a by no means negligible multiplier effect on the economy of the area (transport services, accommodation, etc.). In Costa Rica, for example, in 1991 the nature parks attracted half a million visitors who generated over US$ 330 million of foreign exchange, thus becoming the country's second largest industry (Grey, 1995, p. 5). Unlike other natural assets sought by tourists for leisure purposes, these parks are valued for their unspoilt character, and demand studies tend to show that visitors are very sensitive to everything –such as overcrowding or excessive commercialization– that affects their enjoyment of nature (Dixon, Scura and Van't Hof, 1995; Shah, 1995).

Economic analysis reveals that these assets have at least three sources of direct value:

i) A financial value for the owners of neighbouring properties, which can serve as a base for tourism operations and therefore gain in value. Other owners, however, may be adversely affected if the protection of the environment means that they cannot continue to carry out a number of economically profitable activities (farming, hunting, stock-raising, etc.).

ii) An economic value for society as a whole, due to the multiplier effect that these operations have on income and employment in the area (assuming that this is not a zero-sum game) or in the country as a whole. Ultimately, the public budget is also favoured through the higher income generated by the increase in economic activity, though in this case the impact is purely redistributive.

iii) The recreational value proper arising from the well-being experienced by visitors, which is reflected in the value of the net consumer surplus, as determined by, for example, the journey cost or contingent valuation methods (Azqueta and Pérez, 1996).

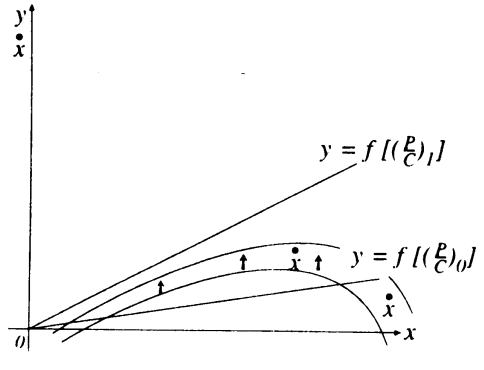
The problem facing the managers of these areas, when seeking to maximize their social value, is therefore to find the difficult balance between public and private financial profitability (in the medium and long term), the multiplier effect on employment and income in the economy, and the preservation of the essential ecological functions of the environment (maintaining biodiversity, for example). All this must also be achieved without losing sight of the interests of the local population, who are usually adversely affected by the protection of the area (since restrictions are imposed on activities in it and access to resources traditionally used in the past) yet do not benefit from the multiplier effect, since normally these effects are felt mostly in the urban centres where tourists stay. In this respect, if the presence of a substantial consumer surplus among the visitors is confirmed, attempts could be made to turn this value (a positive disposition to pay for enjoyment of the recreational services of the environment) into a flow of financial resources (through entry charges, for example) that could be directed in favour of those sections of the local population who have been adversely affected.

Unfortunately, certain well-meant conservation policies may prove to be clearly harmful both to the interests of the inhabitants of the surrounding area and to the objective of conservation itself. This may be so, for example, as a result of the inclusion of certain species in Appendix I of the Convention on International Trade in Endangered Species (CITES), which prohibits all trading of the corresponding products. The results of such a measure must be very carefully analysed, for when a species thus protected competes with others which are not, the final result may be counterproductive, since the measure reduces the financial value of the endangered species compared with its competitors, thus reducing its practical value for the local population in an attempt to save it at the global level. Thus, if two species (say, elephants and cattle) compete for territory, the local population is being encouraged to displace elephants, which have no practical value, to make room for cattle, which do have such value. We already saw that the same thing can happen with the prohibition of exports of certain types of wood. If the non-protected species is a natural predator of the protected species, the fact that the prohibition eliminates the financial value of the latter makes its protection less

profitable, and this state of affairs becomes even more unfavourable if the predator does have a financial value (Swanson, 1993; Schulz, 1996).[14]

The foregoing can be expressed in formal terms on the basis of figure 4 (similar to figure 2). The growth function of the resource *H(x)* depends on a series of variables which are not shown in figure 4 because of the implicit introduction of a *caeteris paribus* clause but which obviously influence the evolution of the resource not only in terms of the land devoted to its development (with its corresponding load capacity) but also in terms of the execution of a number of collateral investments (Swanson, 1994). These measures, like the expansion of the area devoted to the resource, shift the curve outward, permitting higher growth rates of the resource. In contrast, when the resource loses its economic use value these variables move in the opposite direction, causing the growth curve to contract and making ecologically sustainable management more difficult.

FIGURE 4
Growth rate of a renewable resource



Source: Adapted from Swanson, 1994.

2. Pharmaceutical research and biodiversity

The case of biodiversity and the pharmaceutical industry is more complex. Some underdeveloped countries possess an asset in this respect from which they can try to earn money by offering to allow the pharmaceutical industry to exploit it in return for payment. In this way, they could not only preserve the environment but also finance the development process. However, it is necessary to get a clear picture of the possibilities in this field before beginning to celebrate. Firstly, serious estimates of the payments that the countries owning such biodiversity might be offered for its use (bearing in mind that they are calculated as a percentage of the profits that the pharmaceutical company makes from the commercial exploitation of the product finally obtained) give really modest sums which would hardly be sufficient to cover the preservation of this asset (Simpson, Sedjo and Reid, 1996). Secondly, it should be noted that in order to carry out this operation it is necessary first of all to invest in the conservation of the biodiversity of a particular environment, and as it is a public good this can only be done by the administration. The authorities of such countries generally provide a number of extra services (identification and classification in local laboratories and research centres) for which they make no charge, and if we add to this the opportunity cost of the land set aside for the preservation of biodiversity we see that the "big deal" may prove to be financially ruinous. Barbier and Aylward (1996) calculated that the net present value of the benefits that Costa Rica would receive in this respect from the preservation of a particular natural space for a period of 40 years would amount to US$ 4.6 million, whereas the net present value of the costs involved (including the opportunity cost of the protected land) would come to US$ 240 million over the same period.

It is therefore obviously very important to take into account the institutional framework within which these kinds of agreements are signed (although the calculations of the above-mentioned authors do not hold out much hope on this level) and the need for coordination among the different coun-

[14] Barnes (1996) has made an interesting study on the possible effects in Botswana of the inclusion of elephants on the protected list. Taking into account both the opportunity cost of the land occupied by the elephants and the costs of protection which have an impact on management costs (keeping watch, control, etc.), he puts forward what he considers would be the best strategy for managing this resource. Using the framework of social project evaluation for this purpose, and introducing the corresponding implicit prices, he comes to the conclusion that the controlled reintroduction of a number of prohibited practices (hunting for sport, hunting by the local population, use of elephant meat in crocodile farms for the marketing of skins, etc.) would markedly improve the economic value (for the country) and the financial value (for the local population) of elephants and hence would ultimately make a greater contribution to their preservation. The prohibition of trading elephant-based products was needlessly reducing their economic use value solely to that deriving from their mere observation.

tries possessing biodiversity (which can to some extent take each other's place in this respect), so that they will not compete with each other and thus lose a large part of the benefits of exploiting that biodiversity commercially. It is also worth noting that the institutional framework in which these transactions take place does not recognize that the true owners of these areas, the indigenous peoples, have intellectual property rights for a large number of medicines and treatments which they have developed through their knowledge of nature and which have brought the pharmaceutical industry enormous profits (Azqueta-Bernar, 1996).

At all events, subject to the above reservation regarding the pharmaceutical industry, such efforts to derive gain from some natural resource- and environment-linked services undoubtedly seem to have positive aspects. Nevertheless, it is worth mentioning a couple of obvious limitations of this sale of environmental services with regard to the objectives of reducing poverty and environmental degradation. Firstly, while there can be no objection to the idea of deriving gains from the recreational services of certain natural areas, this nevertheless leaves out all those natural environments which are not considered as "cathedrals of nature" yet are particularly threatened; it is precisely for this reason that the different forms of protection of natural areas have been evolving in this direction (López Ramón, 1996). Secondly, with regard to the solution of the problem of development, the difficulty is that on the whole these "cathedrals" are not very equitably shared out, and many countries and regions have very few of them. Therefore, while this is probably a better scheme than those analysed earlier, it can nevertheless not be relied on alone to solve the environmental problem of the global preservation of natural areas or the relief of the global problem of poverty.

V

Internalizing environmental externalities

A fourth possibility which is undoubtedly interesting and is only beginning to be explored derives from the fact that some natural resources generate a series of positive externalities which can redound to the benefit of all. One of the most obvious cases is the role played by large forested areas in fixing the carbon in the atmosphere. The existence of these positive externalities immediately gives rise to strong tensions between the common interest on the one hand and the private interests of those who consider that they have a right to dispose of the asset and object to the idea of preventing its commercial exploitation and introducing a system which will only bring them benefits very indirectly.[15] This is a long-standing conflict: the countries which have tropical forests complain that, adducing the general interest, those who did not trouble to preserve their own resources are now trying to prevent them from exploiting them in a financially profitable manner, and moreover the rich countries are not willing to offer many alternative ways of solving the problem of underdevelopment either (for example, by opening up their markets). Let us now look at two undoubtedly significant possibilities in this respect.

1. Carbon deposits

From the strictly economic point of view, the foregoing is a typical problem of the generation of positive externalities which do not directly benefit the owner of the resource. One solution could be to try to internalize the benefits provided by these services; in this way, the rest of the world would pay the managers of tropical forests the value of the services rendered by them in retaining a quantity of carbon which, if liberated into the atmosphere, would aggravate the global

[15] This is precisely why economic analysis is generally against the recognition of private rights over environmental and natural assets which generate various kinds of positive externalities: the smaller the group recognized as owning the resource, the greater the disparity between the financial benefits of its exploitation (which are shared out among a few) and the corresponding environmental costs (which are shared by the whole population).

warming problem. This would occur if, for example, they burnt or cut down those spaces to devote them to agriculture and/or stock raising, as indeed many countries which are now developed did in their time.

It is not easy to compute the value of these benefits, but one way which is quite often used is to calculate the economic cost that would be involved in reducing emissions, at their source, by an equivalent amount of carbon through, say, the conversion of industry or the modification of public transport systems. This would enable us to calculate the implicit price of the resource on the basis of this environmental function. Likewise, once the principle that it is necessary to remunerate the environmental functions carried out by certain natural resources is accepted, it would also be logical to remunerate countries which have deposits of fossil fuels (oil, coal) in a similar manner for not extracting them and keeping them instead as carbon deposits (Goodland and Daly, 1996).

2. Carbon sinks

The foregoing also points the way to a second possibility which, if treated with the necessary care, could also be interesting. Thus, some developed countries (specifically Canada) are analysing the potential profitability of afforesting or reafforesting land purely for the purpose of absorbing carbon from the atmosphere in order to avoid having to reduce emissions at their source by an equivalent amount to comply with the environmental commitments they have entered into. In this connection, Van Kooten, Binkley and Delcourt (1995) have estimated that the cost to a country like the United States or Canada of fixing one metric ton of carbon by this means would be between US$ 6.64 and US$ 10.67: a figure which does not compare unfavourably with the US$ 1.35 to US$ 59.41 it would cost to do so by other means, to say nothing of the benefits that the creation of a forest area would bring in other respects.[16] As well as this direct contribution to reducing the amount of carbon in the atmosphere by sequestering it, woods and trees (especially in urban areas) also make an indirect contribution to this aim by reducing the consumption of energy for certain activities. Thus, in countries like those mentioned above, a suitable distribution of trees around dwellings can reduce the demand for air conditioning by as much as 50% and the need for heating by 15% (Sedjo, Wisniewski, Sample and Kinsman, 1995). It would also be possible to carry out such operations in developing countries too, by remunerating the reafforestation of marginal land that could even serve as a protective belt for other spaces. The problem is that, because of the economic profitability of this operation, it might seem an attractive proposition to turn mature primary woodlands into a carbon sink, replacing the existing trees with new ones which, managed with this objective, would maximize the amount of carbon sequestered. An option of this type, however, would not stand up very well to cost/benefit analysis, since doing this would cause the loss not only of an existing carbon deposit but also of all the services provided by the rest of the ecological functions of primary forests, whose economic value (according to the data given in the excellent study by Constanza, D'Arge and De Groot (1997)) is very considerable and gives a price per hectare for tropical forests which is a good deal higher than that given by the commercial exploitation of the land as a source of wood, pastureland or any other market option.

In general terms, and for purely illustrative purposes, Fearnside (1997) calculated that the environmental services of the Amazonian rain forest would be worth US$ 7 billion per year for maintenance of biodiversity, US$ 24 billion as a carbon deposit, and US$ 7 billion more for their role in the water cycle. The first two are undoubtedly externalities which benefit the whole of mankind. In the opinion of the author, the first of these should not be subject to reduction with the passage of time, whereas the value of the second should be discounted in this way to reflect the differing value of fixing carbon according to when such fixing takes place. The third (regulation of the water cycle) is of a more local nature, as it covers the role of the Amazonian rain forest as a generator of rain in that general area, together with the impact of that rain on the productivity of agricultural land. At all events, as the author himself acknowledges, these very rough calculations do not include many other

[16] On the basis of these figures, the authors make an analysis of a possible optimum subsidy policy for both reafforestation and the subsequent use of the wood produced in such a way as to keep the carbon sequestered: 40% of the wood used for construction still exists after 50 years, while in the case of the wood used for paper manufacture the figure is only 3% (Sedjo, Wisniewski, Sample and Kinsman, 1995). There would thus be justification for a subsidy for the outright burial of wood, as a way of ensuring minimum return of carbon into the atmosphere.

positive aspects of the Amazonian rain forest, but they nevertheless provide a very good idea both of the magnitudes involved and of the path to follow.[17] As in the case of exploitation of the recreational services of natural areas, however, one must not lose sight of the fact that although the economic value of the forest, calculated in this way, is probably much higher than that of any other option, in financial terms the change may adversely affect the population which uses the resource and may now be deprived of access to it. Shyamsundar and Kramer (1996), in an interesting analysis in which they combined the production function method with that based on contingent valuation (using for this purpose –in one of the rare examples to be found in the literature– the "compensation demanded" format), calculated the loss of welfare that the inhabitants of the area would suffer through the protection of the Mantadia National Park in Madagascar. The result obtained indicates that the adverse effects would be far from negligible: in this case, their value was almost equal to the commercial value of the rice harvest.

3. Debt for nature swaps

The foregoing approach may also be taken to include the debt for nature swaps which were in vogue some years ago between various non-governmental organizations (NGOs) and some developing countries. This system is very simple and well-known: it merely consists of buying public external debt on the secondary market at a heavy discount and changing it with the issuing country for some kind of environmental commitment: creation of new nature reserves, expansion and/or improvement of existing ones, etc.[18] Leaving aside the always thorny questions of sovereignty, the problem with these schemes, apart from their somewhat voluntaristic and unorganized nature, is that they can result in an increase in the price of the debt on the secondary market (because of the increased demand). Such an increase does not benefit the issuing country but instead its creditors (who witness the rise in value of an asset which they feared was virtually worthless), nor does it facilitate subsequent operations of the same kind (as experience seems to have proved). It would therefore be preferable to place payment for such positive environmental externalities on a formal basis both in institutional terms, by setting up some supranational body or agency to be responsible for it (which would reduce the problems of sovereignty) and on the strictly economic level, by determining the flows of payments according to some established criterion.

Returning to the dual issue with which we are concerned, this internalization and consequent endowment with financial value of some environmental externalities would appear to be an ideal complement to what we analysed in the previous section from the point of view of nature conservation and protection, all the more so in view of the magnitude of the environmental services acknowledged to be rendered by these resources to mankind as a whole. Unfortunately, it does not seem that the same can be said of their possible contribution to solving the global problem of poverty: not all poor countries or regions –especially the most under-privileged and needy– have been lucky enough to possess such resources and be able to preserve them. Table 1 shows, for example,

[17] Since some of these environmental benefits are subject both to uncertainty about the future and the irreversibility that would be involved in allowing activities which are financially profitable but incompatible with their maintenance in the long term, this considerably complicates the decision-making process in this respect. Albers, Fisher and Hanemann (1996) studied the case of the Khao Yai National Park in Thailand, modelling the problem of a decision-maker faced with three mutually exclusive alternatives: preservation of the environment, semi-sustainable development of it, and non-sustainable development. Taking account of the possible sequences through a dynamic model and seeking to maximize the net present value in the best of them, the study shows that the conventional open loop strategy of maximizing the target function is inferior to a closed loop strategy of incorporating such uncertainty about the future, which results in better preservation of the environment.

[18] Among the most significant of such swaps are: the purchase of US$ 650,000 (nominal) of Bolivia's external debt by the Frank Weeden Foundation in return for increased protection of a natural area in Beni; the swap of a million dollars' worth of Ecuadorian external debt, which the Wild World Fund (WWF) acquired on the secondary market (at 30% of its nominal value), for investments in environmental education, to begin with, and a further five and a half million dollars' worth of such debt (at 12% of its market value) a few years later, in return for investments in conservation activities in Ecuadorian Amazonia and the Galapagos Islands; the purchase by The Nature Conservancy (another NGO) of US$ 2.2 million of Brazilian external debt from a private bank for US$ 850,000 and its swap with the government for internal debt (six annual payments of US$ 132,000 in local currency, at 6% interest), to be used for the management by a local NGO (the Fundação Pro-Natureza) of the Parque Grande Sertão Veredas; or the swap, also by the WWF, of US$ 2 million of Philippine debt for national bonds to be used to set up two nature parks (Pearce and Warford, 1993).

TABLE 1
Selected countries: Area of enclosed forests [a]
(Thousands of hectares)

Bolivia	44 010	
Brazil	357 480	
Colombia	46 400	
Mexico	46 250	
Venezuela	31 870	
Zaire	105 750	
Indonesia	113 395	
Peru	69 680	
Total, 8 countries	*815 335*	*(56.75%)*
World total	*1 436 492*	*(100%)*

Source: Stähler, 1996.
[a] The figure for India (36,450 thousand hectares) was omitted because it was felt that it distorted the global conclusions of the table.

how the main forest masses are distributed at present: a situation which could well be described as oligopolistic. The problem is that this oligopoly is not only not appropriate for solving the global problem of poverty, as we already said, but may even make it more difficult to solve the environmental problems themselves. Thus, Stähler (1996), using the optimum control theory, shows that when the developed countries are willing to pay more and more to maintain a resource as it becomes increasingly scarce and the countries that possess such a resource are few in number and act strategically, the optimum form of behaviour of the latter may lead to a lower equilibrium level of the total stock of the environmental good in question than if no payment were made for its preservation. In this respect, financing specific conservation projects which involve some degree of control over the resource may be a more suitable alternative than indiscriminate payment for its conservation, although they may be less acceptable from the point of view of sovereignty.

VI

Access to common global environmental resources: a market for pollution rights

It might seem a contradiction in terms to emphasize the need for more active defence of the environment while at the same time bringing into the discussion the idea of "pollution rights". In reality, however, it is probably not so.

Thus, as already noted in section II of this article, the optimum degree of pollution is not zero, since this would mean giving up the production and consumption of almost all the goods and services on which organized life is based. It would therefore seem that human beings are willing to make use of the biosphere to some extent to satisfy their own needs.[19] This naturally means making use of its positive functions while respecting its limits. Among the most important of those functions is the capacity of the biosphere to assimilate the wastes generated in the processes of production and consumption; as the principles of ecology rightly remind us, this is a closed system in terms of matter, in which human beings take a number of elements out of the biosphere for their processing, use and enjoyment, on the one hand, and return them in the form of wastes and entropy on the other.

However, the capacity of the biosphere to absorb these wastes is limited. So far, because the biosphere is a freely accessible common resource, each person has got rid of his wastes in the environment (the atmosphere, water or the soil) as he saw fit. The application of this law of unrestricted appropriation has brought the problems we are suffering now and calls for a total reformulation of the situation: a reformulation which would be reflected in the establishment of

[19] For a discussion of the fascinating problem of whether this is ethically defensible or not, see the articles included in Elliot (1995).

limits on what can be returned to the environment in the form of wastes and rubbish; for example, limits on what can be emitted into the atmosphere without endangering the viability of the system. In this respect, since we are dealing with a scarce resource, we may ask how the right to enjoy this environmental service –by emitting CO_2 into the atmosphere, for example– should be shared out. These are the "pollution rights" referred to earlier: the right to use the services of the biosphere as a rubbish dump, within the limits represented by the absorption capacity of the system.[20]

The problem posed, then, is to find a means of sharing out these emission permits which is both fair and efficient.

One alternative which has been the subject of many studies, both from the theoretical standpoint and in terms of the simulation of its results, is that of "buying" the participation of underdeveloped countries in schemes for the reduction of global pollution. Examples of such studies include those by Bohm and Larsen (1994) and Larsen and Shah (1994) on CO_2 and the study by Klaasen, Forsund and Amann (1994) on SO_2. Let us take a look at one of them in greater detail.

The above-mentioned study by Larsen and Shah (1994), whose main results are summarized in table 2, is a good illustration in this respect. The authors analyse the possibility of establishing a system of marketable permits for the emission of carbon dioxide (CO_2), with a view to stabilizing emissions in the year 2000 at the 1987 levels.[21] The problem is that if an agreement of this nature is to have a chance of being effective, one cannot leave out the underdeveloped countries (the non-OECD countries, to simplify the matter), which are responsible for 43% of all emissions according to 1987 data. However, the incentives these countries may have for participating in a scheme for the reduction of emissions are rather limited. Taking into account the limits presented as an objective and the marginal costs of reducing emissions of CO_2 (using the extended function proposed by Nordhaus for this purpose),[22] Larsen and Shah come to the conclusion that the unit price of an emission permit would be US$ 58 per ton. On the basis of this, we can construct the cost/benefit function applicable to each country that participated in the scheme, depending on how the permits are awarded and assuming that, in equilibrium, each country will reduce its emissions until the marginal cost of doing so is equal to the price of the permit.

On this basis, various forms of distribution of these "emission permits" are analysed, always bearing in mind that a country will have an incentive to participate in such agreements only if it receives an amount of money, in respect of permits granted, which exceeds the benefits it forgoes through its participation. Let us look at four possible allocation schemes:[23]

i) Allocation of rights as a function of population, so that the per capita amount of permits is equal in all countries (0.915 tons), as suggested some years ago by the Indian economists Agarwal and Narain (Martínez-Alier, 1992) and supported by such respected figures as Herman Daly (Goodland and Daly, 1992). From a purely logical standpoint, it would seem reasonable that every human being should have the same right to use the atmosphere (while respecting the limits mentioned earlier), so that every person should have the same right to emit pollutants. This assertion could be modified, if this is considered desirable, to take account of the past and present responsibility of the various societies in creating the problem (the stock of wastes already emitted) and

[20] The problem will not actually be posed in terms of individual pollutants (such as CO_2) but of desirable objectives and of the contribution of groups of variables to their attainment (Schaltegger and Thomas, 1996). For the analysis we are about to make, however, this distinction is irrelevant.

[21] At the summit meeting on climatic change held in the city of Kyoto the objectives were somewhat different; the main thing, however, is the theoretical framework provided by this study, which would be easily adaptable to changes of this nature, without affecting the basic results.

[22] The cost function in question is as follows:

$$R = 1 - e^{-0.0054MC}$$

where R is the percentage reduction of emissions of CO_2 and MC is the marginal cost of securing this reduction (in dollars per ton).

[23] The article in question also addresses two further questions. The first concerns the problem raised by "free-riders", and it considers that if the allocation is taken into account as just one more variable this will reduce the likelihood that this problem will arise among the OECD member countries, although it acknowledges that this possibility does not disappear altogether. The second concerns the marginal cost function used (which has been hotly debated), and the robustness of the results obtained with various functions is analysed.

TABLE 2

World: Costs (-) and benefits (+) of the different schemes for the allocation of CO_2 emission rights
(As a percentage of GDP)

Country	Per capita GDP [a]	Emissions per unit of GDP (kg/US$) [a]	Per capita emissions (kg) [a]	Allocation options: net advantages as percentage of GDP			
				A	B	C	D
Bangladesh	166	0.18	30	25.38	-0.16	0.23	
Nigeria	229	0.37	84	26.63	-0.93	0.35	
China	286	1.87	533	1.92	-6.06	1.15	
India	322	0.57	182	7.92	-1.73	0.47	
Pakistan	325	0.39	128	11.11	-0.68	0.31	
Indonesia	443	0.35	153	6.41	-0.14	0.23	
Zimbabwe	598	0.77	463	5.58	-2.04	0.52	
Egypt	709	0.54	380	1.98	-1.75	0.48	
North Korea	889	2.06	1 834	-3.58	-9.10	1.62	
Mexico	1 715	0.55	943	-0.10	-1.46	0.43	
Brazil	2 145	0.17	356	0.97	0.42	0.14	
South Africa	2 493	0.92	2 292	-2.72	-3.63	0.77	
Venezuela	2 629	0.49	1 276	-0.39	-1.30	0.41	
South Korea	3 121	0.34	1 067	-0.64	-0.13	0.22	
Poland	1 700	1.96	3 338	-5.83	-7.39	1.36	
Yugoslavia	2 700	0.52	1 403	-0.42	-0.99	0.36	
USSR	2 900	1.23	3 578	-3.79	-4.16	0.85	
Czechoslovakia	2 400	1.71	4 110	-5.56	-6.28	1.18	
Switzerland	26 115	0.06	1 580	-0.12	1.04	-0.15	-0.30
Iceland	21 873	0.09	1 955	-0.22	0.91	-0.22	-0.44
Norway	19 963	0.10	2 048	-0.26	0.85	-0.26	-0.51
Denmark	19 830	0.16	3 238	-0.54	0.58	-0.41	-0.81
Sweden	19 257	0.09	1 812	-0.21	0.89	-0.24	-0.47
Germany	16 754	0.20	3 427	-0.69	0.40	-0.51	-1.02
Finland	18 070	0.16	2 925	-0.51	0.59	-0.41	-0.80
Luxembourg	16 331	0.36	5 930	-1.38	-0.30	-0.91	-1.81
France	15 913	0.10	1 636	-0.22	0.85	-0.26	-0.51
Austria	15 441	0.11	1 717	-0.25	0.82	-0.28	-0.55
Netherlands	14 521	0.17	2 428	-0.57	0.57	-0.42	-0.83
Belgium	14 457	0.18	2 637	-0.55	0.50	-0.46	-0.91
Italy	13 176	0.13	1 691	-0.29	0.74	-0.32	-0.64
United Kingdom	12 024	0.23	2 707	-0.69	0.31	-0.56	-1.12
Ireland	8 353	0.25	2 170	-0.68	0.18	-0.64	-1.26
Spain	7 452	0.15	1 123	-0.18	0.64	-0.38	-0.75
Greece	4 619	0.31	1 437	-0.58	-0.07	-0.78	-1.55
Portugal	3 612	0.21	758	0.09	0.38	-0.53	-1.04
Turkey	1 293	0.50	649	1.36	-0.92	-1.26	-2.50
Japan	19 437	0.10	1 942	-0.25	0.87	-0.25	-0.50
United States	18 434	0.28	5 112	-1.01	0.08	-0.70	-1.38
Canada	16 056	0.26	4 221	-0.92	0.14	-0.66	-1.31
Australia	11 364	0.35	3 932	-1.16	-0.23	-0.87	-1.72
New Zealand	10 749	0.16	1 709	-0.33	0.60	-0.40	-0.79
OECD		0.20	3 015	-0.62	0.43	-0.50	-0.99
Rest of world		0.55	639	0.80	-1.47	0.43	
World as a whole		0.34	1 112	-0.24	-0.24	-0.24	

Source: Larsen and Shah, 1994.
[a] 1987 data.

solving it (by maintaining ecosystems that help to reduce wastes). In any case, however, the underlying principle would remain the same: recognition that all persons have the same right to enjoy the common services of nature, without consideration of race, wealth, or any other variable that might come to mind.[24] As already noted many times, the poor would probably sell their rights cheaply, but whether they sold them cheaply or dearly the calculations made regarding the benefits a scheme of this type would bring the underdeveloped countries leave little room for doubt: as may be seen from column A of table 2, which shows the gains each country would derive from participating in the agreement (measured by the increase in GDP in the year 2000), the poor countries would receive notable benefits. The bill would be paid by the developed countries, which would only be granted permits for 25% of their projected emissions, and by most of the middle-income countries and emerging economies.

ii) Allocation of rights as a function of the projected GDP of each country for the year 2000 with respect to world GDP (0.23 kg per dollar). Under this system, most of the low- and middle-income countries and the emerging economies would lose (column B), so they would not be willing to participate in a joint emission reduction effort which would only favour the developed countries.

iii) Allocation of rights in such a way that they would cover the projected emissions of the underdeveloped countries for the year 2000. These countries would therefore have no objections, in principle. The rest of the emission rights, up to the proposed maximum permissible level, would be shared out among the OECD countries as a function of, for example, their past emission levels or any other criterion considered to be acceptable. The results for this system (column C) indicate that many underdeveloped countries would gain by participating in an agreement of this nature, for a very simple reason: the economic value of the permits they could sell if they did not use them would exceed the cost of adopting new and less polluting technologies.

iv) Unilateral reduction of emissions by the OECD countries. Under this system (column D) the developed countries would assume that the other countries were not going to take any measures at all and would unilaterally reduce their emissions accordingly: exactly the same as in the previous case. The difference would be that the emission permits market would be limited to the participating developed countries, which would prevent them from taking advantage of the efficiency gains offered by the fact that in the underdeveloped countries the cost of reducing emissions or not using the permits allocated to them would be lower. As a result, the price of the permits (per ton of emissions) would rise from the US$ 58 calculated by Larsen and Shah (1994) to US$ 181.

On the whole, if emission permits were allocated according to the first or third of the above options, this would be a much more promising scheme than the previous ones with regard to the dual aspect we have been analysing. With regard to the environmental problem, this approach tries to achieve some social objectives which would permit global sustainability, and it is also a system which is compatible with incentives for the adoption of cleaner technologies. As regards the problem of poverty, it has the great advantage that, as it is a question of global common resources, enjoyment of its benefits does not depend on the arbitrary manner in which nature distributed its "gifts", and this would seem more acceptable from the point of view of equity.[25]

[24] However, we should not forget the role of population policy: a scheme like that proposed would favour the adoption of policies to promote high birth rates, discriminating against those countries which are trying or have tried to contain their population growth, and this might be ethically unacceptable.

[25] As noted time and again, in order to avoid further aggravation of the problems of poverty it is essential that the compensation received in this respect should not end up in the hands of those who do not need it. In this respect, it has been recommended that this compensation should take the form of a reduction of the external debt burden, which would make it possible to considerably ease the adjustment programmes and the accompanying budgetary cuts that would otherwise be necessary (Rotillon and Tazdaït, 1996).

VII

Conclusions

In this study, we have analysed the possibilities of relieving their poverty problems offered to underdeveloped countries and regions by exploitation of the comparative advantages deriving from their endowment of environmental and natural resources, within the framework of international trade and without giving rise to further degradation of the environment but, on the contrary, ensuring its sustainability.

Five possible schemes were studied in the light of their potential contribution to solving both the problems of poverty and those of deterioration of the environment:

i) Ecological dumping, based on the supposedly greater acceptance of pollution by the most underprivileged segments of the world's population. This was rejected from both standpoints: both as potentially harmful to the environment and as ethically unjustifiable. Its apparent rationality was based on two unacceptable premises: consideration of human life as just another merchandise, and incomplete calculation of its true social costs.

ii) Production of goods which make intensive use of renewable or non-renewable natural resources with a market value. In this respect, emphasis was placed on the limits established by the sustainability of such operations, in the first case, and intergenerational equity, in the second. Emphasis was also placed on the fact that, with regard to the solution of environmental problems, such efforts to derive income from natural resources only permit the preservation of those which offer financial yields higher than the market interest rate, since the decision-making process does not take account of the positive externalities generated by the resource.

iii) Financial exploitation of certain services provided by natural areas. These were viewed as suitable areas for a certain type of environmentally committed tourism, which would make it possible to derive economic benefits from the so-called "cathedrals of nature", provided they were suitably managed, and as sources of raw materials for research, especially in the pharmaceutical industry. The dual problem presented by these two examples is that, from the environmental point of view, they do not solve the problem of all those environmental assets which generate very considerable (and in some cases vital) positive externalities but do not have an economically appropriable value, while from the point of view of the poverty problem they only offer solutions to those countries which are fortunate enough to possess such assets.

iv) Calculation of the economic value generated by the environmental externalities of various assets and ecosystems, for subsequent payment of the corresponding amount to their managers. This is a much more powerful scheme for solving the environmental problem, since it places a value on all assets and all their environmental functions, regardless of whether, through their exclusibility, a price can be charged for their use. Unfortunately, this suffers from the same limitation as the previous scheme with regard to the problem of poverty.

v) Finally, the scheme which we consider to be most promising for solving the two problems addressed is the trading on the market of the right to use common environmental resources, especially the capacity of the atmosphere (and the biosphere in general) to absorb wastes. Supranational management of the question of emissions into the atmosphere, for example, would not only make it possible to solve a very serious environmental problem but would also, with the proposed scheme, provide the most under-privileged countries and regions with very substantial financial resources, independently of their good or bad luck in terms of natural gifts.

The foregoing analysis economically values the environmental functions of natural resources and ecosystems, putting a price on them so that they will be treated accordingly. This may be unacceptable to those who reject the idea of treating the environment as a form of merchandise because they feel that in their relations with the biosphere human beings should not reduce it to the level of a good (Anderson, 1993, chap. 9). While we feel a natural sympathy for this approach, however, it should be remembered that what we are seeking is that those who need to do so should earn revenue

from the ecological functions of the various ecosystems in order to safeguard them more efficiently, with due compensation for those who have to forgo their commercial exploitation. In this respect, the decisions on their preservation are not left to the market and their enjoyment is obviously shared: both features that run counter to their supposed nature of commercial goods. Naturally, the least promising schemes in both fields are those which are already in operation. The last two schemes analysed, which not only require a supranational institutional framework but also call for sacrifices by the more highly developed countries, would raise much more problems. Even so, from the point of view of both efficiency and equity they represent a much more promising approach in both senses: development and sustainability.

(Original: Spanish)

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The natural gas *industry and its regulation* in Latin America

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This article analyses the systems of regulation of the natural gas market in Argentina, Bolivia, Chile, Colombia and Mexico, which are the Latin American countries that have made most progress in this field, and it also presents some information on countries which had not yet defined their regulatory systems at the time of writing, such as Peru and Venezuela. First of all, it describes the situation of the natural gas industry worldwide and defines Latin America's place in it. It then studies the changes that have taken place in natural gas regulation systems in the region in the 1990s, especially with regard to the treatment given to exploration and production, and industrial processing, transport and marketing. The main features of the natural gas markets in the countries studied are then described, as well as the systems adopted for restructuring the industry, with special emphasis on the role of natural gas in regional energy integration. Finally, the article analyses the main features of natural gas regulation and the principles underlying it; the structure and powers of the regulatory bodies; the mechanisms for fixing the prices of extraction, transport and distribution; the different forms of subsidies, and the tax regime.

I

The behaviour of natural gas demand and world consumption projections

Over the last twenty years, world demand for natural gas has grown faster than the demand for the other fossil fuels (oil and coal). In the period from 1971 to 1991, the demand for gas grew by 3.3% per year compared with 2.1% for coal and 1.4% for oil.[1]

This faster growth of natural gas consumption is due mainly to the following factors:

• Thanks to the abundant reserves of natural gas, its supply can be maintained for many years, and moreover these reserves are not very concentrated geographically (in contrast, nearly two-thirds of world oil reserves are in the Middle East).

• Technological advances have reduced the cost of transporting gas from the areas of production to the centres of consumption.[2]

• In recent decades greater importance has come to be attached to conservation of the environment, which favours the use of natural gas because it emits less carbon dioxide than oil.

• The growth of the energy markets of the emerging economies has made investments more attractive for both international and domestic operators.

• The energy security policy of the OECD countries aims to reduce dependence on imported oil and natural gas, especially from the Middle East.

Most of world consumption of natural gas is concentrated in the OECD countries and in the former Soviet Union and the transitional economies of Eastern Europe, which account for 48% and 36% of world demand, respectively. Among the developing regions, the Middle East and Latin America each cover around 5% of world demand, followed by East Asia and South Asia with 2.1% and 1.4% respectively. Africa covers 1.45% of world consumption and the People's Republic of China 0.75%.

In the mid-1990s, oil, coal and natural gas –all fossil fuels– covered 91% of world energy consumption (oil, 38.8%; coal, 28.4% and natural gas, 23.6%). Projections of energy consumption for the period from 1995 to 2020 indicate that this pattern is likely to continue (OECD, International Energy Agency, 1995). Demand for natural gas will continue to grow faster (2.4%) than demand for coal (2.1%) and oil (0.8%). The proportion of total energy consumption covered by these three sources will thus increase to 92.2%, due above all to the increase in natural gas consumption, whose share will increase to 25.2% while those of coal and oil will remain more or less unchanged (figure 1).

According to the OECD (1995), the developing countries will register the highest growth rate of consumption (5.6%), followed by the OECD countries (2.1%) and the former Soviet Union and transitional economies of Eastern Europe (0.8%). China and the Middle East will have the highest growth rates for individual countries or regions (8% and 7%, respectively), while the projected growth rate for Latin America is 3%, although other sources estimate it at 5%[3] (OECD, International Energy Agency, 1995).

□ This article is based on a publication on this subject which appeared in the "Medio Ambiente y Desarrollo" series (No. 9) of the ECLAC Environment and Development Division.

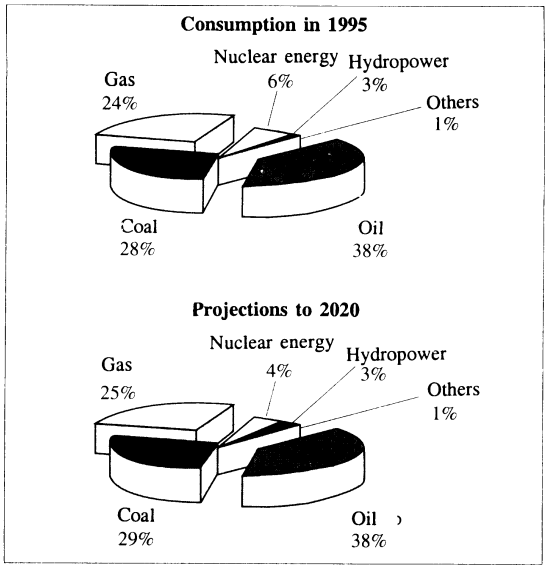
[1] For detailed analyses, see United States Department of Energy, 1995, and OECD, International Energy Agency, 1995.

[2] The transport of natural gas is more complicated than that of oil and coal, which are extracted in liquid and solid form, respectively, because it has to be kept in a completely sealed unit for transport and handling. Gas pipelines are the most common forms of transport, but when the distances are very great their use is not only difficult but also very costly. In that event, gas must be converted into liquid form at very low temperatures (liquefied natural gas) for transport in refrigerated ships to the markets, where it is subsequently "re-gasified" for distribution by gas pipelines. The problem with liquefied natural gas is that the conversion process and the cost of the ships, handling and special installations considerably increase its cost, thus making it less attractive economically (United States Department of Energy, 1995).

[3] There are discrepancies regarding the growth rate of demand for natural gas in Latin America. DRI-McGraw-Hill forecasts a growth rate of 5.1% per year in the region's demand during the period 1995-2015, which coincides with the projections of Amoco International (*Oil & Gas Journal*, various issues).

FIGURE 1

World energy consumption in 1995 and projections to the year 2020
(Percentages)



Source: OECD, International Energy Agency, 1995.

Such high rates will be reflected in the coming century in major changes in the structure of world demand for natural gas. The OECD countries will continue to be the main consumer market, but their share of the world total will go down from 48% to 45%. The former USSR and the transitional economies of Eastern Europe will register a sharp drop of 10%, thus accounting for 27% of the total, while the share of the developing countries in total world consumption will rise by 12% (to 27.8% of the total).

The reserves of the countries of the region have increased fourfold over the last 25 years (figure 2). Venezuela, Mexico and Argentina account for 89% of the total; Venezuela has over half the region's reserves (3962 x 10^9 cubic metres). Brazil, Colombia, Ecuador and Peru have increased their reserves, but to a considerably smaller extent.

Few countries of the region are traditional natural gas producers: such production is usually linked with that of petroleum, and the pattern of natural gas production by countries is similar to that of their oil reserves, with Venezuela, Mexico and Argentina accounting for 84% of total regional natural gas production (figure 3).

FIGURE 2

Proven natural gas reserves in Latin America
(Billions of cubic metres)

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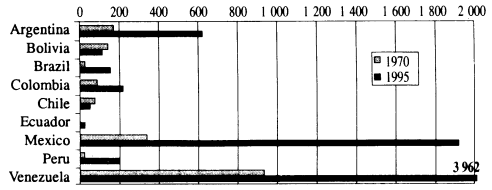
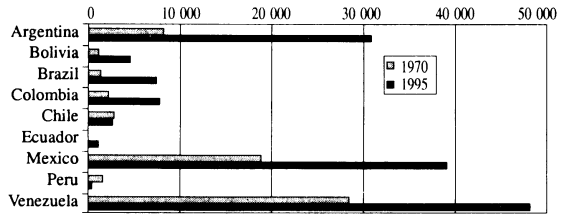
Proven natural gas reserves in Latin America
(Billions of cubic metres)



Source: OLADE, 1997a.

FIGURE 3

Natural gas production in Latin America
(Millions of cubic metres)



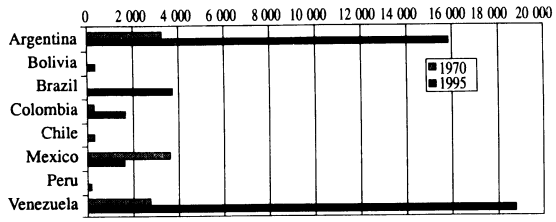
Source: OLADE, 1997a.

FIGURE 4

As regards the final energy demand of the countries of the region, 42% of this is covered by oil and 21% by electricity (hydro-electric, nuclear and geothermal plants). The share of natural gas is 18%, compared with 15% for biomass and 4% for coal. However, this global figure fails to reflect the great disparities which exist in the region, since Argentina, Brazil and Venezuela account for 92% of regional demand (figure 4).

There continues to be a marked difference between the final demand for natural gas and its consumption for intermediate purposes. In 1995, the structure of the total supply of natural gas (final consumption plus intermediate consumption) by sectors in Latin America (table 1) showed that only 33% of natural gas went for final energy consumption (42,330 million cubic metres), mainly in the industrial sector (22%), residential and other uses (5.9%), and to a lesser extent in the commercial, non-energy and transport sectors.

Natural gas consumption in Latin America
(Millions of cubic metres)



Source: OLADE, 1997a.

The other two-thirds of the total supply of 141,025 million cubic metres went for intermediate uses, such as gas treatment plants for the production of liquefied petroleum gas and gasoline (32.8%), consumption by the natural gas companies themselves (17.1%), and thermal and private power stations (15.8%), the remainder being consumed by refineries, other uses, and losses.

TABLE 1
Latin America, 1996: Supply of gas, by use
(Percentages)

Gas treatment plants	32.8
Industry	22.0
Own consumption	17.1
Power plants	13.2
Residential and other	5.9
Non-energy uses	2.9
Private producers	2.6
Commercial	1.4
Transport	0.8
Other centres	0.8
Refineries	0.5
Total	*100.0*
Total, in millions of cubic metres	*141 025*

Source: Kurtz, 1997.

Everything indicates, however, that final demand for natural gas will tend to grow in the coming years, in view of the major energy projects scheduled and some government policies which are promoting its consumption on a more generalized scale.

II

Reforms in the natural gas industry

In the course of the 1990s, most of the countries studied have made substantial reforms in their legislation governing the prospecting and exploitation of hydrocarbons (Argentina, Bolivia, Colombia, Chile). These reforms affect both petroleum and natural gas, since the prospecting and exploitation of these resources are similar, but they take account of the special features of natural gas.[4]

In Mexico, the oil industry legislation proper was not reformed, but substantial changes were made in the rules on the transport, storage and distribution of natural gas and the State enterprise Petróleos Mexicanos (PEMEX) retained its monopoly of natural gas prospecting and exploitation.

The origin and motives of the reforms which have been made in most of the countries of the region are to be found in the globalization process of the world economy, which favours the liberalization of markets, the elimination of State monopolies, the promotion of private investment and the reduction of State entrepreneurial activities. Substantial differences may be observed in the manner of application of these reforms, however, due to the influence of such factors as the amount of reserves and the production/consumption ratio for petroleum products and natural gas, the size of the domestic market, and the technological level and experience of the countries' oil and natural gas industries.

1. Reforms in the rules on prospecting and exploitation of oil and natural gas

The rules on prospecting and exploitation apply to both oil and natural gas. Generally speaking, the differences are in the amounts of royalties and the mechanisms for determining the sale price of first-hand natural gas, since natural gas does not have the same characteristics of an internationally tradeable good as oil.

[4] For a more detailed analysis of the hydrocarbons sector in ten countries of the region, see Campodónico, 1996.

Almost all the countries studied in this article –except for Mexico, which has maintained the State monopoly of PEMEX– have reformed their systems of contracts for the prospecting and exploitation of crude oil and natural gas in order to attract venture capital so as to expand their available reserves and increase exports or reduce imports with a view to obtaining a more favourable net foreign exchange balance in their energy transactions.

Most of the countries analysed consider that greater investment incentives are needed in the light of the strong competition to attract venture capital in the current conditions of an over-supply of crude, low international oil prices, technological innovations which permit greater advantage to be taken of the existing reserves, and the elimination of barriers to foreign investment in some areas with major oil production potential (Russia, China).

Basically, the reforms have involved a reduction in tax rates on private operators and have affected the free commercial availability of the crude and natural gas extracted; there is also a tendency to do away with public monopolies in the sphere of extraction. In Argentina, Bolivia, Chile, Colombia and Peru, where there were no restrictions on foreign investment, the incentives have been concentrated on the following aspects:

• More flexible conditions with regard to technical aspects of the contracts: longer periods for prospecting, elimination of the obligation to drill test wells, longer periods of retention of areas under exploration, etc.

• Bigger shares in the amount of oil and natural gas produced or transfer of ownership of the oil and natural gas to the private operators themselves.

• Free import and export of oil and, in some cases, elimination of the obligation to keep the domestic market supplied.

• Greater profitability of the contracts because of the reduction in tax rates on income and remittances (in some cases tax on remittances was eliminated altogether); temporary duty-free importation of machinery; accelerated depreciation, and other measures involving exemption or reduction of taxes.

• Greater guarantees for foreign investment through tax stability contracts, guaranteed availability of foreign exchange, possibility of resorting to international arbitration, etc.

2. Reforms in industrial processing, transport and marketing

In all the countries studied, changes have been made in the legislation governing the transport, distribution and marketing of natural gas. The reforms are designed to do away with barriers to private investment in an activity which, in many countries, was previously reserved for State enterprises. The deregulation of domestic markets has been promoted (elimination of subsidies and price controls) and free trading of oil and natural gas has been permitted on both the domestic and external markets.

The wellhead prices of natural gas for the domestic market have tended to be fixed generally in line with international prices. However, the lack of international benchmark prices for natural gas like those which exist for petroleum has led some regulatory bodies to establish base prices or initial prices for the sale of first-hand gas.

In all the countries studied, gas pipelines can be built and operated both by State enterprises and by private firms. In Argentina, Bolivia, Chile, Colombia and Peru there were already no restrictions on private participation in this area, and this situation was reaffirmed and expanded in the changes made to the legislation in the 1990s. The new development in this area was the elimination of the barriers which existed in Mexico to the participation of private operators in the transport, distribution and marketing of natural gas.

In almost all the countries studied, legal measures have been adopted to regulate the natural gas markets and the activities of private companies in the transport, distribution and marketing of gas, which has been given the status of a public service.

III

Forms of restructuring of the natural gas industry in Latin America

In the countries studied, the ways in which the natural gas industry has been restructured are closely linked with the process of liberalization of markets and growing participation by the private sector, especially by the big international operators.

The local characteristics in terms of natural gas reserves, production and consumption have given rise to different domestic market structures in each country. There are also differences as regards expansion plans: whether these are based on expansion of the domestic market or on connections with other countries of the region. There is therefore no single restructuring model, although there is a general tendency towards liberalization in favour of private enterprise.

1. Argentina: a country with a mature market

Natural gas consumption is very widespread in Argentina, which has the biggest network of transport and distribution pipelines in the region (50,000 km). Natural gas is the second most important energy source for electric power generation in thermal plants after fuel oil, and it is expected that it will further increase its market penetration and replace large amounts of liquid fuels, resulting in better performance of thermal plants.

In 1992 and 1993 the State-owned enterprises YPF and Gas del Estado were privatized. With privatization of YPF, the whole of natural gas production is now in the hands of private firms, which can dispose of it as they wish. Three producers account for nearly 81% of the supply of gas in Argentina: YPF, Pérez Companc and Tecpetrol (64, 11 and 6%, respectively).

With the privatization of Gas del Estado in 1992 the transport and distribution of gas were separated. The privatization operation involved the sale of the two most important gas pipelines to different firms (Transportadora de Gas del Norte (TGN) and Transportadora de Gas del Sur (TGS)), which have a network of gas pipelines connecting the production centres with the various cities. In the mid-1990s these firms transported respectively some 65% and 35% of the natural gas produced in Argentina.

The privatization of the distribution networks of Gas del Estado involved their sale to eight different firms: Metrogas, Gas Natural BAN, Camuzzi Gas Pampeana, Camuzzi Gas del Sur, Litoral Gas, Centro, Cuyana, and Gasnor. The first three of these account for 54% of the gas distributed in the country.

The transport and distribution of natural gas are considered to be public service activities, so the State carries out important regulatory functions, through the National Gas Regulatory Body (ENARGAS), in such areas as the granting of concessions, access to transport and distribution networks, scales of charges, and consumer protection.

2. Bolivia: priority given to the export of natural gas

With reserves of some 110 billion m^3, Bolivia occupies seventh place in Latin America. Natural gas is of great importance in primary energy production (58% of the total), followed by oil (24%) and hydropower and wood (6% and 7%).

Most of the natural gas produced is not consumed in the country but is exported to Argentina and Brazil; there is also a supply contract with Paraguay, but on a much smaller scale. Consequently, the share of natural gas in national primary energy supply amounts to only 25%, compared with 42% for oil.

As a result of the entry of private capital into YPFB in 1996 and early 1997, private firms now control the whole of natural gas production under shared risk contracts with YPFB.

The new Hydrocarbons Law (No. 1689 of April 1996) lays down the forms of development of the natural gas industry, the characteristics of the regulatory body, and the mechanisms and forms of market regulation; it also regulates both export and domestic consumption, with a clear leaning in favour of exports. The Law lays down that producers must satisfy

the demand for natural gas arising from the export commitments of the Bolivian State.

The construction of the Santa Cruz-São Paulo gas pipeline is one of the biggest projects undertaken by Bolivia in the last twenty years and provides for the supply of 105 billion m^3 (3.7 million million cubic feet). The pipeline, which will be 3,700 km long, will involve investments of US$ 2 billion. The agreement is for a period of 20 years; in the first eight years 8 million m^3 of gas will be exported daily and in the following 12 years 16 million m^3 per day, making a total of 93 billion m3 for the whole period.

There are also plans to build a gas pipeline to Paraguay. In September 1996 the two governments signed a contract for the export of 2.4 million m^3 of natural gas per day, rising to 3.3 million m^3 over a period of 10 years.

The idea is to make Bolivia the centre for the interconnection of natural gas integration projects. The domestic market will also be developed, as long as this does not conflict with regional energy integration.

3. Colombia: towards more massive use of natural gas

Colombia's natural gas reserves, at 214 billion m^3, put it in fourth place among the countries of the region. Natural gas comes third among the primary energy products of Colombia, accounting for nearly 10% of the total; the shares of oil and coal are almost 49% and 26%, respectively, followed by wood (7%) and hydropower (5%).

The natural gas produced (7,674 million m^3 in 1995) is used entirely for domestic consumption. Oil accounts for 43% of the total primary energy supply and natural gas for 13% (a similar proportion to those of coal (13.4%) and wood (13.3%). The natural gas producers have signed association contracts to supply gas at a fixed price to ECOPETROL, which is the enterprise that determines the forms of transport and distribution on the domestic market.

Since 1991, Colombia has been trying to increase domestic consumption of natural gas. To this end, it adopted a programme for the more massive use of gas, the main objective of which is to promote a more efficient energy consumption pattern through the replacement of high-cost energy products with gas. Specifically, the aim is to promote more massive use of propane gas by increasing the production and importation of this fuel; by optimizing the use of the available natural gas reserves through the construction of a nationwide transport network; by promoting private participation in the various investments called for by the plan, and by bringing gas prices level with the real costs of production and services.

The State oil company, ECOPETROL, is responsible for carrying out the programme for more massive use of natural gas. In 1992, the Ministry of Mining and Energy approved the general plan for the transport of natural gas, under which ECOPETROL is to develop the nationwide gas pipeline network. This network supplied 517,000 consumers in 1995, and it is hoped to reach a figure of 2 million in the year 2000, with total investments estimated at some US$ 3 billion, plus the installation of thermo-electric plants to use natural gas, as scheduled in the 1995-2007 electric power expansion plan.

Colombia's natural gas strategy is based on the following division of tasks:

i) The gas transport system will be developed by ECOPETROL, either directly or through private investments under such systems as BOT (Build-Operate-Transfer) or the like, and through concessions granted by the Ministry of Mining and Energy.

ii) The construction and operation of the urban distribution networks will be the responsibility of private or mixed enterprises in which the departments or municipalities of the country may participate.

iii) A new body will be set up, with private-sector participation, to be responsible for running the gas transport and marketing system.

iv) A special regulatory system will be set up, together with independent legislation for the natural gas industry.

Colombia plans to secure a considerable increase in the domestic natural gas market, making use of the country's large reserves. ECOPETROL has an important role to play in this, as it will be responsible for building the gas pipelines and promoting private enterprise. The legislation for regulating the transport and distribution of natural gas is already in force.

4. Chile: energy dependence and replacement of existing sources

Chile's natural gas reserves amount to only 48 billion m^3. Natural gas occupies second place in primary energy production, with 24% of the total,

compared with the slightly more than 38% accounted for by wood. Hydropower accounts for 20%, coal for 11% and oil for a little less than 7%.

In order to satisfy its domestic energy needs, Chile has to import some 180,000 barrels of oil per day: this source covers 46% of the total primary energy supply, followed by wood and coal, with 19% and 15%, respectively. Natural gas and hydropower account for 10% each.

Chile aims to increase domestic consumption of natural gas by importing gas from Argentina. In July 1995, the governments of Chile and Argentina signed a protocol liberalizing trade in natural gas, so that producers and consumers of the two countries will be completely free to negotiate volumes, transport, prices, places of origin and the terms of the corresponding commercial contracts.[5]

Development of the natural gas industry in Chile is entirely in the hands of private enterprise, and integration of gas supply with Argentina plays a crucial role in this process. The first gas pipeline to be built between Chile and Argentina was in Tierra del Fuego, built by a consortium made up of YPF and Bridas (Argentina) and Chauvco (Canada).[6]

Three gas pipelines have been built between Argentina and Chile in recent years. In August 1997 the gas pipeline belonging to GasAndes was inaugurated. GasAndes is a consortium made up of the Argentine firms Techint and Compañía General de Combustibles, Novacorp of Canada, and the Chilean firms Gasco and Chilegener. This pipeline, which supplies the Santiago market (the most important of the country), will bring about major changes in the energy balance of the country, since it will promote the construction of thermal electric power stations, thus favouring the sustainability of the energy supply process.

In February 1997, a contract was signed between the Chilean firm ENDESA and the United States consortium CMS Energy for the construction of a gas pipeline between the Argentine province of Salta (Campo de Durán) and the province of Atacama in Northern Chile. The main objective of this project is to supply thermal power stations and mining companies in Northern Chile, where 30% of world copper production is located. It is calculated that the total investment will amount to US$ 900 million.

The "Gasoducto del Pacífico" (Gas Sur) will link the gas reserves of Neuquén with the Bío-Bío area of Southern Chile. It will be 530 km long, and the total investment will be US$ 400 million. The consortium led by Nova International (Canada), together with Gasco, YPF and El Paso Energy, will invest a further US$ 44 million in natural gas services (transport and marketing), and in GasSur, a commercial and residential distribution system for the city of Concepción (*Petroleum Economist*, various issues).

5. Mexico: private participation in transport and distribution

In Mexico, primary energy consumption is marked by a clear predominance of oil, which accounts for 69% of the total (OLADE, 1996b). Natural gas accounts for 16% and associated and non-associated gas account for close to 3% of total consumption, while condensates account for 2%. Thus, altogether hydrocarbons account for 90% of national primary energy consumption. The remaining 10% is made up of hydropower (3%), wood (3%), sugar cane bagasse (1%) and other types of energy (1%).

The most important items in natural gas consumption are extraction of liquefiable components, consumption by the gas sector itself, use of gas for energy generation, and final non-energy forms of consumption. Another important area is that of industrial consumption, where the demand of the petrochemical industry is outstanding. Natural gas has not managed to penetrate the residential sector, and its use in transport is zero.

All exports and imports of natural gas by Mexico are to or from the United States.

Natural gas production continues to be a State monopoly of PEMEX, since no change took place in this situation in the 1990s. Important changes have been made, however, with regard to the transport and marketing of natural gas. In 1995 the Mexican Congress adopted the Law Regulating Article 27 of the

[5] Buyers and sellers will freely negotiate and contract the price of gas, the volumes involved, the necessary guarantees and other conditions usual in this type of contracts, as well as the facilities (including the necessary gas pipelines) for the transport of gas from the delivery points to the points of consumption.

[6] This gas supplies the plant belonging to Methanex Chile (a subsidiary of the Methanex Corporation of the Nova Group) at Punta Arenas in Southern Chile. This pipeline is 109 km long, but a further 106 km will be added between Poseidón and Cabo Negro to transport 2.9 million m3 per day as from 1999. Commercial deliveries began in January 1997 (see *Latinominería*, various issues).

Constitution which allows the transport, storage and distribution of natural gas to be carried out (subject to the approval of the Federal Electricity Commission (FCE)) by the social and private sectors, which can build, operate and own pipelines, installations and equipment under the terms of the legal, technical and regulatory conditions laid down by the Law. This measure was supplemented with the assignment of new functions and powers to the Energy Regulation Commission and the adoption of the Natural Gas Regulations in November 1995.

These changes in the legislation are indicative of the boost that the Government seeks to give to the domestic consumption of natural gas, which still only accounts for 4% of residential energy consumption and has not penetrated into the field of transport at all. There would therefore appear to be solid grounds for expecting an increase in domestic demand in the future.

The reforms do not extend to aspects connected with the production of natural gas, which continues to be the sole responsibility of PEMEX. However, private firms will now be able to build and own new gas pipelines additional to the 12,000 km of trunk pipelines owned by PEMEX. The private firms will have free access to the PEMEX network, while PEMEX, for its part, will have free access to the privately-owned pipelines. PEMEX considers that these and other projects could give rise to some US$ 4 billion of private investments in the next few years.

This new policy puts an end to the State monopoly of the transport and distribution of natural gas in Mexico. Presumably, PEMEX will not participate in the construction of new gas pipelines except in special cases connected with the production of both oil and gas.

6. Peru: predominant role of private enterprise and development of the domestic market

Peru's natural gas reserves amount to 201 billion m^3, corresponding to the fifth place in Latin America as a whole. Most of the reserves are in the Camisea area, near Cuzco, and are still to be brought into production. It is estimated that the Camisea reserves of natural gas and condensates could amount to 340 billion m^3 (12 million million cubic feet) and 650 million barrels, respectively.

Natural gas does not currently occupy an important place in the primary energy production of Peru, accounting for a little less than 2% of the total. The main energy source is oil, with a share of 50%, followed by wood with 31% and hydropower with 12%; the remainder is accounted for by products derived from sugar cane and other sources.

Natural gas production is as yet very small: some 258 million m^3 in the mid-1990s.[7] Its share of total primary energy supply is only 1.4%, compared with 53% for oil and 28% and 11% respectively for wood and hydropower.

Exploitation of the Camisea gas deposits is a key element in Peru's energy policy, since it will make it possible to increase the reserves of natural gas and condensates, promote conversion to cleaner fuels, and generate foreign exchange through probable exports.

In May 1996 a 40-year contract was signed with the Shell-Mobil consortium for the exploitation of the Camisea deposits. The three stages of the contract provide for total investments of US$ 2.4 billion; the State would not participate in these investments and would leave the execution of the works in the hands of the consortium.

In mid-July 1998, at the end of the first stage and after arduous negotiations between the parties, the Shell-Mobil consortium decided not to continue with the second stage, so that the contract was terminated. The consortium considered that under the prevailing conditions the Camisea project would only give a yield of 8.4% on the investments in the project, which was not considered to be acceptable as it would not allow the investments to be recovered in the desired space of time.

In order to continue with the second stage, the consortium demanded a number of new incentives, such as acceptance by the government of a higher price for the natural gas than that laid down in the contract, participation in gas distribution in Lima, the possibility of exporting gas to Brazil through a connection with the Santa Cruz-São Paulo gas pipeline, and reforms in Peru's electricity legislation to guarantee a price for natural gas which would allow it to compete with other fuels for supplying thermal power stations. In August 1998 a High-Level Commission was set up to organize international bidding

[7] Most of the gas produced is used by the petroleum industry itself, though it also supplies the city of Talara in northern Peru.

for the development of this resource, expected to take place in September 1999.

In 1998 natural gas production began in the Aguaytía deposits. The investments made will permit the production of 6,314 million m^3 (223 billion cubic feet). It is estimated that annual production will amount to 569 million m^3 (1.58 million m^3 per day) and that 4,000 barrels of liquefied petroleum gas (LPG) will also be obtained. The gas produced will be used to operate two thermal power stations: one for the city of Pucallpa and the other at Aguaytía. The latter, which will have a capacity of 140 MW, will be linked up with the Centre-North electricity grid.

At the time of writing this article, there was no regulatory framework for the natural gas industry as regards the production, transport, distribution and marketing of gas. In December 1996 Law No. 26734 was adopted, which set up the Supervisory Body for Investments in Energy (OSINERG), to be responsible for monitoring compliance with the legal and technical requirements regarding the activities of the electricity and hydrocarbons sectors and the rules on conservation and protection of the environment. Its powers do not extend to the fixing of charges for the transport and distribution of gas or to the granting of concessions, however.

IV

The boom in natural gas investments, and regional energy integration

In Latin America, natural gas has been used above all in industry, and especially in the petrochemicals industry, except in Argentina, where it has for many years been used on a large scale for commercial and residential purposes. Natural gas was not used to generate electric power, because hydropower was predominantly used for this purpose, while the thermal power stations used fuel oil or coal.

In recent years, however, there has been a significant increase in the demand for natural gas for electricity generation. It is estimated that the countries of the region will require over 90 GW of extra power in the period from 1995 to 2005, and a further 24 GW in the period from 2005 to 2010, mainly supplied by the private sector (Kurtz, 1997). This demand could be satisfied with thermal power stations using natural gas, particularly as the possibilities of developing hydroelectric projects are likely to be very limited.[8] It is also expected that the construction of thermal power stations using natural gas will held to reduce electricity prices, as this fuel is cheaper than the fuel oil used in the thermal power stations that usually serve the market at peak hours.

The preference for natural gas is due, among other things, to the high cost of hydroelectric power generation works; to the new policies of multilateral development agencies (the World Bank and the Inter-American Development Bank), which involve the virtual termination of finance for hydroelectric projects; to technological innovations in combined-cycle thermal power stations, which are quicker to build and cost less than hydroelectric power stations; to improvements in the systems of transport and distribution of natural gas, and to the lower environmental pollution caused by natural gas compared with coal and fuel oil.

National plans for increasing the use of natural gas coincide with various initiatives designed to promote greater regional energy integration, such as the considerable increase in the number of gas pipelines linking producer and consumer countries.

The natural gas investment projects identified in the region amount to over US$ 29 billion (table 2). They mostly concern investments in international or domestic gas pipelines. This figure does not include investments in related projects, such as the construction of thermal power stations or the development of petrochemical complexes (except for the petrochemical projects in Argentina and Trinidad and Tobago).

[8] One of the most important uses for natural gas all over the world will be closely linked with electric power generation. It is calculated that world investments in electric power generation will amount to US$ 2.28 million million over the period from 1995 to 2010, two-thirds of which will be made in developing countries. In Latin America, the total expected investment in electric power projects over the same period is US$ 203 billion, of which US$ 23 billion will correspond to thermal power stations using natural gas (United States Department of Energy, 1998).

TABLE 2

Latin America: Natural gas projects
(Millions of dollars)

Projects	Countries	Total investment	Length	Status
Regional integration projects				
GasAndes [a]	Argentina-Chile	350	450 km	Executed
Atacama [b]	Argentina-Chile	900	914	Underway
GasSur [c]	Argentina-Chile	400	530	Underway
Tierra del Fuego-Cabo Negro	Argentina-Chile	70		1999
Gaucho [d]	Argentina-Chile	200	440	Underway
Buenos Aires-Montevideo	Argentina-Paraguay	135	200	Underway
Mega [e]	Argentina	500	600	Underway
Mercosur	Argentina-Bolivia-Brazil	3 100	1 500	Feasibility study
Santa Cruz-São Paulo	Bolivia-Brazil	2 000	1 350	Underway
Bolivia-Paraguay	Bolivia-Paraguay	300	1 000	Feasibility study
Subtotal		*7 955*		
National projects				
Petroquímica Bahía Blanca	Argentina	700		Underway
Polisur	Argentina	250		Underway
Plan to promote massive use of natural gas	Colombia	3 000		Underway
Natural gas distribution	Mexico	4 000		Underway
Camisea	Peru	2 500		Feasibility study
Aguaytía	Peru	250	215	Executed
Trinidad and Tobago	Trinidad and Tobago	5 000		
Cristóbal Colón Project	Venezuela	5 500		Feasibility study
Subtotal		*21 200*		
Total		*29 155*		

Source: Prepared by the author on the basis of research results.
[a] Mendoza-Santiago. [b] Salta-Atacama-Mejillones. [c] Neuquén-BíoBío.
[d] Entre Ríos-Uruguayana-Porto Alegre. [e] Neuquén-Bahía Blanca. Includes exports to Brazil.

V

Regulatory arrangements for the natural gas industry in Latin America

1. Principles and objectives of regulation

At the time of writing of this report, only Argentina, Bolivia, Chile, Colombia and Mexico had laws governing the natural gas transport and distribution markets. In Peru and Venezuela, the corresponding legislation has not yet been officially adopted.[9]

The main principles of legislation on the gas industry are similar in almost all the countries studied. The idea is to give due protection to end-users, bearing in mind the fact that some phases of the gas industry (transport and distribution) represent natural monopolies. In these cases, the State has to intervene to ensure free competition, to prevent possible abuse of dominant market positions, and to promote the continuity and quality of the services provided. When these cannot be provided under conditions of competition, the State has to intervene to ensure that the operations are efficient, which means optimizing the quality-price ratio.

[9] This section of the article is based on the legal instruments and publications of the various bodies and ministries of the countries studied. The complete list may be found in Campodónico, 1998.

The programmes of action of the regulatory bodies are based on the basic principles of gas industry regulation, which include inter alia: fair or reasonable profits; competition; efficiency and rationality; optimization of quality; reliability, safety and continuity of the service provided; access without discrimination, and maximum coverage. With respect to these principles, the regulatory frameworks include such objectives as:

• Promoting the interests and rights of users through improvement of the quality of public service and ensuring that its ultimate purpose is to provide users with a better quality of life;

• Promoting competition in the natural gas supply and demand markets in order to avoid abuses due to a dominant market position;

• Promoting better operation, reliability, equality, free access, non-discrimination and generalized use of natural gas transport and distribution services and installations;

• Regulating natural gas transport and distribution and ensuring that the prices charged are fair and reasonable;

• Ensuring the continual and uninterrupted provision of services at all times, except when there are reasons of force majeure, acts of God, or technical or economic reasons which prevent this;

• Raising the levels of safety and reducing the number of incidents connected with the provision of service;

• Promoting the rational use of natural gas while ensuring due protection of the environment;

• Promoting investments to ensure supplies in the long term.

The various types of national legislation do not deal explicitly with matters of social equity and user participation, except in Colombia, where the legislation lays down that coverage must be constantly expanded, with arrangements to compensate for insufficient payment capacity of users, and users must be guaranteed adequate access to the services and participation in their management and control.

2. Natural gas supply as a public service

All the countries studied make a distinction between the production and the transport and distribution phases. The production of natural gas is considered to be a matter of general interest, governed by the conventional standards of the market and competition, so it is not subject to regulation. In concrete terms, this means that the wellhead price of natural gas –also known as the "first-hand" price– is determined by the laws of supply and demand.

The transport and distribution of natural gas, in contrast, are considered to be public service activities, so that they are subject to State regulation.

3. Establishment of regulatory bodies

In all the countries which have regulatory frameworks, regulatory bodies have been set up which have varying forms depending on the way the Executive is organized. They are generally administratively autonomous, however. In some cases they come under ministries (Argentina, Colombia), in others they form part of the national regulatory systems (Bolivia), while in Chile regulation is carried out by an inter-ministerial commission. They also vary in their forms of financing. In some cases they depend on the general budget, but in others (Bolivia and Colombia) they are financed with contributions from the companies they regulate.

In Argentina, the National Gas Regulatory Body (ENARGAS) was set up under the Ministry of the Economy and Public Works and Services. In Bolivia, there is a Superintendency of Hydrocarbons belonging to the Sectoral Regulation System (SIRESE), which is part of the Executive, under the supervision of the Ministry of Finance and Economic Development. In Colombia, the legal figure of "Public Service Companies" exists and has its own legislation. The Regulatory Commission for Energy and Gas Fuels acts in the sector as a special administrative unit of the Ministry of Mining and Energy, with administrative, technical and financial autonomy.There is also the Superintendency of Household Public Services, which is responsible, at the behest of the Office of the President of the Republic, for the control, inspection and supervision of the bodies providing such services. Chile has no specialized regulatory body for the natural gas industry. The National Energy Commission, under the direction of the Ministerial-level President of the Commission, is responsible for regulation, while the Superintendency of Electricity and Fuels, which comes under the Ministry of the Economy, carries out routine supervisory functions. In Mexico, the Energy Regulation Commission (CRE) is responsible for regulation of the gas sector; it is a quasi-autonomous body coming under the Ministry of Energy, which in turn comes under the Executive.

The functions of the regulatory bodies are similar in almost all the countries studied, namely:

• To grant concessions and licences to firms transporting and distributing natural gas and to cancel or revoke them when necessary;

• To supervise fulfilment of the obligations and rights of concessionaires and licensees;

• To protect the rights of consumers, concessionaires and producers;

• To ensure compliance with the legislation designed to prevent monopolies and protect competition;

• To guarantee free and non-discriminatory access to pipelines;

• To regulate, fix scales of charges, and promote the efficiency and continuity of transport and distribution services;

• To carry out all inherent and necessary actions for the fulfilment of their functions in accordance with the prevailing rules.

The regulatory bodies may also have special characteristics and powers, however. In Chile, the scales of charges for transport and distribution are freely determined and are not subject to regulation, except in the case of users with a consumption of less than 100 gigajoules. In Mexico, the body responsible for fixing transport and distribution charges is the Committee on Petroleum, Natural Gas and Petrochemical Products, which is made up of representatives of a number of bodies, including the Ministry of Energy.

4. Prohibition of vertical integration

The question of vertical integration has been a source of concern to regulators. Depending on the type of activity and the size of the markets to be regulated, it is often considered that vertical integration could give rise to situations which might affect competition.

In the region, only in Chile are there no express prohibitions that regulate the natural gas industry. Vertical integration between the activities of production, transport and distribution is only explicitly and categorically forbidden in Argentina and Colombia; in Bolivia and Mexico it is partially prohibited, with some exceptions.

The Bolivian legislation authorizes vertical integration for projects and operations in isolated areas which would not be financed or be economically profitable without it, or when it is necessary for the development of new domestic piped natural gas distribution networks, whose efficiency depends on vertical integration.

In Mexico, the Energy Regulation Commission (CRE) can authorize vertical integration when it considers that this will give benefits in terms of greater efficiency and profitability of the service or when it is absolutely necessary because the transport infrastructure needed for developing the market in a given geographic area does not exist and there are no other firms interested in undertaking the transport or distribution project.

5. Free access to transport and distribution networks

In Argentina, Bolivia, Chile, Colombia and Mexico the law lays down that concessionaires or licensees must give users free access to the services offered by their systems, without any kind of discrimination. The legislation in force does include some limitations on such freedom of access, however, connected with the available or non-contracted capacity and the effective use of capacity contracted. It stipulates that in any case the potential user must sign the corresponding contract for the provision of the services in question.

In Colombia, there are codes on transport and distribution which provide mechanisms whereby producers, marketers, major consumers and distributors can put into effect the principle of free access to the networks.

6. Establishment of wellhead prices

In most of the countries studied the wellhead price of natural gas is considered to be a matter of general interest and is therefore not subject to regulation. There are problems in determining the price of the gas, however, since unlike oil there is no international posted price for natural gas. In some cases, the international price of fuel oil is used as a benchmark, as this fuel can be replaced with natural gas. It could happen that as the gas reserves increase and the possibility of gas taking the place of other fuels increases, its opportunity cost may be more closely linked with the average costs of producing, transporting and distributing gas.

In Argentina, the wellhead price of natural gas is a matter of general interest, since it is the result of the free play of supply and demand, while in Bolivia, where most of the gas produced is exported to Ar-

gentina, the price is determined in negotiations between the two countries. The same will occur in the case of Bolivia's future exports to Brazil through the Santa Cruz-São Paulo gas pipeline.[10]

In Colombia, the law lays down that there will be freedom of prices when there is effective competition between suppliers and there is no domination of the market, to be determined by the regulatory body. In the transitional period, even though various forms of price fixing may be applied, ECOPETROL buys natural gas from its associates at a price corresponding to the international price of fuel oil.[11]

In Chile, prices are determined freely by exporters and importers in accordance with the terms of the 1995 economic complementation agreement between Argentina and Chile.

In Mexico, the prices of dry gas are the same as those in effect in South Texas (because of the possibility of access to that market), plus transport and service costs and the value added tax. For fixing domestic prices, the domestic fuel prices index (linked to a basket of prices on the United States market) is applied, plus transport costs in line with the import parity system.

In Peru, the authorities have not yet legislated on these matters. In oil and natural gas contracts, the form of valuation is determined in each individual case, but generally speaking the market price is used. Thus, for example, the contract with the Shell/Mobil consortium for exploitation of the Camisea gas deposits, which was signed in May 1996, lays down that the value of the natural gas will be calculated according to the effective price, which must reflect the market price of the gas produced in the contract area. The effective price is defined as the price effectively paid by the purchaser to the natural gas contractor, in this case the Shell/Mobil consortium.[12]

In Venezuela, the prices reflect the opportunity cost and vary according to the geographical location.[13] By way of reference, it may be noted that in the United States gas prices are free and register considerable fluctuations according to the season of the year.[14]

7. Regulation of transport and distribution charges

In Argentina, Bolivia, Colombia and Mexico, the regulatory bodies fix the natural gas transport and distribution charges, but in Chile they only regulate the charges made to users of less than 100 gigajoules. In the countries which do regulate charges, the price paid by the final user is the result of the natural gas price negotiated in the wholesale market, plus transport and distribution charges. There are various different ways of calculating the transport and distribution charges, however.

In Argentina, ENARGAS approves proposed charges and sets a maximum or ceiling charge, adjustable by a price index and a productivity factor. As these are maximum charges, the service supplier can reduce them in the light of his commercial interests (to maintain or expand markets) without any need for ENARGAS's approval, provided of course that they cover his costs.

ENARGAS must ensure that transporters and distributors who operate properly will earn enough to cover all reasonable operating costs involved in the provision of their services, taxes, amortization costs and a reasonable profit margin. The concept of rea-

[10] In 1995, the average wellhead price in Argentina was US$ 1.125 per million British Thermal Units (BTUs), which is equivalent to US$ 1.20 per thousand cubic feet. The price of the gas to be exported from Bolivia to Brazil will be US$ 0.90 per thousand cubic feet. For new contracts, or when the existing contracts expire (in five years' time), the price for sales to thermal power stations, industrial plants and distributors of piped gas will be calculated as follows: First, the weighted wellhead price for exports to Argentina and Brazil will be determined, and this price will be increased by the cost of transport for domestic use. This amount will be multiplied by a factor of 1.1494, and the result will be the price charged to producers and consigners at the point of delivery on the domestic market.

[11] As long as prices are not free, the maximum initial price at the entry node into the national transport system will be US$ 1.30 per million BTUs (US$ 1.391 per thousand cubic feet). This price will be reviewed every six months as from 1 January 1996, on the basis of a formula taking into account the variation in the price index for standard crude quoted on the New York Mercantile Exchange (NYMEX).

[12] In the Reference Plan for the Electricity Sector the Ministry of Energy and Mining makes a forecast of the prices for natural gas from Camisea as well as from Aguaytía and Talara. These prices are US$ 1.5 per thousand cubic feet at the Camisea wellhead and US$ 2.5 delivered in Lima; US$ 2.5 at Aguaytía, and US$ 2.0 at Talara.

[13] It is estimated that the price will be US$ 0.53 per thousand cubic feet at José and US$ 0.642 at Puerto Ordaz (OLADE, 1997b).

[14] Wellhead prices in the United States were US$ 1.59 per thousand cubic feet on average in August 1996 (*Oil & Gas Journal*, various issues).

sonable profits is defined, in current Argentine law, as those which could be obtained in other activities of comparable risk, and it must also be in line with a reasonable level of efficiency and satisfactory quality of the services provided.

The charges fixed by ENARGAS must take into account the possible differences that could exist between the different types of services as regards the form in which they are provided, geographical location, relative distance from the gas deposits, and any other aspect that it considers to be relevant. Although the sale price by the distributor to the consumer includes the acquisition and other costs involved in providing the service, it is the responsibility of the regulatory body to ensure that consumers are charged the lowest prices compatible with security of supply.

In Mexico, the system adopted is also that of a ceiling tariff, proposed to the Energy Regulation Commission by the firms wishing to provide the service. The initial tariffs authorized must be such as to allow them to make rational use of the resources and, if adjusted, to ensure them sufficient income to cover reasonable costs of operating and maintaining the service, taxes, depreciation and a reasonable return on capital. This mechanism does not, therefore, necessarily guarantee the income, costs or returns expected by those applying for permission to provide the service.

The method of fixing tariffs is not applicable when the Energy Regulation Commission considers that there is effective competition in the market. The concessionaires are therefore entitled to request the regulatory body to issue a ruling on whether such competition effectively exists.

In Bolivia, regulation is through the rates of return. The tariffs for transport of hydrocarbons and their products by pipelines and for the distribution of natural gas through piping systems must be approved by the Superintendency for Hydrocarbons, which is a department of the Sectoral Regulation System.

The mechanism adopted is such that it guarantees a certain rate of return on the investments made by the concessionaires. In this respect, the regulatory body must ensure that users of the pipeline transport system and the local natural gas distribution systems pay the lowest possible costs compatible with the security and continuity of the service. Such costs must ensure that the concessionaires, with rational and prudent management, will receive sufficient income to cover all their operating expenses, taxes (except for taxes on remittances of profits abroad), depreciation, and financial costs and to give a reasonable rate of return on their net worth. The regulatory body should therefore incentivate concessionaires to increase the efficiency of their operations.

In Colombia there is no single tariff system. If the market is not dominated by a single firm and there is therefore a situation of competition (a situation which must be officially attested by the regulatory body), public service companies in the gas sector can fix their tariffs freely. If not, they are subject to a regulatory system providing for two forms of operation: monitored freedom and regulated freedom. The first of these applies when there is competition and the second when the market conditions call for intervention by the regulatory body.

The companies are subject to price fixing formulas periodically determined by the regulatory body. On the basis of a cost study, the regulatory body can set compulsory maximum and minimum tariffs and decide when the monitored and regulated forms of operation should be applied.

The methods based on a maximum tariff (including also a minimum rate) and a given rate of return on the investment operate in combination.

The law lays down that the methods used in fixing the tariffs must be guided by considerations of economic efficiency, neutrality, solidarity, redistribution, financial soundness, simplicity and transparency, with priority being given to criteria of economic efficiency and financial soundness when fixing tariffs. If conflicts arise between the two criteria, the tariffs must be defined on the basis of financial soundness, which, in the opinion of the regulatory body, will ensure economic efficiency.

The aim of the system is that the tariffs should be close to those that would apply in a competitive market. To this end, the tariff-fixing formulas must take into account not only costs but also expected increases in productivity, the benefits of which must be shared between the concessionaires and their users, as would occur in a competitive market. Thus, the tariff-fixing formulas cannot pass on the costs of inefficient management to users nor allow the concessionaires to appropriate profits deriving from practices that restrict competition.

In public services the tariff formulas must always reflect the level and structure of the economic costs of providing the service, and also the demand.

All consumers are entitled to the same treatment in terms of tariffs if they cause the same costs to the service companies. However, this right must not prevent the service companies from offering various tariff options or the consumers from choosing the option that suits them best.

When the tariff system is put into practice measures will be taken to allocate resources to solidarity and redistribution funds so that users in the upper strata and commercial and industrial users will help low-income users to pay the cost of the services needed to cover their basic needs.

The tariff formulas must ensure that concessionaires recover their operating costs and expenses, including those of expansion, replacement and maintenance, and are able to give their shareholders returns on their investments comparable with those of an efficient firm in a sector with the same level of risk (the rate-of-return method). Technologies and management systems which ensure the highest quality, continuity and security of the services will be used for this purpose.

The tariff fixing formulas will be prepared in such a way as to facilitate their understanding, application and control.

The tariff system itself will be explicit and completely public for all the parties involved in the services and also for users.

8. Cross-subsidies and fiscal subsidies

The policies applied in the countries studied differ with regard to subsidies. There are two main tendencies among the countries of the region.

In Argentina, Bolivia, Chile and Mexico, cross-subsidies are prohibited but fiscal subsidies may be granted. In Argentina, cross-subsidies are prohibited but fiscal or government subsidies may be granted provided that they are explicitly provided for in the national budget. They may be granted to residential users in Southern Argentina and to various types of pensioners.

In Bolivia, cross-subsidies are prohibited but it is not clear from the legislation whether fiscal subsidies may be granted. Cross-subsidies are not permitted in Chile, either, but in the case of users consuming less than 100 gigajoules the tariffs may be regulated if it is shown that the tariff system makes possible operating revenues that represent a rate of return more than 5% higher than the annual capital cost rate.

Cross-subsidies are not permitted in Mexico. Fiscal subsidies provided through the tariffs can only be granted under decisions taken by the competent authorities and must be covered by resources officially allocated for the purpose. They must not affect the income of the concessionaires nor represent an extra cost for them. They must be granted in a transparent manner and must be explicitly shown in the tariffs charged to users.

In Colombia, cross-subsidies are permitted for the purpose of assisting low-income sectors. Public service companies which provide or market gas fuels will collect them, on behalf of the consumers they supply, by contributing to the National Solidarity and Income Redistribution Fund an amount resulting from the application of a factor of 20% to the city-gate cost of the gas supply, as stipulated by the Domestic Energy and Gas Regulatory Commission. The resources obtained by that Fund will be used to provide subsidies for low-income users, as a social investment under the conditions established by the law. The Solidarity and Income Redistribution Funds set up by the local municipal councils receive transfers from the public service companies and grant the subsidies as laid down by the law.

The legislation of the countries studied does not contain any references to the system of taxation to be applied, so it may be inferred that companies operating in the natural gas industry will be subject to the normal tax system.

VI

Conclusions

The increase in production and consumption of natural gas all over the world, but especially in the developing countries (China, Southeast Asia and Latin America) is a feature of the energy markets and will tend to grow even stronger in the medium and long term for various reasons: technological progress, geographical dispersion of gas deposits, less environmental pollution than other fossil fuels, growth of the energy markets in the emerging countries, and considerations relating to the geographical security of supply, especially in the case of the industrialized countries.

The changes made in hydrocarbons legislation in the 1990s in the countries of the region have been aimed at opening up and deregulating markets in order to attract new investments. The abundant natural gas reserves in a number of these countries give grounds for expecting that investments in the coming years will amount to the impressive figure of US$ 29 billion.

The high cost of exporting natural gas by sea has caused the use of this fuel to be aimed at meeting the energy needs of the domestic markets of the countries of the region (thermal power stations, industrial and domestic use, development of the petrochemicals industry) and at promoting regional energy integration by building cross-border gas pipelines.

In almost all the countries studied, the production of natural gas is in the hands of various public and private oil companies and its price is not regulated but is subject to the law of supply and demand. In many countries, however, the State intervenes to fix wellhead prices because this is a very new industry and there is no single international price to serve as a benchmark for all markets.

In the supply of natural gas and electricity to end-users the price is not fixed by supply and demand but is regulated by the State. This is because the transport and distribution of natural gas are based on pipeline systems which form a natural monopoly and because this is an energy source which is considered to be a public service. These two aspects make State regulation necessary in order to ensure free competition in gas supply (it may be recalled that, before the reforms, in almost all countries of the region the provision of public services was reserved for the State), to prevent possible abuses by those enjoying a dominant market position, and to favour the continuity and quality of the services provided. It is considered that when a situation of competition does not exist, the State must step in to ensure that operations are efficient, which means optimizing the quality/price ratio.

The new legislation on regulation in the countries of the region gives monopoly rights and other special rights to electricity and gas companies, within the context of their public service obligations. The degree and form of regulation vary considerably, depending on the ownership of the company, the sources of power generation, the administrative traditions of the countries concerned, and also political considerations.

In the 1990s there was a general tendency towards the existence of regulatory bodies in almost all the countries of the region; in some cases these bodies are only two or three years old, which means that they are still at the learning stage. It is therefore extremely important that governments should promote training policies and give the work of these bodies the necessary support.

Some of the key areas for action by governments and regulatory bodies could include the following:

• Control of the use made of natural resources, especially oil and natural gas.

• Regulation of the pipeline industries, with growing emphasis on the promotion of competition; ensuring free access to the pipeline systems; a flexible approach to the vertical integration of transport and distribution, with special emphasis on strict regulation; transparency and equity in the fixing of natural gas transport and distribution tariffs; and protection of consumers' rights.

• Dissemination of information and greater education of energy users.

• Intervention in large-scale contracts for natural gas imports.

• Strengthening of environmental regulations regarding energy production and use, including study

of the viability of using tax policy as an active instrument in energy and environment policies.

• Technological research and development.

• Promotion and increased use of renewable energy sources.

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Educational *decentralization models* in Latin America

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Decentralization of social services is one of the central elements of the social policy reforms being carried out in Latin America in order to make the provision of such services more efficient and to strengthen the democratization processes. This article analyses the processes of decentralization of education in seven Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Nicaragua). It seeks to systematize these experiences, using a theoretical typology of reform models; to present some results and trends in terms of the efficiency and equity of the provision of these services, and to extract some useful lessons for the design of future reforms. Although the models developed in the various countries differ from each other, they nevertheless have some common features: they depend on the resources provided by the central level to finance the services, and in many cases they subordinate schools to decisions taken at other levels. Among the main economic and social effects of the reforms are the limited progress made in participation and, hence, social efficiency; the ambiguous results obtained in terms of technical efficiency, and a trend which is not yet fully confirmed towards greater inter-territorial disparities in educational indicators. Among the lessons for policy formulation is the importance of giving the new levels of supply some degree of real autonomy, using a system of transfers which encourages a quest for efficiency while at the same time safeguarding equity, taking care to preserve the internal coherence of the models, giving some responsibilities directly to the schools, and ensuring that there is a suitable framework for the regulation and supervision of decentralized service supply systems.

I

Introduction

The structural reforms carried out in Latin America during the 1980s in order to change the State's role in the economy, and the incorporation of the macroeconomic balances as a central element of economic policy after the crisis of the early 1980s, led to a new conception of public policy and especially social policy. The paternalistic conception of the State, which had led to the measurement of policy results in quantitative terms, has gradually been replaced by an approach which attaches greater importance to objectives of quality, efficiency and selectivity in public spending. The processes of privatization and decentralization of social services which are spreading throughout Latin America are perfectly in line with this new approach, as they aim to improve efficiency in the provision of these services.

In this article, we will concentrate on the processes of decentralization of basic education which are taking place in seven Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Nicaragua). The analysis of these processes is made more difficult by their complexity, for decentralization promotes a new distribution of roles and powers among the existing territorial or non-territorial institutional actors and brings with it profound changes in the political/institutional, financial, community participation and other areas. In order to capture the main characteristics of this new distribution of responsibilities we have brought in a conceptual framework which also helps in comparing the processes of the different countries. Our main purpose is to describe and systematically order the decentralization models adopted in the seven countries, using this frame of analysis. We will also try to describe very briefly some of the effects the reforms have had on the efficiency and equity of the provision of services –whose improvement is the main challenge in the area of education in Latin America– and to draw some lessons that will be useful in designing future reform models.

II

The analytical framework

Analysing the logic and consequences of decentralization is a complex matter, because of the wide variety of concepts that are involved in a reform of this type. According to Rondinelli, Nellis and Cheema (1983), decentralization may be defined as the transfer of responsibilities in the fields of the planning, management, procurement and distribution of resources from the central government and its organs to field units of governmental bodies, subordinate units or levels of the government, quasi-autonomous public authorities or corporations with a more widespread local presence, regional or functional authorities, or private voluntary non-governmental organizations. With regard to this latter category of institutions, decentralization may also be defined as a situation in which public goods and services are provided by the market in response to the express preferences of individuals; in other words, privatization may also be seen as a form of decentralization. Within this broad spectrum, in this article we will only consider cases of the transfer of responsibilities from the central government to subordinate public units and to semi- or fully autonomous public corporations or authorities.

This definition, however, still covers many possible forms of decentralization. Generally speaking, the literature on this matter[1] distinguishes three main forms which differ mainly in terms of the degree of autonomy in decision-making that the central government gives to its subnational units, but in practice it is not easy to identify real cases with one or an-

[1] See Rondinelli, Nellis and Cheema (1983), Klugman (1994) and Winkler (1991).

other of these three forms of organization, since most such cases correspond to hybrid types which combine elements from at least two of the following three forms of decentralization:

i) Deconcentration, which is the transfer of responsibilities to lower levels, with limited decision-making power, within ministries or organs of the central government.

ii) Delegation, which consists of the transfer of management responsibilities in respect of certain well-defined functions to public organizations which may be situated outside the normal bureaucratic structure of the central government (public enterprises, private enterprises regulated by the public sector, authorities responsible for area development and regional planning, etc.) and which generally have semi-autonomous authority for carrying out their tasks.

iii) A form of "devolution"[2] which consists of the transfer of management responsibilities to subnational units of the government or public units in general, clearly viewed as separate levels over which the central authorities exert little or no direct control: that is to say, which have independent authority to carry out their activities.

It is supposed that the decentralizing reform of social services should improve the efficiency of public expenditure through its impact on costs and on the results in terms of the provision of such services. Production costs could be reduced, for example, by making more intensive use of local human and material resources and promoting greater control by users over the management of the services, thereby increasing the technical (or production) efficiency of the supply.[3] Such reform should lead to more flexible management, closer to local needs and preferences, which should improve the yield of services and affect both the technical[4] and the social[5] efficiency of their provision. All in all, decentralization should make it possible to progress towards more efficient resource allocation and thus favour economic growth.

The foregoing considerations would appear to make it advisable to choose a decentralization model which gives the subnational levels full autonomy in the provision of social services, in order to take maximum advantage of the possibilities for increasing technical and social efficiency. As the goods involved are of national scope, however, there are reasons why it might be better to give subnational bodies only partial autonomy and why governments often prefer intermediate (such as deconcentration or delegation of responsibilities) and hybrid (such as "devolution" with only limited autonomy) reforms rather than more radical ones. These reasons are connected with the fact that, in a context in which the aims and preferences of the subnational units are generally different from those of the central government, or else cannot be effectively implemented at the local level, it is useful for the central level to keep open certain channels of intervention to further national interests. It is easy to see, for example, that when the different geographical areas have different endowments of human and financial resources, decentralization will further increase territorial inequity. If the government is concerned for spatial equity because it seeks geographically balanced and integrated national development, linked with the individual distribution of wealth, it will find it necessary to accompany the transfer of responsibilities with compensatory or redistributive measures. Likewise, the presence of interjurisdictional externalities in the production of public goods of this type justifies measures to ensure that they meet certain minimum standards. The probably limited technical capacity of the subnational levels and the scant community participation in local decision-making can also justify active intervention by the central levels, at least to start with.

The central government can intervene in various ways. Among the instruments available to it for this purpose, transfers between the different levels of government are undoubtedly those with the greatest potential (box 1). Other such instruments are direct restrictions on autonomy through, for example, compulsory directives, laws and statutes which regulate certain functions such as the procurement and use of resources and the administration of human resources.

[2] The term "devolution" refers to a form of decentralization with full transfer of power.

[3] Although decentralizing provision also means losing economies of scale and possibly increasing, at least in an initial phase, the administrative outlays needed to enable the supplier levels to begin to make effective use of their new fields of responsibility.

[4] Measured by comparing costs and results.

[5] A good is socially efficient if its characteristics reflect the preferences of the user community. Social efficiency may be a solid argument in favour of decentralization if local preferences and needs are effectively expressed and fit in with the combination of results desired by the community.

Box 1

SOME FORMS OF INTERVENTION THAT CAN BE USED BY THE CENTRAL LEVEL

Guidelines (compulsory or not) on the quality and minimum or uniform quantity of the social services provided.

Stipulation, through official orders, of a binding minimum level of per capita public expenditure on the provision of social services.

General redistributive transfers to reduce inequalities in per capita income between districts.

General transfers to make the terms on which local levels of authority can supply social services more uniform. Classic examples of such subsidies are those designed to allow the same rate of fiscal expenditure to produce the same level of services.

General transfers conditional upon fulfillment by the recipient authority of a certain level of provision of social services.

Specific transfers (for a specific sector of expenditure) conditional upon the fulfillment by the recipient authority of a certain level of provision of social services.

Source: Prepared by the author on the basis of Winkler (1994).

Indeed, the main challenge facing the central government is to ensure that the units given new responsibilities advance as efficiently as possible towards objectives consonant with the national interest, thus maximizing the advantages expected from decentralization without losing control over the final results. This challenge may be illustrated very clearly in terms of a principal/agent model in which the central level is the principal and the new supplier levels the agents, who continue to be responsible to the principal for their actions. This type of model makes it possible to analyse the specific nature of the relationship between the centre and the periphery, bringing out some of the problems of incentives that often affect this relationship, such as adverse selection and moral hazard.

The existence of asymmetrical access to information when there are different central and local objectives gives rise to a problem known as adverse selection:[6] the subnational levels of government can mislead the central government about their real preferences and economic conditions, thus giving rise to an inequitable and inefficient distribution of the central resources. On the other hand, uncertainty about chance events which affect the final results of each area (macroeconomic fluctuations, for example) and which cannot be predicted by either the central or the subnational levels,[7] nor can be observed *ex post* by the central government,[8] gives rise to another problem called moral hazard,[9] which may lead subnational levels of government to put little effort into the execution of their tasks, alleging "bad luck". These two problems make intervention by the principal more difficult, since in order to overcome them it is necessary to prepare optimal contracts[10] which are costly and difficult to apply in practice. In such a situation, the principal may decide to use mechanisms which will allow him to negotiate more favourable and simple contracts. The main means of reducing the magnitude of these two problems is to increase the amount of information available to the central level through closer technical supervision, the strengthening of local sources of information, the setting of in-

[6] This is analysed at length in Rasmusen (1989) and Kreps (1990).

[7] If the agent could see the state of affairs before the agreement was decided, this too would be a case of adverse selection.

[8] That is to say, when there are different objectives and it is assumed that the efforts of the agent to produce the result cannot be seen by the principal. This is a very plausible situation in view of the difficulty of following up actions carried out by external units in small geographical areas.

[9] This is analysed at length in Kreps (1990), Rasmusen (1989), Rees (1985 a and b), and Hart and Holmstrom (1987).

[10] In which the amount of the transfers depends on the initial conditions and preferences of the agents and on the final result of the actions, in accordance with complex non-linear relations which will cause the agents to reveal the truth (in the case of adverse selection) and to choose the level of effort desired by the principal (in the case of moral hazard).

termediate objectives (which are easier to follow up than the final objectives), or greater participation by the local community in judging the behaviour of the subnational unit. Alternatively –for example, when the central level lacks technical capabilities and there is no consensus on national objectives between it and the community– the government may perhaps prefer to impose direct restrictions on the autonomy of the subnational levels by transferring responsibility for only part of the total number of functions, or for only part of the responsibilities in respect of a given function, through more or less restrictive orders, laws or statutes. In the final analysis, it is the combination between the need for intervention by the central level to safeguard national interests and the difficulties that such intervention involves because of the differences of objectives and the asymmetrical access to information between the agents and the principal which explains why there are so many social service decentralization models which take a somewhat weak rather than a radical approach.

The degree of autonomy effectively granted to the subnational levels in the provision of services will vary according to the frequency and intensity of direct restrictions, incentives for particular forms of behaviour[11] or other control mechanisms. In view of the foregoing, the list of types of theoretical models given at the beginning of this section is too restrictive to take proper account of these differences. In order to facilitate a classification according to the degree of autonomy and incorporate more explicitly aspects relating to community participation in decisions on the provision of services and the number of recipient levels involved, we will now add two new categories of models which come somewhere between the "devolution" and deconcentration models and we will also make a change –often made in practice– in the definition of one of the existing types. The resulting classification may be somewhat arbitrary, but it will be useful for arranging in order the various actual cases to be discussed below. This classification introduces:

i) A category of low-intensity principal/agent models –i.e., hybrid "devolution" models– which basically involve a form of "devolution" in which the central level continues to finance a substantial part of the provision of social services but the subnational levels nevertheless have a high or very high degree of autonomy in all the main functions involved in such provision. Thus, there is still a relation with the central level, although it is only slight.

ii) A category of medium-intensity principal/agent models in which the subnational levels have a relatively high degree of independence in almost all the main functions but continue to be responsible to the central level for their actions to a significant extent, because of a financing structure which is highly dependent on that level and because they are subject to quite strong rules and incentives laid down by it. These models are noteworthy for the difficult balance between autonomy and control involved in the relationship between the central and sub-central actors.

iii) A category of high-intensity principal/agent models –i.e., deconcentration models– which involve the transfer of responsibilities to levels which are also outside the ambit of the central level. This type of model has many direct restrictions on the decision-making powers transferred.

Another two aspects which must be taken into account when describing a decentralization process are: the last level affected by the reform (the intermediate level,[12] the local level,[13] or the service-producing unit itself) and the degree of participation in decision-making effectively attained by the local community. For example, a reform which involves the service-producing unit (hospital, school) and the user community by transferring substantive decision-making responsibility to them goes deeper than a reform which is on a level of supply that is more distant from users and does not create the mechanisms (forms of participation, use of demand subsidies, etc.) needed to enable them to control the quality of the services provided and to express their own preferences. Another important aspect is the existence of more than one subnational level responsible for providing the service.[14] When this is the case, there may be problems of coordination and allocation of responsibilities that must be taken into account.

[11] In the shape of general or specific financial transfers allocated in line with predetermined criteria or depending on the recipient's behaviour.

[12] This usually means states (in federal countries), provinces or departments.

[13] This means the municipalities.

[14] This refers to cases of co-responsibility between two or more levels. It does not include marginal participation by different levels.

In the case of the principal/agent model described earlier, a reform in which major responsibility for the provision of services is allocated jointly to two or more subnational levels which must operate in a complementary manner would constitute a model with a principal and two or more agents.[15] If a reform gives the local community a major role in decisions on the provision of services, as for example regarding different combinations of expenditures or the appointment of upper management personnel, it could be identified with a model with one agent and two principals (the central government and the community). When the central level gives the subnational levels almost complete autonomy in the provision of services, representing a "devolution" model, this would be a model in which the only principal would be the community; that is to say, it would be a model with local fiscal decisions.

III

Decentralization models in education

Most of the Latin American countries are in the process of decentralizing their basic[16] or primary educational services. Some of them are doing this for more or less political motives (legitimation of the State, control of conflictive situations, democratization), others for fiscal reasons (reduction of the size and cost of the central administration, encouragement of indirect privatization processes), others for reasons of efficiency, and still others for a combination of these motives. Decentralization of educational services, like that of primary health services, is undoubtedly a megatrend in the region.

The present state of the provision of educational services in the seven countries analysed here is the result of reforms that have generally been of an ongoing but often non-linear nature which have transferred responsibility for the provision of such services to territorial subnational levels (intermediate or local government levels) or non-territorial public units (the educational establishments themselves). Among the reforms, some are of the first generation, begun in the 1980s or even before, while others are second-generation reforms begun in the early 1990s. Table 1 shows the educational decentralization episodes for each of the countries analysed. The different initial socioeconomic and political/institutional conditions of each country and the different motives they have had for undertaking the reform process have led to decentralized systems which differ in the degree of autonomy they have given to the subnational, territorial and institutional levels when transferring responsibilities and in the degree of community participation in decision-making.

The present configuration of the countries' decentralized educational service systems in these three levels –subnational, territorial and institutional– is shown in figure 1, which takes account only of the main models and tendencies, leaving out cases with little national coverage.

In order to measure these dimensions effectively, the provision of educational services has been divided into four main areas covering the main functions involved: i) the function of leading, regulating and supervising the sector; ii) the financing function; iii) the function of the direct management of the service, which involves both current management, with emphasis on personnel policy, and investment management, and iv) the "planning" function, which refers to all the decisions on content in the educational field, especially those referring to educational goals and the teaching and curricular aspects of education (fixing of the school timetables and schedules, specific goals in respect of coverage and quality, study curricula, etc.).

Sections A to G[17] of figure 1 summarize, for each of the countries analysed, the participation of the central level, of the subnational levels –which include the intermediate level, the local level and the

[15] Understood as different categories of agents. In a decentralization process, the model applied naturally involves multiple agents anyway, affecting the intensity of the problems of incentives and of the design of the transfer contracts.

[16] Here, basic education is understood as primary plus secondary education.

[17] A summary and simplified version of the tables given in Di Gropello (1997).

TABLE 1

Latin America (seven countries): Some examples of decentralization of education

Country	Starting date	Description
Argentina	1978	Transfer of responsibility for management of primary educational establishments to the provinces.
	1992	Transfer of responsibility for management of secondary educational establishments to the provinces.
Bolivia	1994	The Popular Participation Law, adopted in 1994, and the Administrative Decentralization Law (1995) transfer respectively the physical infrastructure of basic education to the municipalities and responsibility for human resources management and planning to the departments.
Brazil	No exact date	State and municipal primary education systems have formally existed since 1930. Since 1970 the municipalization of primary education has been further intensified and since the mid-1980s the autonomy of the schools has been increased in nearly 50% of the states.
Chile	1981	Transfer to the municipalities of responsibility for the management of basic educational establishments.
Colombia	1991	With the 1991 Constitution, the main responsibility for planning and human resources management in basic education was transferred to the departments and the municipalities were made responsibility for the physical infrastructure of the schools.
Mexico	1992	Responsibility for the management of basic educational establishments was transferred to the states.
Nicaragua	1993	Establishment of "autonomous centres" for primary and secondary education, with the centres receiving broad responsibilities for the provision of services. In 1997 this process covered 50% of secondary educational centres and 13% of the primary educational centres.

Source: Prepared by the author.

educational establishments (production units) themselves– and of the community (through community or user organizations) in the responsibility for these different functions. This summary makes it possible not only to identify the levels receiving the functions transferred and to see whether the processes give the community a place in decision-making, but also, by showing the number of levels involved in each of the functions, to determine the degree of concentration of responsibility for each function; it thus gives an (albeit only partial) indication of the degree of autonomy of the subnational levels in the provision of educational services. In order to make a full appraisal of the degree of autonomy granted, this information must be supplemented with detailed data on the role of each of the levels in the function in question, in order to determine their relative importance in the decision-making process. Thus, for example, the degree of autonomy of the local level in the financing of the services depends not only on the participation of other levels in this function but also on the relative weight of the local level's own resources compared with those coming from other levels, the degree of decentralization of the execution of expenditure[18] and –a very important factor– the conditions governing the use of the resources transferred for budgetary execution. Likewise, as regards human resources management, if the sub-function of hiring staff is fully decentralized and only wage negotiations are still centralized, the subnational level's degree of autonomy will be quite different from what it would be if hiring itself were still partly centralized.

Table 2 provides information on the financing structure and human resources management: the two functions which most differ from one country to another, depending on the degree of autonomy granted. Decisions on educational content are generally shared by the various levels, with the central level

[18] The local level's own resources may represent only a small fraction of total resources, but most of the latter may have been transferred to the local level for it to manage.

FIGURE 1

Latin America (seven countries): Summary of the prevailing models and trends in the decentralization of education[a]

A. Argentina

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU					
C	T				T

B. Bolivia

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU					
C					T

C. Brazil

	L,R,S	F	A		P
			HR	O	
CL			T		
IL					
LL					
PU					
C	T				

D. Chile

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU				T	
C				T	

E. Colombia

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU				T	
C	T			T	

F. Mexico

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU					
C					

G. Nicaragua

	L,R,S	F	A		P
			HR	O	
CL					
IL					
LL					
PU					
C					

Source: Prepared by the author on the basis of Carciofi, ed. (1996), Ruiz-Mier and Giussani (1997), Draibe (1998), FUNDAP (1996), IPEA (1994), Espínola (1995), Chile, MINEDUC (1996 a and b), Vargas and Sarmiento (1997 a and b), Ornelas (1997), Castillo (1998), World Bank (1996), Fiske (1996) and Hevia (1991).

[a] CL = central level; IL = intermediate level; LL = local level; PU = production unit; C = community; L, R, S = leadership, regulation and supervision; F = finance; A= administration; HR = human resources; O = other administrative functions (current and capital management); P = planning; T = theoretical function, not yet put into practice.

TABLE 2

Latin America (seven countries): Features of decentralized systems for the provision of education, according to various indicators

Country	Territorial distribution of finance for public expenditure on basic education, after transfers between different levels of government			Nature of transfers and allocation criteria	Degree of decentralization of human resources management
	CL[a]	IL[a]	LL[a]		
Argentina (as from 1978)	8	92[b] (1978-1985)	–	General transfers via co-sharing of taxes, allocated by law.	Autonomous labour policy (IL).
Bolivia (as from 1994)	10	90[c] (1997)	–	Specific transfers to departments, with allocation guidelines for current expenditure. General transfers to departments and municipalities via co-sharing of taxes, allocated according to size of population. Since 1996, the resources for municipalities are subject to guidelines on allocation for investment (85% of the co-sharing resources must be allocated to investment).	Decentralized hiring (IL). Centralized wage negotiation and decisions on administrative staff regulations.
Brazil (as from the 1970s)	26	44	30[d] (1995)	General transfers via co-sharing of taxes, allocated according to negotiation and equity criteria. Specific transfers (wages-education) allocated to the states according to the amount collected. Since 1995, 60% of the total resources for education must go to a fund which must spend at least 60% of them on wages. The resources from the fund are distributed among the state and municipal schools of the Nation according to the number of students enrolled. There is also a regulation on the minimum expenditure that each municipality must make, and if the fund does not manage to cover this amount the Union must pay the difference from its own resources. This mechanism is still only theoretical.	Autonomous labour policy (IL and LL), subject to an indicative average salary. Flexibility for hiring by the schools.
Chile (as from 1981)	50	–	50[e] (1991)	Specific transfers allocated according to the average attendance rate of students over the last three months in each municipality and the cost of providing the services. There are also redistributive cross- transfers between municipalities (through the Common Fund for Municipalities).	Decentralized hiring (LL). Centralized wage negotiations and administrative staff regulations.
Colombia (as from 1991)	10	50	40 (1996)	General transfers to the departments (Situado Fiscal), with guidelines on allocation to health (25%) and education (75%), allocated according to past expenditure, population and fiscal effort. In practice, allocation is according to past expenditure. General transfers to municipalities, via co-sharing of taxes, with guidelines on allocation (30% for education), allocated according to past expenditure, local relative poverty indicators, fiscal effort and administrative efficiency. This formula is too complex to be effective.	Decentralized hiring (IL and, to a lesser extent, LL). Centralized wage negotiation and administrative staff regulations.
Mexico (as from 1992)	56	44[f]	– (1995)	Specific transfers allocated according to an established minimum level (taking account of the amount allocated the previous year) and sectoral priorities.General transfers, via co-sharing of taxes, allocated according to population and past tax collection.	Responsibility for hiring shared between the central and intermediate levels. Centralized wage negotiation and administrative staff regulations.
Nicaragua (as from 1993)	68	–	32[g] (1996)	Specific transfers to schools, previously allocated according to the number of teachers, have been allocated since 1997 according to the number of students served, administrative expenses and average wages. Specific transfers to municipalities, introduced only recently, are allocated according to equity criteria (in theory rather than in practice).	Decentralized hiring (PU). Centralized wage negotiation and administrative staff regulations, but with a broad margin of flexibility.

Source: Prepared by the author on the basis of Carciofi, ed. (1996); Ruiz-Mier and Giussani (1997); Draibe (1998); Vargas and Sarmiento (1997 a and b); Ornelas (1997); Castillo (1998), and Espinoza and Marcel (1994).

[a] CL = central level (central or federal government); IL = intermediate level (states, provinces or departments); LL = local level (municipalities); PU = production unit. [b] Primary education. [c] Only the distribution of the central level budget for basic education is taken into account (i.e., the subnational levels' own resources are not included, nor are co-sharing resources). [d] Total education (including higher education).

[e] The modest degree of decentralization is due mainly to the fact that public resources for the subsidized private sector are still centralized. There is a lack of data on regional resources for investment.

[f] Total education (including higher education). The modest degree of decentralization is due not only to the inclusion of higher education but also to the continued existence of a considerable degree of centralization in human resources hiring and the considerable size of a number of programmes (for example, for the improvement of the quality of education and promotion of science and technology) which are still centralized.

[g] Total education. Decentralized resources are provided to municipalities and schools. The figure includes own resources generated by the schools. The fact that the degree of budgetary decentralization is still low is due to the limited coverage of the process in 1996. There is a lack of more up-to-date information.

fixing more or less flexible rules and general study plans, complemented with rules and plans submitted by the subnational levels. In Argentina, Brazil and Colombia, the subnational levels have greater flexibility, since there are only some basic binding rules.

If we look at the models shown in figure 1, we see that there is a very wide variety of levels involved in the various functions making up the provision of services. In all cases,[19] at least two levels (including the central level) share responsibility in all functions except capital management and the routine functioning of the establishments (i.e., in the management function, excluding human resources management); this shows that there is no simple dichotomy between centralized and decentralized systems but rather a variety of options. Indeed, the only common trend seen in all the systems for the provision of services is the strengthening of the regulatory role of the State (which is very necessary in a decentralized system) and the transfer of the direct management of the services to subnational levels. Depending on the combination of levels per function and the indicators shown in table 2,[20] it is possible to determine the degree of autonomy effectively granted to each subnational level in each aspect of the provision of services and to identify the level or levels receiving most of the responsibility for services, the magnitude of that responsibility, and its distribution among the different levels.

Summarizing all the foregoing and also taking into account the role of the community in the various aspects of the provision of services,[21] we can tentatively classify the processes analysed into five major types of reforms, using the classification described in section II, which emphasizes the autonomy aspect:

i) Hybrid "devolution" processes with little participation of the top territorial level, such as the "provincialization" process in Argentina and the state and municipal systems for the provision of primary education services, operating in parallel, in Brazil. In both countries these processes provide similar proportions of decentralized resources to the subnational levels (around 90% of total resources, in the case of primary education) and make most (or all, in the case of Argentina) of the transfers in the form of general transfers (table 2). Secondly, because of the proportions of resources generated by the supplier levels themselves, which generally represent over 40% of the total resources available in the case of education,[22] they give more financial autonomy to the supplier levels than in other cases, to degrees which differ according to the guidelines for use: Argentina probably gives most freedom of decision-making to the intermediate level, since the Argentine provinces –unlike the Brazilian states and municipalities– are not subject to any rules on how they can use their own and co-financed resources. Thirdly, in both countries there is almost complete autonomy as regards personnel policy and a very high level of autonomy in teaching and curricular matters. With regard to participation mechanisms, in neither of the countries have the processes been participative, or at least the existing participation arrangements have not functioned effectively. However, as we shall see below, the school deconcentration process which is under way is promoting active participation within the schools.

ii) Hybrid participative "devolution" processes in the production units, that is to say, processes of the principal/agent type between an agent and two principals (the central level and the community), with only a slight relation between the agent and the central level, as for example in the school decentralization process in Nicaragua. Because of the amount of own resources generated by the schools themselves (an average of 45% of the total resources available to secondary education centres in 1996) and the high degree of autonomy they have in personnel management (appointment of headmasters, hiring and firing, wage incentives) and in teaching and curricular matters, the Nicaraguan process is close to a hybrid "devolution" process, although there are greater limitations on autonomy than in Argentina and Brazil. It can also be described as participative because of the growing importance of management councils in running the autonomous educational centres.

[19] Except Argentina, with respect to the human resources management function.

[20] Supplemented in the text with details of the relative weight of own resources compared with total resources.

[21] In order to evaluate this dimension we took into account not only the existence or absence of channels of participation but also their effective use by the community.

[22] Except in the case of the Brazilian municipalities, where the proportions of own resources must represent 15% to 20% of total resources. In the state of Santa Catarina, for example, in 1993 the municipalities financed an average of 20% of educational expenditure from their own resources, and the percentage is rising (FUNDAP, 1996).

iii) Reforms of the principal/agent[23] type, between a principal (the central level) and an agent (the intermediate or local level), with little participation (as in Chile and Mexico). In both cases these processes are marked above all by a low proportion of own resources (an average of around 10% of the total resources available for education at the supplier level), which limits the financial responsibility of the service providers but leaves them free to allocate resources without being subject to rules on expenditure or allocation. Approximately 50% to 60% of the resources destined for primary and secondary education are managed in a decentralized manner and the whole (in Chile) or most of them (in Mexico) are provided in the form of specific transfers (table 2). Wage negotiations, as well as the main aspects of teachers' career situation, are retained at the central level, while responsibility for educational content is shared between the central level and the intermediate or local levels, though the central level plays an important role in defining study plans or curricula.[24] Although the Chilean model is based on municipalization and the Mexican model is based on control by the states, both of them lack effective mechanisms for local participation. In Chile, however, efforts have been made since the early 1990s to transfer responsibilities in schools throughout the country, and this should favour participation. The system of per capita subsidies for students as a means of allocating resources in that country ought to stimulate parent participation, through their choice of the school that seems best to them, but the fact that the subsidy is given to the municipality and not to the school or the students' families causes the latter to feel left out of the process of resource allocation and they continue to see education as a free public service, thus reducing the incentive to take an active part in choosing and running the schools.

iv) Reforms of the principal/agent type between a principal (the central level) and two agents (the intermediate and local levels, functioning in complementation to each other), with little participation, such as the decentralization processes in Bolivia and Colombia. These reforms are marked first of all by a co-financing system which involves two levels in addition to the supplier level (the municipality), with a similar proportion of decentralized resources in both countries (approximately 90%), subject to quite restrictive guidelines on their use (table 2). Secondly, in both cases there is a low level of financing from local resources (approximately 5% in Bolivia and 10% in Colombia). Thirdly, decisions on labour policy and teaching and curricular matters are shared between the supplier level and at least two other similar levels (Colombia) or depend on two similar levels which do not include the supplier level (Bolivia). In these forms of decentralization, responsibility for the provision of services is diluted among three levels and this may give rise to problems of responsibility, inter-level coordination and financial supervision. Even though both countries are promoting mechanisms to involve the local community through the creation of participation bodies, and in Colombia there is an incipient transfer of responsibilities to the school level, community participation and control continue to be weak. In Colombia, discussions are currently under way on a change in the formula for allocating resources by establishing a system of per capita allocation to make the provision of services more efficient by, inter alia, promoting greater involvement on the part of parents.

v) Processes of deconcentration involving some degree of participation of the production unit, as in the case of school decentralization in Brazil. The transfer of some categories of resources directly to the schools, which has been done since the mid-1980s in the state schools of many states, together with the appointment of headmasters by the school councils and the participation of the latter in the routine management and content of the schools, may be considered as quite an advanced form of deconcentration[25] of responsibilities in schools, with a satisfactory degree of participation by the school community in the educational process, through the councils.

Figure 2 gives a summary of the various types of educational decentralization models.

Although these reform models may seem very different from each other, a comparative analysis of them reveals some general trends. Firstly, whatever

[23] Hereafter, the principal/agent model will be understood to refer to the mid-intensity principal/agent model defined in section II.

[24] It may be noted that the way these functions are handled is relatively more rigid in Mexico than in Chile.

[25] The most highly advanced example of this process is that of Minas Gerais, where combined measures were taken in the early 1990s to democratize the management and strengthen the autonomy of schools in the administrative, financial and teaching areas. For a description of this process, see Guedes, Lobo and Walker (1997).

the degree of decentralization of the budget and the types of transfers used, the subnational levels continue to display a high degree of financial dependence on the central level, since most of the resources still come from it, except in the state systems in Brazil. Secondly, in almost all the countries studied there are still serious rigidities in the area of human resources, due mainly to the rules on public officials which still govern the wage negotiations and career aspects and which greatly reduce the degree of autonomy in the provision of services (in all the models the teaching and curricular functions usually show greater autonomy). Thirdly, the level of community participation in decisions on the various functions involved in the provision of educational services is low (except in Nicaragua and to a rather lesser extent in Brazil), although it is increasing in some cases. Fourthly (and this is linked with the low levels of participation), the schools are relatively absent as major actors in the decision-making processes. In almost all the countries, the reforms tend to transfer responsibilities to the intermediate and/or local levels, so that the schools are dependent on these levels in financial, administrative and teaching matters. Only in Brazil –and above all in Nicaragua– have the schools come to play a central role in the system. As noted earlier, in recent years a gradual transfer of teaching and curricular responsibilities to the schools has been embarked upon in Chile and Colombia, but these measures must be accompanied by greater administrative autonomy if they are to be really effective.

FIGURE 2

Latin America (seven countries): Types of educational decentralization models [a]

	"Devolution"			Principal/Agent			Deconcentration			Degree of community participation
	IL	LL	PU	IL	LL	PU	IL	LL	PU	
Argentina	HM									Low
Bolivia										Incipient
Brazil	HM	HM								Medium (PU)
Chile									IA	Low/Increasing
Colombia									IA	Low/Increasing
Mexico										Low
Nicaragua			HM							Medium/Increasing

Source: Prepared by the author.

a IL = intermediate level (province, state or department);
LL = local level (municipalities);
PU = production unit (school);
HM = hybrid model;
IA = incipient autonomy.

IV

A brief analysis of the main trends and results of the reforms

The possibility of evaluating a reform depends on its time horizon, its depth, and the availability of reliable information for following up its results; it therefore varies from country to country, thus greatly complicating the comparative analysis of results. Furthermore, the very nature of decentralizing reforms, which are generally gradual, highly complex and involve great spatial heterogeneity, makes evaluation more difficult in any case. Finally, as the majority of the episodes analysed here took place in the early 1990s, there is not yet a sufficiently broad time horizon to make a true appraisal. Indeed, most of the experiences are so recent that only those of Chile, Argentina and Brazil lend themselves to an (albeit incomplete) evaluation of their results; in the other cases all we can do is to identify some initial trends. The appraisal should be centered on the effect of the reforms on the efficiency and equity of provision of educational services. As we saw in section II, it may be assumed that a decentralizing reform process should have a positive effect on efficiency, but in contrast equity may be at risk.

On the basis of the information presented in section III and the specific data on each of the countries analysed,[26] we can draw up the following balance, highly simplified for the sake of comparability:

i) The scant progress made in terms of participation in most of the countries has not permitted real advantage to be taken of the potential of the reforms for helping to raise social efficiency.[27] All the countries have more or less specific channels of participation, but few of these have been effective. The factor which has had most influence on the degree of efficiency attained has been the initial motives behind the reforms. Thus, Nicaragua, and to a lesser extent Brazil and Bolivia, have registered most progress in participation, and this is connected with the importance attached to democratization objectives in those countries. Another factor has been the degree of financial autonomy of the new supplier levels and the degree of autonomy of the production units (as the cases of Brazil and Nicaragua show).

ii) Little information is available on the evolution of the technical efficiency of provision of educational services, as measured through cost-impact indicators,[28] either because most of the reforms analysed are so recent or on account of lack of information. Only in the cases of Argentina, Brazil and Chile is there some long-term information on the evolution of indicators of this type (summarized in table 3). Generally speaking, this evolution has been of an ambiguous nature in all the cases where main responsibility for the provision of services has been transferred to subnational (intermediate or local) levels of government. In the three countries in question, for example, coverage and expenditure have followed equally marked upward or downward paths and there is not enough information on the evolution of cost-quality indicators. At all events, it does not appear that the reforms have been accompanied by tangible improvements in the productivity of expenditure. In contrast, there would appear to be a posi-

[26] Taken from Carciofi (ed.) (1996), Ruiz-Mier and Giussani (1997), Draibe (1998), Vargas and Sarmiento (1997 a and b), Ornelas (1997), Castillo (1998) and Di Gropello (1997).

[27] The absence of direct information in this respect, due to the lack of periodic surveys on user satisfaction, limits the possibilities of evaluation - whatever the time horizon - to the analysis of indicators of community participation in decisions on the provision of services. It may be assumed that a satisfactory degree of participation is a necessary prior condition for achieving a satisfactory degree of social efficiency.

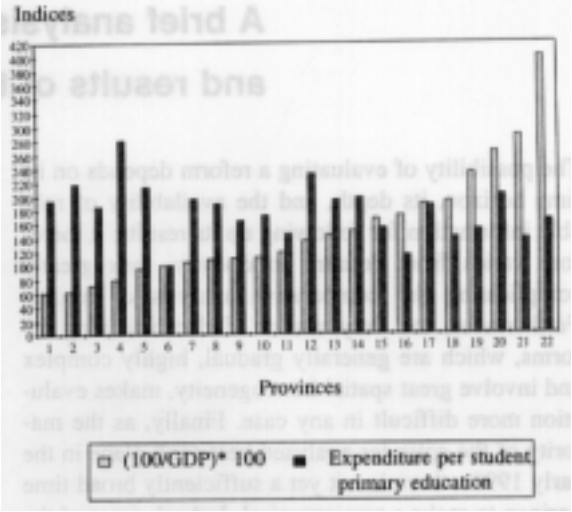
[28] In order to make direct measurements of technical efficiency, cost-impact indicators are used in which the impact is estimated by the effect on coverage (measured, for example, by the rate of school enrollment), quality (measured by the rate of repetition or the level of scholastic achievement) and cost (measured by indicators of expenditure or inputs). The difficulty of comparing numerators and denominators expressed in different units of measurement and establishing a causal relation with the reform under analysis suggests that these kinds of indicators should be interpreted with caution.

tive evolution in cases where the decentralization has been to the schools themselves, as in the Brazilian state of Minas Gerais and –although this is a more recent experience and hence more difficult to evaluate– in Nicaragua.[29] In the absence of cost-impact indicators, or in order to supplement them, positive and negative signs in terms of efficiency can be identified by using data on possible changes in the allocation and use of resources, the existence or absence of prior training conditions, the institutional development and regulation needed to ensure the success of the reforms, the degree of autonomy granted to the subnational levels, and the existing mechanisms for encouraging efficiency. Generally speaking, some positive trends are to be observed, such as some increases in investment (Bolivia, Colombia), but there are also some problems in the use and allocation of resources: for example, there have been cases of faulty utilization of the infrastructure (Bolivia) or excessive expenditure on personnel (Nicaragua, Chile), due to shortcomings in the design and application of the models.

iii) Likewise, with regard to territorial equity there is little information on the evolution of the territorial distribution of educational results and its relation with the reforms. The available analyses generally concentrate on the distribution of resources and expenditure among geographical areas resulting from the reforms, taking it as an intermediate indicator of equity.[30] In the only two cases where comparable data are available for two periods sufficiently distant from one another –in Argentina and Brazil– there are indications that the dispersion of service quality between different areas has probably increased. In both countries this is related with inequitable distribution of resources among areas, in the context of the hybrid "devolution" models applied, which has increased the dispersion of intermediate indicators of the quality of education (wages, teach-

FIGURE 3

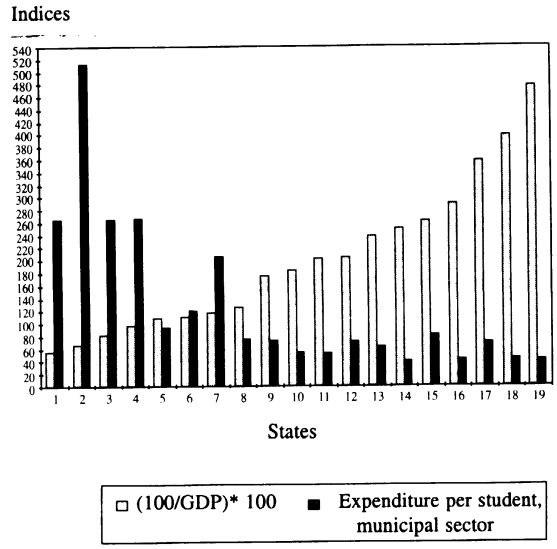
Argentina: Relation between GDP and expenditure per student in primary education, 1995



Source: Prepared by the author on the basis of Porto and Sanguinetti (1996) and Bisang and Cetrángolo (1997).

FIGURE 4

Brazil: Relation between GDP and expenditure per student on education in the municipal sector, 1990



Source: Prepared by the author on the basis of Paes de Barros, Pinto de Mendonça and Shope (1993).

[29] According to a recent survey (World Bank, 1996), the various actors involved agree that the academic level of secondary education has improved in the centres which have been made autonomous. However, it would be necessary to quantify this result and compare it with the size of the resources generated by co-payment in order to draw conclusions on the productivity of the expenditure involved.

[30] It may be assumed that a progressive distribution of expenditure should make it possible to improve the results.

TABLE 3

Latin America (three countries): Results of some of the reforms in terms of efficiency and equity

Country	Technical efficiency	Equity
Argentina	Between 1980 and 1991, the net rate of school enrollment rose by 6.6%, while the percentage of the population between 5 and 9 years of age who had never gone to school went down by 70%. However, expenditure on primary education went up by 85% between the sub-periods 1970/1977 and 1978/1985. Consequently, the evolution of the cost-coverage indicators for the provision of educational services is not clear. Furthermore, there is a lack of periodic measurements of the quality of the education provided, so that it is not known how the cost-quality indicators evolved.	After the transfer, dispersion of the average wage levels of primary school teachers trebled, favouring teachers in the provinces with higher levels of income: σ_s *(1983) = 13*[a]; σ_s *(1992) = 39* and $r_{s.GDP}$ *(1992) = 0.6*[b] This evolution, combined with the adjustments made in the size of the teaching staff by each province (in order to secure greater uniformity in terms of the number of students per teacher) would appear to have given rise to a regressive distribution of expenditure per student in primary education (eps) (figure 3): $r_{eps,\ 1/GDP}$ *(1995) = -0.3* and may have led to increased dispersion of quality of education[c] between different areas.
Brazil	Between 1982 and 1995 the net rate of primary school enrollment rose by 23%. However, the real per capita expenditure on primary education also rose by 23% between the subperiods 1980/82 and 1983/90, so that the evolution of efficiency in the provision of educational services is not clear. Furthermore, there are no direct quality measurements that would enable us to determine the evolution of the cost-quality indicators. In some states, the cost-coverage and cost-quality indicators may have improved. Thus, for example, in the state of Minas Gerais, after the 1991 reform which increased the autonomy of the schools, there have been improvements in the academic performance tests (increases of 20 points in Portuguese and 40 points in mathematics between 1992 and 1994), in the condition of the infrastructure and in teachers' training, for the same amount of expenditure.	There has been an increase in the dispersion of quality of education between different areas, as may be seen from the increase in the dispersion of the proportion of teachers with incomplete primary education (tip) between different areas: σ_{tip} *(1980) = 39;* σ_{tip} *(1994) = 63* which is connected with the ongoing increase in the dispersion of the average wages of teachers after the liberalization of the labour market. The evolution of the dispersion of wage levels, combined with the adjustments in the number of teachers made by each municipality, gives rise to a regressive distribution of expenditure on education per student in the municipal sector (resps) (figure 4): $r_{reps,\ 1/GDP}$ *(1990) = -0.6*
Chile	With the 26% drop in per capita expenditure on basic education between 1981 and 1990, enrollment in the municipal sector (m) went down by 23% over the same period, while enrollment in the subsidized private sector[d] (p) went up by 73%. Furthermore: $R_p - R_m$ *(1992) = 6 points*[f] This shows the low management capacity of the public schools compared with the subsidized private ones, in spite of the municipalization process.	In spite of the positive correlation between municipal contributions and the fiscal capacity of the municipalities,[e] the effects of decentralization on territorial equity have been limited, and in fact there is inequality of expenditure per student on education (eps) (calculated as the sum of the municipal contributions and the school subsidy from the central government) only with respect to a small number of high-income communes. If we add the compensatory expenditure programmes implemented as from the early 1990s, we even observe a slightly progressive distribution of expenditure with respect to the poverty distribution, by municipalities (p): $r_{eps.p}$ *(1994) = 0.4*

Source: Prepared by the author on the basis of Carciofi, ed. (1996); Porto and Sanguinetti (1996); Draibe (1998); Guedes, Lobo and Walker (1997); Paes de Barros, Pinto de Mendonça and Shope (1993), and Winkler and Rounds (1993).

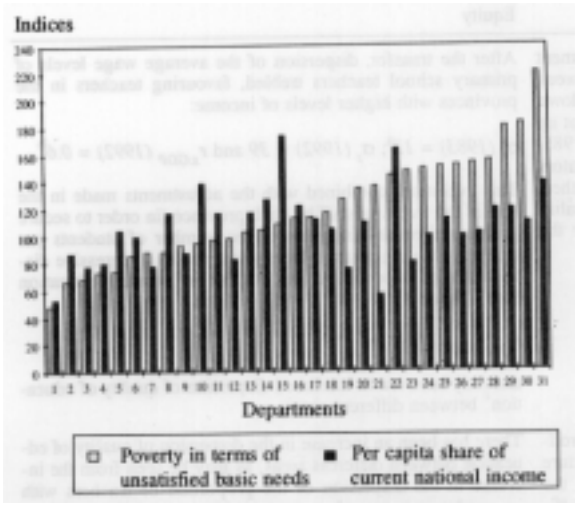
[a] σ is the standard deviation, calculated on the basis of indices, for comparability between countries. [b] *r* is the coefficient of correlation $(r_{x,y} = Cov(x,y)/\sigma_x \sigma_y)$. [c] Insofar as higher average wages attract more highly trained persons and have a positive impact on teachers' attendance and motivation, a positive relation may be expected between wage levels and the quality of education.

[d] The reforms of the early 1980s in Chile also encouraged privatization, by giving the same public subsidies to both private and public schools. The existence of subsidized private schools is a very useful benchmark for measuring the efficiency of municipal schools.

[e] In 1993, as regards spending on education per student, the richest decile contributed four times more to education than the poorest decile (Winkler, 1994). [f] Rm = educational result of the municipal sector; Rp = educational result of the subsidized private sector. The positive difference in performance in favour of the subsidized private schools is maintained even after taking into account the socioeconomic bias.

FIGURE 5

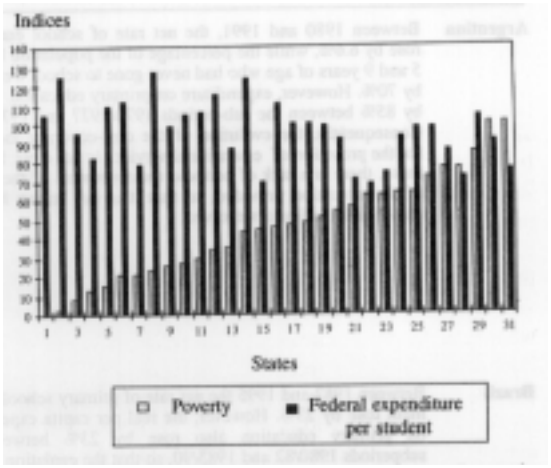
Colombia: Relation between poverty and per capita share of current national income, 1996



Source: Prepared by the author on the basis of Vargas and Sarmiento (1997a).

FIGURE 6

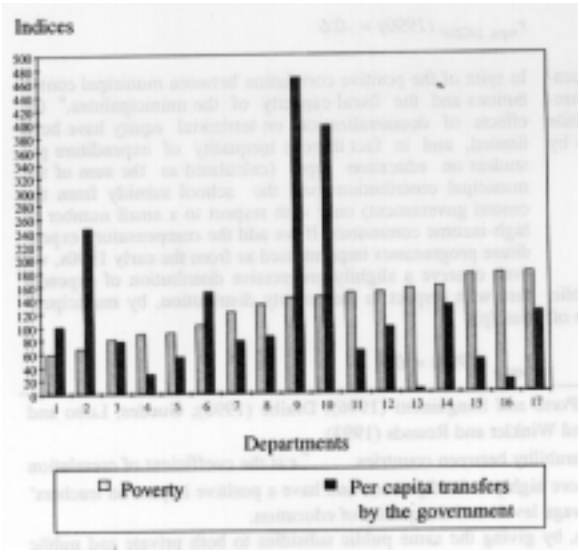
Mexico: Relation between poverty and federal expenditure per student on basic education, 1995-1996



Source: Prepared by the author on the basis of Mexico, Secretaría de Educación Pública (1996) and World Bank (1992).

FIGURE 7

Nicaragua: Relation between poverty and per capita transfers by the central government for education, 1996



Source: Prepared by the author.

ers' training). In the other countries, information is only available on the territorial distribution of resources or expenditure after the reform, without any comparisons over time, serving only to detect the degree of progressiveness or regressiveness of the distribution. In three of the seven countries (Argentina, Brazil and Mexico) there would appear to be a regressive correlation between expenditure and levels of income or poverty (figures 3, 4 and 6). In another two countries (Colombia and Nicaragua) there is a lack of correlation between the transfers between different levels of government and the levels of development of each area (figures 5 and 7), which should likewise lead to a regressive territorial distribution of expenditure, because of the combination of this lack of correlation with the regressive distribution of subnational resources. Only in Chile is there a slightly progressive distribution of expenditure (table 3), related with the allocation and compensation mechanisms used in that country.

V

Some lessons for the design of reform models

What may be concluded from this rapid assessment? It is not easy to draw conclusions, but the appraisal we have made indicates that the longer-term results of the reforms in terms of efficiency and equity have not generally been very satisfactory, since they show little progress in the social efficiency of social service provision and the productivity of expenditure, while the quality indicators tend to differ widely. Furthermore, the most recent tendencies are ambiguous. However, it is clear that these somewhat unsatisfactory results are due mainly to problems of design or implementation of the reforms which can be solved.

We will now try to outline some lessons[31] on the design of reform models that may be drawn from the foregoing analysis:

i) The new supplier levels must be given a degree of real autonomy, minimizing the number of direct restrictions. The scant progress made by Chile in the field of efficiency, for example, is due largely to the rigidity of the model applied. The lack of labour flexibility, which is a common fault in many countries, is also a hindrance to the achievement of higher levels of efficiency.

ii) A factor of fundamental importance for the results obtained is the internal coherence of the models, especially as regards the clarity of definition of the responsibilities assigned to each level and the existence of effective coordination mechanisms. This is even more important in models based on the co-responsibility of two or more levels. In these cases there can easily be inefficiency in the use of resources (as for example in Brazil, where decisions affecting the investment/current expenditure ratio are not coordinated, giving rise to problems of over-investment compared with the availability of staff.

iii) A crucial point for the success of the reforms is the design and implementation of financial transfers between different levels of government. As already noted in the context of decentralization reform, the continued existence of a significant amount of central-level finance which is distributed among the subnational levels according to socioeconomic criteria is a guarantee of equity, which may potentially be at risk with the reforms. Furthermore, when there are low levels of participation and training, transfers from the central level can significantly help to encourage options which are efficient from the technical, fiscal and social point of view. In view of the special features of the agents (the new supplier levels) and the principal (the central level), the latter should guarantee all the subnational levels a certain minimum level of financing, proportional to the initial socioeconomic conditions and local production costs (adjustment for equity), and supplement it with additional finance subject to efficiency criteria (allocation according to the results obtained in terms of coverage or quality of the services). In order to minimize the problems of adverse selection and moral hazard which may arise in situations of unequal access to information and differences of objectives between the agents and the principal, however, the central level must establish an efficient system of supervision which will make it possible to check on the efforts really made by the agents to reach the production targets, paying out the allocations according to the efficiency attained, and which will also stimulate the collection and transmission to the higher levels of information on the socioeconomic situation of the areas served by the new supplier levels, in order to facilitate allocation by equity. If this is not done, the interventions of the central level –assumed to be the remedy for the problems observed– could turn out to be as harmful as the problems themselves, or even more so.

When we review the nature of the transfers and their allocation criteria used in the first-generation reforms, we are struck by the fact that, firstly (except in Chile), specific transfers are only quite small, although they are more suitable than general transfers for meeting sectoral needs and are also necessary for linking resources with efficiency indicators. Secondly, there is a marked absence of allocation criteria

[31] These must of course be interpreted in the light of the initial socioeconomic and politico-administrative conditions of each country.

and/or guidelines which take account of equity and technical efficiency.[32] This partly explains the generally rather unsatisfactory results observed in these countries in terms of efficiency and equity. With regard to the second-generation reforms, almost all of them try to incorporate these criteria explicitly through more or less complex formulas and guidelines on expenditure or allocation. There are cases, however (Colombia, Nicaragua), where the weaknesses of the regulatory framework and lack of information make it difficult to apply the equity criteria, thus contributing to the lack of correlation between transfers and levels of poverty. In order for an incentive system to work properly it is important also to have flexible labour markets and real autonomy, so that the levels receiving the services can respond effectively to the stimuli given.

The transfer of the main areas of authority to an intermediate level or to groups of municipalities (depending on the size and population density of the geographical divisions of the country), together with decentralization of administrative, academic and financial functions to the schools themselves, should make it possible to maximize efficiency and preserve equity. The approaches at the level of individual municipalities applied in many countries, in particular, give rise to losses of economies of scale that decentralization to a higher level should be able to avoid. The gains in terms of technical and social efficiency can be maximized by giving the producer units significant degrees of autonomy, as indicated by the positive experiences in Brazil and the preliminary results in Nicaragua.

It is of fundamental importance to have a regulatory framework adapted to the regulatory and supervisory requirements of a decentralized system for the provision of educational services. Such a framework should involve the central level as well as the intermediate and local levels.

Increasing social participation and control is another great challenge of the reform process. The motivation for the promotion of democracy and the granting of greater autonomy to the producer units should have positive effects in this respect.

The reforms should be accompanied by specific training measures and programmes, especially in aspects relating to management. The lack of technical and administrative skills has adversely affected the results in Brazil and is a particularly serious problem for Bolivia and Nicaragua.

Furthermore, in view of the amounts of information needed for the functioning of the system, local bases of up-to-date information, with effective channels for its transmission, are an essential requirement.

In conclusion, the most recent reforms have had some favourable effects, such as the efforts to reduce the arbitrary allocation of transfers, to create more effective channels for participation, and to adopt approaches less focussed on the municipal level. Some of these elements have been incorporated *ex post facto* in reforms that were initiated at an earlier date. However, there are still some problems whose solution is a major challenge for the third-generation reforms: the limited real autonomy granted in respect of certain functions, especially human resources management; the as yet scanty development of the regulatory frameworks needed for the proper application of allocation formulas and the supervision of service provision systems; the adoption of service provision models which are hard to coordinate and regulate; the lack of autonomy of the units producing services; the lack of up-to-date information systems, and the insufficient efforts made to provide training to face the new demands posed by the provision of services.

(Original: Spanish)

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[32] Although in Brazil allocation criteria incorporating aspects of efficiency and equity were recently introduced.

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The role of agents *in agricultural policies:* intentions and reality

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Sectoral policies make explicit and implicit assumptions about the behaviour and capabilities of the agents (such as dynamic responses to market signals, demand-led assistance, collaborative efforts, participation in financing) which we consider to be rather unrealistic. Because of this lack of realism, policies that aim to be neutral often turn out to be highly exclusive. They fail to give sufficient importance to the special features of the sector –with its high climatic, biological and commercial risks and its slow adaptation– or to the fact that those who take decisions in agriculture are now mostly in an inferior position because of their incomes below the poverty line, their inadequate training, their traditions based on centuries of living in precarious conditions, and their geographical location in marginal areas, far from infrastructure and with only a minimum of services and sources of information. These people have only scanty and imperfect access to the markets which, according to the prevailing model, should govern decisions and the (re)distribution of the factors of production. In our opinion, this explains the patchy and lower-than-expected growth registered by the sector after the reforms to promote the liberalization of markets and external openness in the region. In view of the results of the application of the new model, it may be wondered whether Latin America can afford a form of development which excludes over half of its agricultural producers; what the alternatives are; and what costs and benefits each of them offers in terms of production and monetary, social, spatial and other aspects. The article outlines the changes in policies and their results at the aggregate level, summarizes the arguments usually put forward to explain agricultural performance in the region, and proposes a second set of explanations based on a description of the agents and the responses that may be expected from them, contrasting the latter with the supposedly neutral nature of the policies.

I

Introduction

Various authors, such as Schejtman (1982), have highlighted the heterogeneity of agricultural producers and, hence, the need to formulate differential policies in order to obtain the desired results. This was done in the past, in the context of a paternalistic State, with policies that were often dictated from above and, of course, from the capital.

More recently, taking a similar but considerably more optimistic view, De Janvry and Sadoulet (1993) conclude that the present time should be particularly favourable for rural development, because there is now a better understanding of the dynamics of rural poverty, the logic behind agrarian institutions, and the political economy of the reforms.

In our opinion, however, the present situation points rather in the opposite direction: there is great emphasis on sectorally "neutral" macroeconomic policies, with considerable vagueness about the place of sectoral policies in the "model" and with only incipient emphasis on the definition of regional– and local-level promotional policies but much greater emphasis on demand-driven actions and services, so that it is the agents who take the initiative in such demand, which in many cases should be of a group nature.

Generally speaking, it was expected that the agricultural sector, which had been heavily burdened during the almost thirty years of import substitution policies,[1] would now take advantage of the comparative advantages offered by the natural resources of the region and show all its potential for development and export growth. So far, however, its performance has been rather disappointing.

Microeconomic analyses are now beginning to be made[2] which conclude that while neutral policies have favoured exportable tradeable goods and –less predictably– some non-tradeables (ECLAC, 1997a), they have also favoured some groups more than others.

We feel that (supplementing a recent study on the influence of agents on policies (Binswanger and Deininger, 1997)) an analysis based on the real situation and capacity of the various agents to respond to different policies could help to explain why the sector as a whole has performed less well than was expected under the neoliberal model.

Consequently, after analysing the policy changes made and the indicators of the sector's performance, we wish to outline here some reflections which –based on the different socioeconomic characteristics of producers and the different degrees of use made of factors in the various agricultural and forestry products– try to indicate how they are affected by price signals, policies and instruments and how they are most likely to respond to them.

II

Economic policies after 1980

Since the mid-1980s, Latin America has experienced unprecedented changes, passing from a development strategy aimed at the domestic market, with strong public sector intervention, to an outward-looking strategy with deregulated markets, much fiscal control, and the private sector as the main agent of development. It was expected that this new approach would lead to rapid and more efficient growth, free from the distortions of the past.

We cannot really speak of the existence of a single new development model in the region. There is currently almost general agreement on the need to maintain the macroeconomic balances, to further trade and financial openness, to restrict activities by

□ The author wishes to thank Research Assistant Mónica Arellano for her valuable collaboration.

[1] See, for example, Krueger, Schiff and Valdés, 1990.

[2] With regard to the industrial sector, see for example Peres (ed.), 1998.

the State in the field of production, and to deregulate markets. There is less consensus, however, on the need to regulate and supervise the banking system; on the sequence in which reforms in the areas of trade, financial liberalization and exchange-rate policy should be carried out and on the prior need for a suitable institutional framework in the financial area; on the need for export promotion and sectoral and technological development policies; on privatization, and on the content and scope of labour reforms (ECLAC, 1995).

The reduction of inflation has undoubtedly been one of the main achievements. Other macroeconomic variables of key importance for the competitiveness of a tradeable sector such as agriculture have been tackled less effectively, however: consequently, many of the national currencies of the region are overvalued, and interest rates are very high. Because of this situation and the fact that the reactions of the various agents were less vigorous than expected, even before the Asian crisis the 1990s was showing signs of ending with an average growth rate lower than that of the import substitution period and an income distribution pattern similar to or even more concentrated than that of the early 1980s.

Unfortunately, the division into two opposing camps of those in favour of the neoliberal model, on the one hand, and those who have serious misgivings about it, on the other, has not yet permitted a calm and dispassionate analysis and a constructive debate on this unexpectedly poor performance.

III

Agricultural policies before and after 1980

In general terms, it may be said that in the period from the 1950s to the 1980s there were sectoral policies in favour of agriculture, designed among other things to offset other policies with an industrial and urban slant. According to Krueger, Schiff and Valdés (1990), all in all the policies applied were not favourable to agriculture, since the macroeconomic policies applied had a serious negative impact which the sectoral policies in favour of agriculture did not manage to offset.[3] Furthermore, the subsidies for inputs, water, credit and the prices of various services favoured those who used them most, that is to say, medium-sized and large commercial producers (Gómez Oliver, 1994).

Neoliberalism basically holds that (in conditions of perfect competition and information) it is the market that allocates resources best among various different uses and causes them to flow to the areas of activity which offer the greatest comparative advantages to the country and the economic agents. The private sector thus becomes the main agent of change.[4]

Policies involving greater openness (lowering of tariffs and elimination of import and export hindrances, such as quotas and licences) are therefore a logical consequence of the neoliberal model, though the great importance attached to exports is not: it derives in fact from the need to achieve balance-of-payments equilibrium. Thus, although in industry it is essential (in medium-sized or small economies) to have an export-oriented strategy in order to take full advantage of the potential profits, this is not so in

[3] In this article, "agriculture" is used for the sake of simplicity, usually meaning the agricultural and livestock sector but also sometimes forestry and fisheries too.

[4] In its "Declaration of Santiago" the Ibero-American Agricultural Forum (Santiago, August 1996) asserted that private enterprise (whether in the shape of individually owned private concerns, cooperatives, companies, communities, or any other form) is the main agent of change and that the State must play a facilitating role aimed at strengthening a solid, broad and creative entrepreneurial base for the benefit of those who take the risk of embarking on business ventures and that of countries as a whole, though it tempered this assertion by also reaffirming the State's commitment to give support to agriculture, especially family peasant agriculture and cooperatives, as the most effective and realistic response for a broad segment of medium-sized and small agricultural producers for whom, for economic, social, environmental and cultural reasons, this option represents their possibility of development.

TABLE 1

Latin America and the Caribbean: Main features of changes in agricultural policies

Policies in the 1950s to 1980s	Present policies
Strong State centralism	Political, institutional and financial decentralization aimed at serving local projects
State planning and financing of "public" goods and services	Demand-oriented approach, with co-financing of investments in infrastructure and services
Concern for the food security of the country, with research therefore focussed on increasing production and yields of staple foods (rice, wheat, maize, potatoes, beans, lentils, etc.)	Demand-oriented approach, with co-financing of research both in public research institutes and in universities [a]
Free technical assistance, with programmes prepared by State bodies with little or no user participation	Paid private technical assistance in response to demand from producers, subject to presentation of a project for competition when subsidies are involved
Subsidized credit through special lines of credit for the sector	Elimination of specific lines of credit for the agricultural sector, of development banks, and of the obligation of private banks to loan a certain proportion of their portfolio to the sector
Labour reforms leading to the monetization of the rural economy and the gradual disappearance of sharecropping-type systems, with their labour force being replaced by permanent or above all temporary wage labourers	Deregulation of the labour market, although in the case of agriculture the rules had always been less strict and more difficult to enforce
Price controls for staple foodstuffs in order to check inflation and keep minimum wages low so as to encourage industrialization	Freedom of prices
Exchange rates favourable to imports	In principle, equilibrium exchange rates
Tariff rates that were generally high but covered a wide range of rates	Reduction of tariff rates and application of a uniform rate, albeit with some exceptions, especially for agricultural products
Taxes on agricultural exports	Elimination of taxes and other hindrances to exports
Agrarian reform programmes aimed at reducing the inefficiency of highly heterogeneous production systems (with abundant land and capital for a few agents and abundant labour in the case of the rest) and above all at reducing the possibility of social disorder in rural areas	Replacement of agrarian reform programmes with purchase through the land market, aided by loans and/or subsidies for small producers; promotion of formal proof of ownership through the issue of official property titles [a]

Source: Prepared by the author.

[a] For more details, see Appendix 1 and 2.

agriculture, where economies of scale are often non-existent, nor generally in agroindustry either. In such a case, then, development based on a domestic market which demands quality and is open to external competition is a perfectly legitimate option.[5]

In the 1990s, in addition to the efforts made to liberalize markets and open up the economies to the exterior, progress has also been made towards decentralization; new arrangements for consultation and participation; incentives for concerted action by different agents; new forms of association between the State and private agents; the transfer of functions from the State to private agents or non-governmental organizations, and the promotion of horizontal policies (the improvement of general education, for example) rather than sectoral ones.

[5] For example: after the Corporación Colombiana Internacional completed its studies on the possibility of selling tropical fruit on foreign markets it was discovered that the domestic market in Colombia had an unsatisfied demand for such products which was three or four times greater than the external potential estimated in those studies (IICA, 1996).

As a result, the public machinery for agriculture and the rural environment is currently in the midst of a process of change, redefinition and justification of its areas of action and review of its relations with civil society, whereby the latter changes from being a mere beneficiary to an important actor, and like the other areas of government it is striving to increase its efficiency. In order for civil society to become a main actor, however, it must first fulfill a number of requisites: a matter to which we will return later.

Generally speaking, the State has reduced its activities. As a result, in the area of agriculture –which is marked by high risk and the great geographical dispersion of its agents– a number of gaps have arisen which have not yet been filled by the private sector and will not be filled by it in the future unless compensation is provided in unprofitable areas. These gaps have had adverse effects, especially for small and medium-sized producers, in such areas as access to credit, technical assistance for agriculture, markets and collection centres, and also in research aimed at the genetic improvement of seeds and the whole range of technologies designed to aid agriculture using limited resources and marginal land. Non-governmental organizations, within their specialized fields and in keeping with the guidelines laid down by the bodies which finance them, have filled some of the gaps left by the State, but their activities, which are generally on a small scale and are highly localized, have given rise to problems of coordination, feedback and dissemination which are even greater than when rural development was the responsibility of various departments of the State.

In a highly simplified and summary manner, table 1 outlines the main features of the changes which have taken place in agricultural policy.

IV

The expected results, and those actually obtained

In theory, the policies of adjustment, liberalization of domestic markets and external openness (which also meant the elimination of the heavy duties levied on agriculture) should generate higher growth rates for the sector as a whole than those registered in the past (3% per year between 1950 and 1980, and 3.5% between 1970 and 1980). They should also lead to the redirection of resources to make better use of the comparative advantages of the region (weakened however by the intervention policies of the developed countries). All this should give a strong boost to export agriculture at the expense of the basic grains and relatively non-tradeable goods (products with excessively local consumption patterns, or too perishable, or whose prices do not make up for transport costs) which form the bulk of traditional peasant farming production.

Fifteen years after the initiation of the economic reform processes (although in the agricultural sector in many countries these only began in the 1990s), it may be said that production is indeed being restructured in the expected direction (figure 1), but this process had already begun in the 1970s, that is to say, before the reforms. A number of other effects of the reform processes are not yet clear. What is clear is that so far the aggregate economic results of the sector have been less encouraging than was hoped for by those who promoted the reforms.

Thus, although the crisis of the 1980s did not hit agriculture as hard as the rest of the economy, the average annual growth rates of the sector (like those of the economy as a whole) have not yet fully recovered: average annual growth between 1991 and 1997[6] was only 2.5%, with big fluctuations from one year to another (table 2).

The volume of agricultural exports grew relatively strongly (3.1% per year) between 1980 and 1996, but their value increased only slightly up to 1993 because of the decline in international prices. Over the whole period, the annual growth rate of the value of exports was 2.1% (figure 2). The share of

[6] Between 1990 and 1995 there were big improvements in average yields, which increased by 3.3% per year compared with only 1.3% per year in the 1980s, but the area cultivated, which had expanded in the 1980s, went down by 2.2% per year (FAO, 1996, p. 170).

TABLE 2

Latin America and the Caribbean (23 countries): Gross domestic product of agriculture, forestry, hunting and fishing, and total GDP less GDP of agriculture, forestry, hunting and fishing [a]

(Annual growth rates on the basis of figures in dollars at current prices)

Annual growth rate 1971-1980 above average								Annual growth rate 1971-1980 below average							
	1991-1997	1091-1990	1971-1980		1991-1997	1981-1990	1971-1980		1991-1997	1981-1980	1971-1980		1991-1997	1981-1990	1971-1980
Ecuador	3.2 (3.6)	4.2 (1.4)	3.0	Dom. Repub.	4.0 (4.8)	0.4 (2.9)	3.4	Chile	5.0 (8.2)	5.6 (2.8)	2.2	Guyana	9.5 (6.6)	-2.5 (-3.1)	0.9
Brazil	3.0 (3.0)	2.5 (1.5)	4.7	Bolivia	3.7 (4.2)	1.7 (-0.1)	4.1	Peru	4.8 (5.6)	2.2 (-1.4)	-0.6	Uruguay	4.2 (4.1)	0.2 (-)	0.6
Paraguay	2.5 (2.8)	4.0 (2.7)	6.7	Guate-mala	2.8 (4.5)	1.3 (0.8)	4.7	Nicaragua	4.5 (1.8)	2.9 (-1.8)	-0.1	Jamaica	2.6 (0.1)	0.9 (2.3)	0.9
								Honduras	3.4 (3.8)	2.7 (2.3)	2.7	Argentina	2.4 (5.7)	1.3 (-0.9)	2.1
								Costa Rica	2.6 (3.6)	3.1 (2.1)	2.6				
Venezuela	1.5 (3.4)	2.0 (-0.9)	2.9	Mexico	1.6 (2.9)	1.2 (1.9)	3.4	Panama	1.6 (5.1)	2.9 (1.2)	1.3	Trin.and Tobago	1.5 (2.5)	0.1 (-2.7)	-3.0
Colombia	1.4 (4.6)	3.0 (3.9)	4.4									El Sal-vador	1.2 (6.0)	-1.4 (-0.2)	2.4
												Barbados	-1.2 (0.9)	-0.2 (1.3)	-1.1
												Haiti	-6.4 (-1.4)	-0.2 (-0.7)	1.5

Source: Prepared on the basis of figures provided by the ECLAC Statistical Division.

[a] The shaded figures correspond to agricultural GDP growth higher than the average for the region as a whole (excluding Brazil) and the figures in parentheses correspond to the annual growth rate of GDP in constant dollars, less the agricultural GDP.

Average annual growth rates of agricultural GDP of the region:

	Without Brazil	*With Brazil*
1991-1997	2.3	2.5
1981-1990	1.8	2.0
1971-1980	2.9	3.5

Average annual growth rates of total GDP less agricultural GDP

	Without Brazil	*With Brazil*
1991-1997	4.1	3.7
1981-1990	0.9	1.1

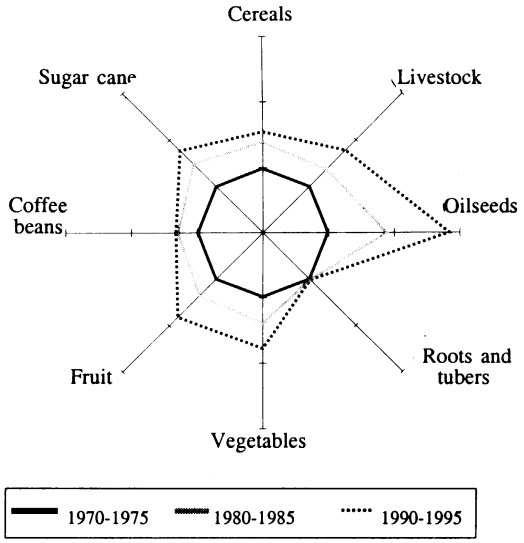
non-traditional products (such as tropical or temperate fresh fruit and vegetables) in agricultural exports has increased, and they now account for nearly 25% of such exports. In terms of the area planted and the number of jobs generated, however, non-traditional exports are much less important.

Agricultural imports, in contrast, which had gone down sharply between 1981 and 1987 (-5.8% per year in terms of value), thereafter resumed the rapid growth begun in the mid-1970s (12.1% per year in value between 1987 and 1996). They consist mainly of staple foodstuffs such as cereals and dairy products. Over the period from 1980 to 1996, agricultural imports grew at an overall annual rate of 3.0% in volume and 3.9% in value.

In the economy as a whole, growth since the beginning of the 1990s has been based on relatively intensive use of capital and has created little employment; the difference between the wages of the most highly skilled workers and the unskilled has increased, as also has the gap between rich and poor. Generally speaking, the model seems exclusive for a substantial segment of the population and also for the agricultural sector (table 3). Contrary to what has occurred in urban areas, in rural areas the levels of poverty and indigence after the crisis seem to have stuck at high levels: 54% and 31% of rural households or 78.2 and 47.0 million persons, respectively, in 1997 (ECLAC, 1999).

FIGURE 1

Latin America and the Caribbean: Changes in the structure of production

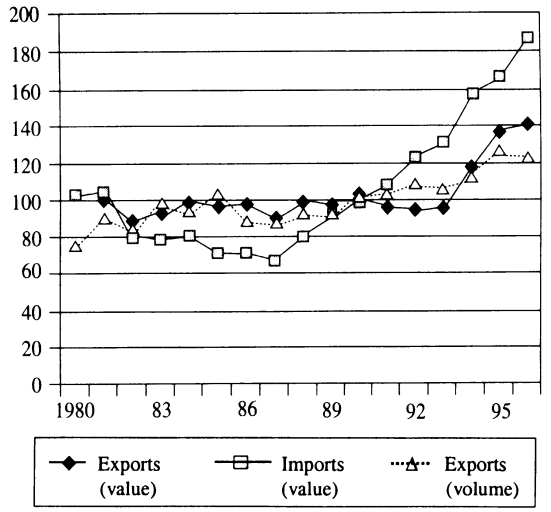


Source: ECLAC/IICA (1997), with data from the United Nations Food and Agriculture Organization (FAO).

FIGURE 2

Latin America and the Caribbean: Agricultural trade

(Base 1989-1991 = 100)



Source: FAO-Internet, December 1998.

TABLE 3

Latin America: Changes in the structure of agricultural production, 1970-1995

Product	Sector A	Sector B	Area	Productivity	Labour intensity
Oilseeds	X		Greatly increased	Greatly increased	Low intensity
Cereals	X		Increased	Greatly increased	Low intensity
Cereals		X	Went down	Remained unchanged	Medium intensity
Fruit and vegetables	X	X	Increased	Increased	Intensive
Stock-raising (for meat)	X	X	Increased	Increased somewhat	Low intensity
Stock-raising (for milk)	X	X	Increased	Increased	Intensive
Small livestock (poultry, pigs)	X		Very small	Increased	Intensive
Tubers and pulses		X	Remained unchanged	Remained unchanged	Medium intensity
Artificial forests	X		Increased somewhat	Increased	Low intensity
Natural forests		X	Went down	Remained unchanged	—

Source: Prepared by the author.
a Sector A: mainly modern
Sector B: mainly traditional.

V

Interpretation of the somewhat disappointing performance of agriculture

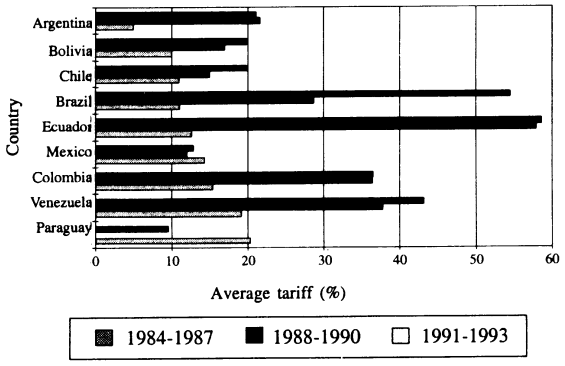
It is important to note that the promoters of the reforms had identified serious hindrances to development –especially for the agricultural sector– in the previous model and were expecting that the reforms would bring more dynamic growth than in the past.

In order to understand why the performance was lower than expected,[7] it should be borne in mind that the countries applied adjustment, free-market and economic openness measures of different intensities, spread over time in different manners,[8] with a number of exceptions for the agricultural sector. In a number of countries the markets only began to be liberalized at the end of the 1980s or even later (figure 3), while others, after a short spell of liberalization, reintroduced tariffs and support measures for prices and domestic sales.[9] Indeed, many of the changes in agricultural policy, rather than forming part of a well-defined development strategy, were in the nature of special measures taken in response to short-term macroeconomic or sectoral problems and demands by pressure groups.

The trade negotiations did not fit in with clear strategies either, and the consolidated levels agreed upon in the Uruguay Round (the theoretical tariff) resulted in great dispersion, even between countries with bilateral or multilateral agreements, and did not form a complete structure of corrective duties to make up for the unequal conditions of competition.[10]

FIGURE 3

Latin America (9 countries): Changes in average tariffs for foodstuffs



Source: ECLAC/IICA (1997), on the basis of data from the United Nations Conference on Trade and Development (UNCTAD).

Furthermore, during much of the last 15 years the efforts to secure greater openness have coincided with a depressed world market, with (in most of the countries of the region) exchange rates that were first over-devalued and then over-revalued,[11] more expen-

[7] ECLAC is carrying out two interdisciplinary projects of broad scope in order to analyse whether it was the theory or its manner of application which went wrong, or if it is too early as yet to see all the benefits of the reforms. Here we will merely outline the explanations that would appear to be applicable with regard to the agricultural sector.

[8] See, for example, Ramos (1997).

[9] This occurred, for example, in Chile (with the reintroduction of government purchasing programmes after the 1982 crisis and the introduction of official price ranges), while Colombia introduced or reintroduced measures such as minimum import prices, compulsory prior licences, a stabilization fund for cotton, a more active role for the reception stations of the Agricultural Marketing Institute (IDEMA), the restoration of lines of credit, a rescue operation for the Caja Agraria bank, a technological shock plan and agricultural insurance. José Antonio Ocampo, who was Minister of Agriculture of Colombia in 1993, justified these measures because of the great economic and above all social importance of the sector and also because, as he said, "the idea that the mere lowering of levels of protection for agriculture as a whole was all that was necessary in order to make the sector flourish has been a failure" (Colombia, Ministry of Agriculture, 1993, pp. 3-7.

[10] An example of this is the Andean countries, which have a common external tariff (between 15% and 20%), supplemented with price ranges or flexible tariffs for a number of agricultural products. However, Colombia negotiated consolidated tariffs ranging from 15% to 332%, with an average of 118%; Ecuador negotiated an average tariff of 26%; Venezuela consolidated its tariffs for most agricultural products at 40%, but with some special tariff ranges which brought the average up to 59%; and Bolivia consolidated its tariffs at a uniform 40%: i.e., three times the normal tariff (IICA, 1996).

[11] If we compare the real exchange rate prevailing in 1996 with that of 1990, we see that it rose and hence favoured exports in only six countries: Bolivia, Honduras, Nicaragua, Paraguay, Costa Rica (up to 1995) and Mexico (in 1994 and 1995). In all the other countries it went down (ECLAC/IICA, 1997, on the basis of ECLAC data).

sive and restricted credit,[12] and a decline in per capita income which led to lower domestic consumption of agricultural products and a shift towards cheaper products, often provided by traditional agriculture (such as cereals, dried pulses and roots and tubers). Together, all these factors probably held back the expected restructuring of the more modern sector. The lower use of various State services and their only partial replacement by equivalent or better private services, together with the limited adaptation capacity of the traditional peasant sector (because of lack of resources, lack of information and excessive risks), also probably held back possible changes in the sector, except for some successful examples of vertical coordination with agribusiness, especially for export. In this context, the reforms have tended to cause tensions between farmers and the authorities which –as in the developed countries– have often been settled through the reintroduction of protectionist measures.

Thanks to policies aimed at greater trade openness and the development registered in infrastructure, agricultural production has become more internationally tradeable and the price of the products depends less and less on micro-regional and national supply and demand (or tariff and price policies) and more and more on variations in external supply and demand. The regulatory effect on producers' income exerted in the past by rises (or falls) in prices due to bad (or plentiful) local harvests is less and less noticeable. In the face of this growing exposure to international prices, the agricultural sector will be able to sustain itself if: i) it manages to produce at internationally competitive prices and to create mechanisms for reducing risks (or offering sufficiently high income to offset them) and for keeping own-account producers, employers and wage-earners in business, and ii) it can attract the investments needed to continue being competitive on the international and also the domestic level.

VI

Some additional interpretations

So far, the interpretation made of the reasons for the performance registered by agriculture has been of a rather traditional nature. We will now explain why we feel that a number of the innovations made in policies for the sector will tend to be exclusive unless they are accompanied by measures to boost the sector's functioning.

1. The agents and the actual agricultural and rural situation in the region

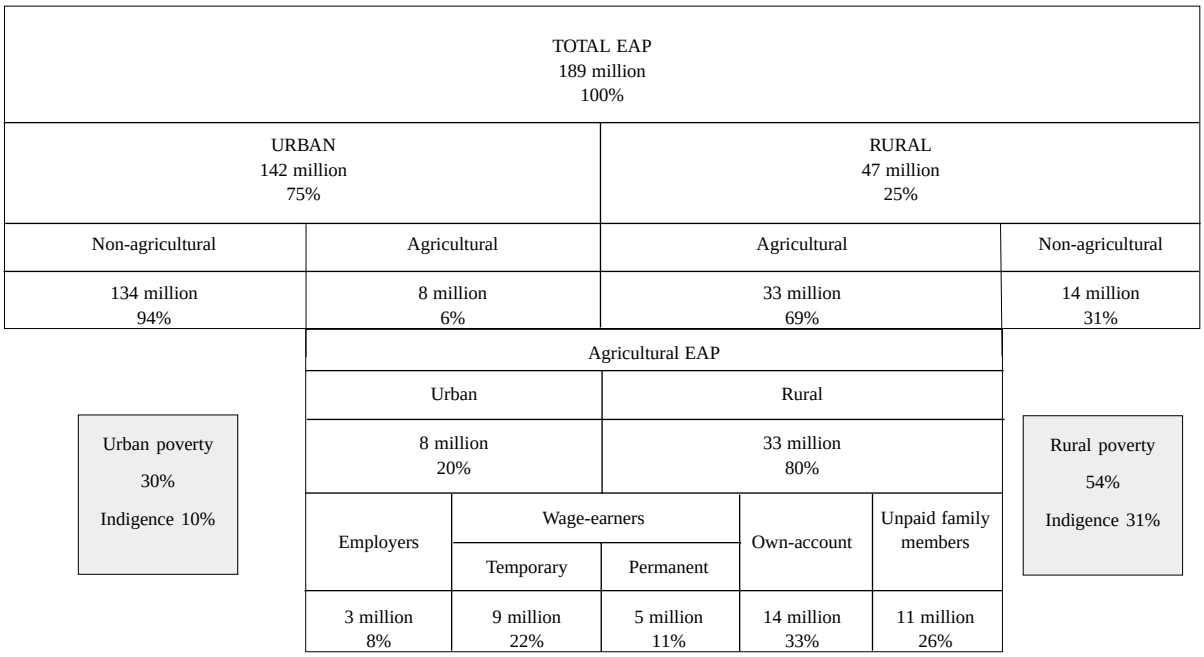
A very rough calculation of the economically active population (EAP) of the region indicates that there are some 17 million agricultural producers –employers and own-account workers– out of a total agricultural EAP of some 41 million persons. These producers are the economic agents who are expected to respond to policy stimuli. We will leave aside the 3 million employers (who should have a greater response capacity one way or another because they have more capital and probably more training) and concentrate on the 14 million own-account agricultural workers (figure 4 and table 4). According to poverty statistics (ECLAC, 1999), the percentage of poor among these own-account workers is similar to that of the rural population as a whole, so that roughly 55% of these 14 million are below the poverty line (and a third of them may also be below the indigence line), with everything that that implies in terms of capacity to accumulate investment resources, to think past the short term, to take risks and innovate and to see agricultural activities as a valid long-term option.

If we also add the lack of schooling (which is even more marked among the decision-makers, that is to say, those over 40-50 years of age), the flaws and asymmetrical aspects of the information market, and the ever-increasing requirements of a flexible, open and globalized market, it is easy to understand why such an important group of agents is at a serious

[12] If we compare the real interest rate prevailing in 1996 with that of 1992, we see that it went down in Chile, Honduras, Panama, Peru, Venezuela, Brazil (as from 1994) and Costa Rica (as from 1993), but in all the other countries it went up (ECLAC/IICA, on the basis of ECLAC data).

FIGURE 4

Latin America: Economically active population, 1995



Source: Prepared by the author on the basis of CELADE (1995 and 1996), FAO (1994), Klein (1992), household surveys effected in various countries in 1992, and ECLAC (1999).

disadvantage in terms of responding to supposed policy stimuli or is indifferent to them. We use the term "indifferent" because as they do not have access to credit it is all the same to them whether interest rates rise or fall, and if they primarily consume their own production or use mainly domestic inputs and goods they have little direct interest in whether the exchange rate is higher or lower.

Fixed transaction costs and the existence of imperfect markets (especially for land, credit and labour) also explain the apparent lack of reaction to price changes of large groups of agricultural producers constrained by their shortage of resources. The fixed transaction costs (for information, organization and hiring) that must be incurred in order to progress from production for one's own consumption to production for the market can be very high, thus making it necessary to produce a certain minimum quantity even though production itself may be neutral in terms of scale. Furthermore, these fixed transaction costs may not be recoverable through other activities, and if they are very high they would make it necessary to participate in a given market for a number of years in a row. For this reason, producers may decide not to incur such costs unless they are sure of being able to participate in the market for the necessary length of time. Thus, in proportion as participation in the markets is more risky and there are no insurance mechanisms external to the farm, producers will opt to continue with an approach based on food self-sufficiency longer than would appear to be warranted by the size of transaction costs. This is why even small producers who participate actively in the markets tend to continue producing crops for their own consumption (De Janvry and Sadoulet, 1998).

2. The explicit and implicit assumptions behind the new sectoral policy approaches

We will now deal with several of the policies outlined in table 1, formulating our reservations in respect of each of them.

TABLE 4

Latin America in the 1990s: The real agricultural and rural situation in figures

	Latin America	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Jamaica	Mexico	Peru	Venezuela
% agricultural EAP/total EAP (1994)	23.9	9.4	39.4	21.9	11.2	24.7	21.4	25.4	27.5	32.6	9.4
% agricultural GDP/total GDP (1997)	7.6	6.6	14.9	6.9	6.8	13.5	14.9	7.6	6.6	7.0	4.8
% agricultural exports (including forestry, fisheries and processed products)/total exports [a]	26	55	28	35	39	38	69		9	32	4
Agricultural GDP in 1997 (millions of 1990 dollars)	103 656.3	13 513.4	1 033.8	36 471.7	3 519.0	7 196.3	1 080.4	298.3	21 070.2	3 654.8	2 903.4
Agricultural EAP (thousands, 1994)	41 000	1 148	931	13 110	571	2 885	251	319	9 016	2 554	719
Productivity of agricultural EAP in 1994 (in constant 1990 dollars)	2 528	11 033	1 009	3 504	5 320	2 415	4 186	1 043	2 189	1 253	3 878
Annual growth rate of agricultural EAP (1980-1993)	0.4	-1	1.2	-0.3	-0.3	0.4	0.4	0.6	1	1.2	-0.7
Agricultural employers (thousands)	3 000			643.5	39.9		13.5		1 205.5		105.2
Own-account agricultural producers (thousands)	14 000			4 263.3	192.7		54.2		2 737.4		217.7
% of poor among own-account agricultural producers [b]			89	56	20	67	24		68		44
6 or more years of formal schooling (% of total 15-24 group)				29	88	47	82		80		
6 or more years of formal schooling (% of total 25-59 group)				15	60	25	70		48		
Average size of farms (hectares) [c]	60.9	469.0		64.7	94.1	26.3	40.6		24.6	18	82.6
Number of farms of less than 5 hectares (thousands) [c]		57.0		2 977.5	134.3	700.2	35.2		2 620.4	1 026.2	169.7
% of farms of less than 5 hectares [c]	47.5	15.1		39.7	42.5	59.5	45.8		59.4	78.0	44.8
Arable land/agricultural EAP (hectares per person, 1993)	3.0	21.6	2.3	3.2	7.0	1.4	1.1	0.5	2.6	1.3	4.5
Arable land/tractors in use (hectares per tractor, 1993)	80.8	89.3	396.3	57.1	95.5	107.4	40.7	50.3	134.6	206.1	65.6
Agricultural GDP in 1996/hectares of arable land (in 1990 dollars)	948	527	464	1 184	819	1 874	3 819	2 266	901	1 042	872

Source: Dirven (1997), ECLAC/IICA (1997), ECLAC (1999), and ECLAC, Statistics and Projections Division, computerized tables (March 1998).

[a] Approximate values for 1995.

[b] Including agriculture, stock-raising, fisheries, hunting and forestry; data for 1996 or 1997, except in the case of Venezuela, where the data are for 1994.

[c] Data taken from agricultural censuses (various years).

i) *Political and financial decentralization designed to further local projects.* In order to implement this approach, the agents must have: sufficient organizational capacity and political weight for their demands to be heard; capacity to formulate their demands in the required formats, types of content and time limits; and capacity to supervise and control regional action. Experience shows that many agricultural producers lack these capabilities and have no access to the training needed in order to acquire them.[13]

ii) *Investments in infrastructure and services based on the demand of the beneficiary population and co-financing.* Because of low geographical density, rural infrastructure and services are generally more expensive per unit of benefit and beneficiary, and many of the latter have little or no payment capacity.

iii) *Demand-oriented and co-financed research in both research institutes and universities.* The situation observed here is one of relative neglect of basic research, with greater emphasis on shorter-term and directly applicable research projects, a shift from staple products to non-traditional products with greater added value, and some divergence between the international research centres, which continue to be oriented towards research on staple foods, and the national research centres, which seek to meet the needs of the more dynamic producers.

iv) *Elimination of free State technical assistance and its replacement by paid private technical assistance.* The latter is provided in response to demand from producers and, when accompanied by a subsidy, after presentation of a project in a competition. The problems arise because of the lack of payment capacity of some producers; unsatisfactory capacity to formulate projects for competition in the required formats; inadequate dissemination and socialization of the experience gained; failure to comply with deadlines and lack of continuity of efforts; lack of interest of consultants in travelling to more distant places or carrying out more complex and higher-risk projects; and insufficient capacity for the evaluation of proposals and control of projects by the authorities which co-finance or subsidize the projects.

v) *Elimination of specific lines of credit for the agricultural sector.* The agricultural sector is less attractive to credit institutions than other sectors of the economy both because of the inherently high risks in its activities (risks due to the weather, phyto-sanitary factors and sharp fluctuations in prices) and the insufficient means for reducing these risks (insurance, stabilization funds, futures), and because of the heavy indebtedness of many farmers and their geographical dispersion. According to partial information from a number of countries of the region,[14] credit for the agricultural sector has gone down substantially since the reforms, especially for small and medium-sized producers.

vi) *Replacement of agrarian reform programmes by purchases made through the land market, with the aid of credit and/or subsidies for small producers.* Efforts to determine whether the desired objectives are being achieved by this means have only begun recently. According to some studies[15] made in Mexico and Peru (both of which made a thorough-going review of the laws governing the land market in the early 1990s), the market for both the rental and the sale or purchase of land is generally sluggish but tends towards the concentration of ownership in the categories of medium and large landowners.

It would therefore appear that while the policies applied are outwardly neutral, in reality they are often highly exclusive because they do not take account of the special features of the agricultural sector, the serious shortcomings in a number of its markets, the high transaction costs which prevail, or the lack of physical, financial, human and social capital among many of its agents. The results of these policies are nevertheless considered politically and morally justified because they are "responses to demand".

[13] See Durston (1999) on ways of promoting the acquisition of these capabilities.

[14] Including Brazil, Costa Rica, Mexico and Peru (the information is based on presentations and as yet unpublished documents presented at the seminar on the impact of structural reforms on agriculture in Latin America, organized by ECLAC at Santiago, Chile, from 25 to 27 November 1998).

[15] Carried out in 1997 and 1998 under an ECLAC/FAO project in the first case and an ECLAC/GTZ project in the second.

VIII

Conclusions

The available information indicates that in the 1990s the growth rate of agricultural production has been below its historical level and agricultural exports have grown a good deal more slowly than agricultural imports. Furthermore, there are more and more indications that modernization and increases in yields have been concentrated among a limited number of farmers, while the others have not shared in this progress or have even suffered setbacks.

In our opinion, the fact that large groups of producers are not forming part of the growth processes that –according to the advocates of the reforms– should have begun with the policy reorientation measures is due to a lack of realism: insufficient account was taken of the special features of the agricultural sector and the disadvantages of its agents. This lack of response by a major group of agents would appear to be the reason why, in aggregate terms, the sector has turned in a rather mediocre performance.

Can there be dynamic rural development without the incorporation of this group into new forms of production? Can there be dynamic, balanced and equitable national development with the exclusion that stems from the policies studied here? What are the alternatives, and the costs and benefits of the different options?

The answers to these questions are not easy, especially as there seems to be little room for sectoral and regional actions in a model governed by the market.

The persistence of rural poverty has given rise to policies of investment in infrastructure and services (especially health and education) which are undoubtedly very necessary and –along the lines suggested by De Janvry and Sadoulet (1998)– should help to reduce transaction costs to some extent and hence allow a larger group of agents to participate profitably in the market.

Another response has been to divide up the poor sector of the rural population between those whose assets are considered sufficient to give them a chance of overcoming poverty through improvements in their production, trade or organization and those who are deemed to require help through social policies. As long as the persons in this latter category only form a relatively small proportion of the total population or of the population of a particular region, this position can be justified from the economic point of view, although not necessarily from the point of view of development in general and still less from that of human and social capital formation. But what should we do if these persons represent a high proportion of the total population? How can we foster a virtuous circle of agricultural or non-agricultural productive activities, in a reasonable length of time and at reasonable cost, in areas with relatively scanty natural resources and underdeveloped physical and human capital?[16]

The truth is that even if there were a political and conceptual framework that permitted more decided action in this respect it would still not be clear whether it is possible to induce such a virtuous circle, or how. It is very necessary that future efforts to develop new technical approaches and concrete practical proposals should seek the answers to these questions.

(Original: Spanish)

[16] This latter concern arose, among other reasons, as a result of repeated conversations on the subject with Maximiliano Cox, Regional Adviser of ECLAC, and also with Julio Berdegué, Director of the International Network on the Methodology of Production Systems Research (RIMISP).

APPENDIX 1

Latin America: Evolution of national agricultural innovation institutes (INIA)

1960: The "Green Revolution" technological package is distributed as a public good.	The establishment of INIAs is begun in most of the countries of the region, and existing INIAs are further strengthened.
1970: The budgetary allocations for INIAs are increased and their staffs grow.	The INIAs obtain excellent results in fulfilling their mission, as shown by all the impact evaluation studies made.
1980: The crisis of the 1980s severely affects the financing of INIAs. By the end of the decade, all of them are affected by the effects of the crisis and of the adjustment programmes. In addition to these budget cuts, financial resources for agricultural research provided by international agencies and donor countries are also reduced.	The INIAs enter into a crisis: in a first stage, their manning tables continue to grow by inertia, while their financing is reduced, so that there are fewer resources for research and fewer resources per researcher. Towards the end of the decade, a number of institutes drastically cut their staff, including even the most highly qualified staff members, while others reduce their manning tables and payrolls.
1990: Reforms are begun in almost all the INIAs of the region, in an environment marked by relative shortage of funds for research, growing appropriability of technology, and the emergence of new demands posed to the INIAs. The latter are mainly the result of the intensive processes of urbanization (demand for post-harvesting technologies) and the processes of greater openness and deregulation (technologies and processes for increasing value added, improving competitiveness and developing the production of non-traditional agricultural exports). On another level, the demands for a more prominent role for the private sector are reflected in reforms in the organization and statutes of the INIAs.	The reforms are basically as follows: a) Research programmes in line with the clients' demands are established and agricultural producers and representatives of the private sector are brought into their governing councils. b) Programmes connected with poverty and extreme poverty and preservation of natural resources and the environment begin to be given priority, largely at the request of international agencies. c) In many INIAs priority is given to the development of processes and technologies for improving competitiveness, post-harvesting technologies and biotechnology. Programmes are established for agroindustry and the development of non-traditional export crops. d) In order to secure greater efficiency in the management of budgetary resources, outlays considered to be less important are reduced and various services are outsourced. e) The INIAs increase the generation of resources of their own, through the sale of goods and services and even by selling off assets. Research and the transfer of technology are regionalized as a way of making them more efficient and bringing the institutions closer to their clients.
New forms of financing appear, such as foundations for technological research and transfer and funds available through competitions.	
The main INIAs of the region recover from the point of view of fiscal budget allocations and also markedly increase the generation of resources of their own.	

Source: César Morales, ECLAC, on the basis of information from the various INIAs.

APPENDIX 2

Recent changes in land tenure legislation

Country, law and objective	Main features of the law	Strengthening of institutions
Bolivia, 1996. Law on the National Agrarian Reform Service. Objective: to increase the equity and security of land tenure.	Members of the indigenous population have preferential access to public lands. Process of clearing land ownership titles over a period of ten years. Land tax.	Land inventory and register, administered at the municipal level. System for the settlement of problems.
Colombia, 1994. Law No. 160, setting up the National Agrarian Reform and Rural Development System. Objective: to facilitate access of poor peasants to land.	The beneficiaries of the programme are responsible for negotiating the purchase of land directly with its owner. The State gives a direct subsidy of up to 70% of the purchase price. The remaining 30% can be financed with long-term State credit.	Restructuring of the National Agrarian Reform Institute to adapt it to its new role of facilitating and supervising land transactions.
Mexico: 1992. Amendment to article 27 of the 1917 Constitution. Objective: eliminating hindrances to development.	The government is no longer obliged to provide land to all who ask for it. Communal landowners ("ejidatarios") can become private owners and sell, rent, sharecrop or mortgage their property. Ejidatarios are no longer obliged to work their land themselves. Size limits are maintained (100 hectares of irrigated land). Commercial companies can acquire land.	Establishment of local Agrarian Tribunals to settle disputes over property rights. Establishment of the "Procaduría Agraria" to watch over the proper application of the law. Establishment of the National Land Register. Programme for the certification of ejido rights and issue of ownership titles for urban plots (PROCEDE).
Peru, 1991, 1992 and 1995. Agrarian Law. Objective: to expand and strengthen private property rights.	Authorization to sell or mortgage land obtained under the agrarian reform process. Authorization for issue of individual titles to communal land, subject to the agreement of over 50% of the communal owners. Size limits are maintained (1000 hectares). Commercial companies can acquire land.	Special project for the issue of official titles to land.

Source: Information provided by Frank Vogelgesang, based on the ECLAC/GTZ project on policies to promote rural land markets.

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Recent ECLAC publications

Periodical publications

Panorama social de América Latina 1998 (Social Panorama of Latin America 1998), LC/G.2050-P, United Nations publication, Sales No. S.99.II.G.4, ECLAC, Santiago, Chile, April 1999, 305 pages.

The 1998 edition of the Social Panorama gives estimates of the incidence of poverty in 1997 or thereabouts in 17 countries, together with data on changes in income distribution, employment and social expenditure.

With regard to poverty, an analysis is made of the main factors affecting the evolution of this phenomenon in the various countries and the effects of the type of economic growth observed in each of them. With respect to income distribution, the variations in indicators of concentration in urban and rural households are described in general terms.

An analysis is also made of the evolution of employment and unemployment, especially the incorporation of young people and women into the labour market and the dynamism of job creation and labour force absorption in different sectors, according to their productivity and incomes.

With regard to public social expenditure in the 1990s, its trends by sectors, its heterogeneity and its features in different sub-periods are described. In addition, the determinants of those trends are identified, their progressiveness is described, by socioeconomic sectors and strata, and the possibilities of maintaining the current level of expenditure in coming years are analysed.

In view of the incidence of teachers' salaries in expenditure on education, details are given of the recent evolution of primary and secondary school teachers' salaries and they are compared with those received by other professionals.

An evaluation is also made of the performance of the region with regard to achieving the UNICEF targets for children in the year 2000, and trends regarding phenomena which limit the welfare possibilities of children and adolescents, such as child labour and adolescent pregnancy, are described.

In the chapter on the social agenda, a diagnostic study is made of the relations between violence and citizen insecurity, criminal forms of behaviour, and the socioeconomic profiles of victims and aggressors. This is supplemented with the views of the authorities of 14 cities on the main problems in this area, the actions taken to deal with them, and some successful examples of such action.

Other publications

La inversión extranjera (Foreign investment), LC/G.2042-P, United Nations publication, Sales No. S.98.II.G.14, ECLAC, Santiago, Chile, December 1998, 289 pages.

This study uses a new approach to interpret foreign direct investment (FDI) in Latin America and the Caribbean, in order to try to overcome the limitations of the official statistics on FDI flows (both of the recipient economies and of the main investor countries) by analysing the strategies of transnational corporations on the basis of the information obtained from research programmes of the ECLAC Investment and Business Strategies Unit and from secondary sources, especially the specialized financial press. This approach makes it possible to gain a better understanding of the nature of this phenomenon, viewed in the context of international market trends, national policies (of both the investor and the recipient countries) and new business strategies.

The inflow of FDI into the region has grown significantly for the eighth year running, which represents a very important factor in the economic performance of the countries of the region. In 1997 the Latin American and Caribbean economies received US$ 65.2 billion, of which some 30% went to Brazil, which has once again become the main recipient economy in the region. Preliminary estimates indicate that in 1998 the net inflow of FDI was of the same order of magnitude as the year before.

This document presents a complete analysis of the characteristics of FDI in terms of amounts, forms of investment, geographical and sectoral destination, and the main agents involved. It includes a detailed examination of the special features of this process in the six main recipient economies (as well as Brazil) and the incipient phenomenon of intra-regional investment. One chapter is devoted to the country which has received the biggest inflows in recent times (Brazil), another to the investor country with the biggest stock of foreign direct investment in the region (the United States), and another to the sector in which the most important foreign companies in terms of sales are located: the motor industry.

Temas y desafíos de las políticas de población en los años noventa en América Latina y el Caribe (Population policy issues and challenges in the 1990s in Latin America and the Caribbean), LC/G.2046-P, "Cuadernos de la CEPAL" series, No. 83, United Nations publication, Sales No. S.99.II.G.13, ECLAC, Santiago, Chile, November 1998, 267 pages.

The regional preparatory activities for the International Conference on Population and Development provided an opportunity for leading specialists to express their views on the most important issues, objectives and goals of population policies in Latin America and the Caribbean.

Five contributions by such specialists are presented in this publication, beginning with an analysis of the debate in general, the evolution of policies and their marked change of orientation and continuing with some reflections on the need to incorporate the question of natural resources and sex-linked issues.

Carmen Miró notes that governments began to become aware of the need to take measures in the area of population after the World Population Conference held in Bucharest in 1974, although they had also taken measures and adopted legislation to regulate population growth and promote or deter migration before that date. There is clear interest in rethinking the direction and significance of population policies, recognizing that their objectives must be based on the desirable levels of population size and growth.

Guillermo Macció, for his part, analyses the evolution of population approaches and policies and their application in the region and describes the present position in this respect and the effective degree of commitment of governments and policy executants, since this

matter seems to be restricted almost exclusively to international agencies and small sectors of society. He also analyses a new postulation of this issue and of the relevant policies, in the context of the new international order.

In his article on the relations between population, development and the environment, Hogan says that when considering the relations between population and development in the region, prime factors are the emergence of environmental perspectives, the availability of natural resources, and the territorial distribution of the population, with special attention to subnational ecosystems. The consensus on this new dimension has not yet been fully incorporated into development policies or into population, natural resources and environmental models. It therefore seems a matter of urgency to reorient the whole direction and concept of development and incorporate the basic environmental concepts into it. This involves financial commitments and the redefinition of institutions.

A special section should be devoted to women in analysing the question of population, since they influence and are affected by all the demographic variables. The articles by Miriam Krawczyk and Elena Prada maintain that Latin American and Caribbean women still occupy a disproportionately low position and must be taken into account if it is desired to promote equity. According to the periodic diagnostic studies on the position of women in the region prepared by ECLAC and set forth at regional conferences on the subject, the most serious problems are the lack of statistical information and conceptual frameworks, the relation between households and the socioeconomic structure, and sexual and cultural stereotypes.

Although the time when women passed much of their period of fertility in a state of pregnancy or suckling their children appears to be over, a great deal still remains to be done in order to overcome various forms of inequality. An analysis is therefore made of the evolution and present state of family planning programmes in the region and their contribution to mother and child health. In a separate section, an analysis is made of adolescent pregnancies, the extent of contraceptive use, and the access to, availability and quality of the services offered.

El régimen de contratación petrolera de América Latina en la década de los noventa (Contract arrangements in the Latin American oil industry in the 1990s), LC/G.2025-P, "Cuadernos de la CEPAL" series, No. 84. United Nations publication, Sales No. S.99.II.G.12, ECLAC, Santiago, Chile, October 1998, 134 pages.

This study seeks to report on the most important changes made in oil industry legislation in recent decades in ten countries of the region: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Peru and Venezuela. To this end, it compares the current legislation (mostly adopted in the 1990s, up to December 1996) with that which prevailed in previous decades.

In order to make this comparison, 26 aspects considered to be of crucial importance were selected (such as the type of contract, its duration, time limits for exploration and commercial operation, the tax system applied, terms of payment of the firm signing the contract, etc.), and this matrix was applied systematically to the successive laws of each of the ten countries studied.

The document is divided into 11 chapters. The first chapter is a summary of those which follow: that is to say, in line with the 26 aspects referred to above it makes a comparison of the different forms of oil industry legislation in force in the ten countries in the period in question. The other ten chapters are devoted to an analysis of the evolution of oil industry legislation in each of the countries studied.

La apertura económica y el desarrollo agrícola en América Latina y el Caribe (Economic openness and agricultural development in Latin America and the Caribbean), LC/G.1963-P, "Cuadernos de la CEPAL" series, No. 81, United Nations publication, Sales No. S.97.II.G.6, ECLAC, Santiago, Chile, July 1997, 122 pages.

Thorough-going reforms have been made in the region in basic aspects of the economic model. In this context, one of the points that has given rise to most controversy is the effect of international financial flows (especially the most volatile short-term flows) on the evolution of the real economy.

The main points discussed relate to: i) the continued existence of the factors which promoted the restoration of capital flows to Latin America; ii) the characteristics and destinations of these capital flows, and iii) the consequences of the massive inflow of capital on aggregate demand and macroeconomic prices, especially the exchange rate.

The massive inflow of capital, together with the use of the exchange rate for price stabilization purposes, has led to a strong tendency towards over-valuation of the exchange rate, which has adversely affected the tradeables sector of the economy and the development strategy itself, which is based on the expansion of that sector.

All this has reduced the leeway for macroeconomic policy and created an exchange rate "trap": on the one hand, monetary policy is at the mercy of capital movements, since there is not as much autonomy for regulating interest rates, while on the other, if the exchange rate disparity is corrected through devaluation, there is a risk of setting off capital flight and speeding up inflation.

This publication seeks to: i) analyse international financial flows to Latin America and the Caribbean in recent years and their repercussions on the evolution of the real economy and the agricultural sector; ii) examine the effects of the interaction of the financial and macroeconomic dimensions on competitiveness and sustainable agricultural development; iii) review some macroeconomic and sectoral policy outlines which could offset the negative effects of financial capital flows on the agricultural sector, and iv) analyse various sectoral policy measures which would help to channel capital flows towards productive investments in that sector.

A dinâmica do setor saúde no Brasil (Health sector dynamics in Brazil), LC/G.1966-P, "Cuadernos de la CEPAL" series, No. 82, United Nations publication, Sales No. P.97.II.G.9, ECLAC, Santiago, Chile, July 1997, 219 pages.

This publication has three main aims. First, to describe the general characteristics of the Brazilian health system, with emphasis on aspects relating to its administrative structure and institutional components, its human resources, and the forms of financing and expenditure used in that country. Second, to make an evaluation of the process of decentralization of health activities in the light of the institutional environment, programmes, financial resources, operational instruments and main ways of transferring resources from the central levels to the local spheres of government. Third, to evaluate

the proposals for the reform of that system, especially as regards financing and continuation of the decentralization process.

The study consists of three parts. The first describes the main public and private health systems currently operating, the structure of the labour market in the health sector, and the financing mechanisms used. The second part deals with the process of decentralization of health services in Brazil: it analyses its background and the main programmes carried out by the federal government; describes the decentralization process carried out after the adoption of the 1988 Constitution, with the introduction of the SUS health services; and appraises the effect of that process on the health expenditure of the three levels of government (the Union, the states and the municipalities). The third and last part describes and analyses the proposals for changes in health financing in Brazil and speculates about some tendencies in this respect.