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CEPAL

REVIEW

94

UNITED NATIONS

ECLAC

60 ECLAC

SIXTY YEARS WITH LATIN AMERICA AND THE CARIBBEAN

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SANTIAGO, CHILE

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Director

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SUMMARY

Explanatory notes

The following symbols are used in tables in the *Review*:

… Three dots indicate that data are not available or are not separately reported.

(–) A dash indicates that the amount is nil or negligible.
A blank space in a table means that the item in question is not applicable.

(-) A minus sign indicates a deficit or decrease, unless otherwise specified.

(.) A point is used to indicate decimals.

(/) A slash indicates a crop year or fiscal year; e.g., 2006/2007.

(-) Use of a hyphen between years (e.g., 2006-2007) indicates reference to the complete period considered, including the beginning and end years.

The word “tons” means metric tons and the word “dollars” means United States dollars, unless otherwise stated. References to annual rates of growth or variation signify compound annual rates. Individual figures and percentages in tables do not necessarily add up to the corresponding totals because of rounding.

KEYWORDS

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Latin America
Argentina

ECLAC
in its historical setting

Tulio Halperin

This lecture discusses the features of the colonial situation in Latin America that conditioned the region's economic and social performance in the nineteenth and early twentieth centuries. It deals in particular with Argentina, looking at the events following the First World War through to the beginning of the Second World War. Those events were formative in the education and experience of Raúl Prebisch, who 30 years later would give ECLAC its fundamental characteristics. The lecture examines the ideas that ECLAC contributed to the debate on Latin American development and the evolution of the countries that applied those ideas. It also looks at the external and internal circumstances that changed the context in which development policies were implemented from the middle of the 1970s onwards. Lastly, it identifies the most recent changes in the world economic situation, and the role of ECLAC in defending the ideas of freedom, well-being and tolerance, which are the essence of modern civilization.

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When I learned that I was to be asked to give the Seventh Prebisch Lecture, my first thought was how to avoid disappointing those who had extended me this rather daunting honour. It occurred to me that, in selecting an historian for the occasion, the Commission was hoping for something different from the offerings of those who had previously taken this podium. I would not be able to look for inspiration, then, to the contributions of those eminent persons, from Celso Furtado to Fernando Henrique Cardoso, who had played a sometimes decisive role in the chapter of Latin America's history that includes the trajectory of ECLAC, nor to those of Joseph Stiglitz and Dani Rodrik, both renowned economists able to speak with absolute authority on issues where prudence forbids me to tread. Instead, I heeded the advice of José Luis Machinea, who in his letter of invitation expressed the hope that my presentation would contribute to "understanding the long-term trends and the evolution of the social phenomena that underlie the functioning of countries in the region", and that is what I shall attempt to do here.

The first thing that becomes clear, from this perspective, is that ECLAC was established to articulate a response, suitable for the stage in which Latin America found itself at the time, to a question that was already two centuries old. The quest had originally been to find the key to overcoming what was already referred to as the lag of the far-off lands of the new world that Castile and Portugal had conquered and subsumed into their overseas empires. It would seek inspiration for this in a new science, one that abandoned the overarching perspectives that had placed metaphysics at both the base and the pinnacle of knowledge, and turned its attention to what the already outdated Aristotelian language called the "sublunar world", in the hope that a more accurate understanding of this mundane sphere would help to make the changes that would alleviate the harshness of human existence. Within this radical new approach, there arose in the eighteenth century the discipline called "political economy", which from its first systematic formulation in the works of Adam Smith came to occupy an ever more central place in the encyclopaedia of modern knowledge.

Yet even before 1776, when Adam Smith published his *Inquiry into the Nature and Causes of the Wealth of Nations*, those responsible for administering the overseas empires of Spain and Portugal were already addressing the economic problems there in the spirit of the new times. They saw, with growing clarity, that the practices that had seen them virtually unscathed through more than two centuries with ever more formidable rivals constantly entering the scene, first in Europe and then overseas, were fast losing their effectiveness.

Indeed, it was awareness of the increasing fragility of the Iberian empires that drove their administrators to consider the new perspectives offered by political economy. They hoped this would help them to develop strategies to replace those that had been found increasingly wanting. When we look back at the relationship that the administrators of both imperial systems established with this discipline, then still in its infancy, we can see a foreshadowing of how ECLAC would work with it in the twentieth century. It is also easy to recognize, behind those shared traits, the influence of the periphery from which both they and it viewed the economic system, whose operating rules this new discipline sought to unentangle.

Viewed from the centre of this emerging system, Adam Smith's theoretical construction could also be seen as the "country party's" indictment of the mercantilist privileges and monopolies flowing from royal favour, as defended by the "court party". The centre in fact had built a society that was discovering itself capable of charting the road to prosperity on its own. But the profile of the societies emerging from the Iberian conquest of the new world could not have been more different. Officials in Madrid or Lisbon trying to administer their far-flung empires on three continents were finding it increasingly difficult to wring from them the resources needed to withstand the attacks of these ever bolder rivals. They looked to political economy for useful lessons in how to build societies in those lands that could emulate the vigour reflected in the overwhelming economic and technical —and thus military— superiority of these same rivals.

This ambitious project was realized too incompletely to protect the Iberian empires from an external threat which, having mounted greatly during the new cycle of hostilities launched by the French Revolution, would lead to their irreversible demise. But the programme of reforms left as its legacy an agenda that the States emerging from the ruins of both empires would adopt as their own. It was now

□ This lecture was delivered at the Economic Commission for Latin America and the Caribbean (Santiago, Chile on 16 August 2007) on the occasion of the Seventh Raúl Prebisch Lecture.

their ambition to organize themselves on the model of the "Nation State", whose advance in the old world, despite the efforts of Napoleon's vanquishers to halt it in 1815, would dominate the entire coming century of European history. It would become clear over this century how important it was to endow the fragmented societies bequeathed by the conquest and the colonial period with the coherence needed to lay the human foundations for the nationality that each of these States aspired to construct as its political expression. Although the objective was now different, it was still recognized that the most urgent task of these newborn States was to bring about a radical transformation of the societal profile that had matured in the previous stage, and to bring it closer to that of the nations leading a process of change which, starting from the Atlantic seaboard of Europe, seemed destined to embrace the entire planet.

The successor States in all of the splintered domains of the Iberian empires assumed this task, but nowhere was this ambition carried so far as in Argentina. The preamble to the document that in 1853 marked that country's entry into the constitutional era called upon "all the men of the world who want to live on Argentine soil" to join in building, on the vast and empty pampa, a radically new society, based on both material and human resources imported from overseas. No doubt leaders of this dizzying process of change placed great faith in the principles of the by now mature discipline of political economy, which severely constrained the role of the State in this area. But that did not prevent the State they organized and administered from finding ways to exert sway over the economic dimension of the vast transformation they had undertaken. Their success was such that by the dawn of the new century —and even before the peak of a flood of immigrants that would see few parallels around the world— it was already possible to discern the outline of the modern nation that, half a century before, Argentina had resolved to become.

We need to pause a moment at this point in what is necessarily a cursory exploration of the historical background of ECLAC, because this context, so distinct from the circumstances that would surround the creation of this United Nations agency, was to make an indelible mark on the person who first defined its agenda. Such a mark that, barely beyond adolescence, Raúl Prebisch had already defined with amazing precision the place he was determined to conquer in the world, and in that young man, we can already recognize the person who, a quarter-century later, having been stripped of the place he had come to occupy in his native land, was to define no less precisely the agenda of the institution he would lead.

The context in which Prebisch began his public career was marked not only by the successful culmination of the enormous experiment in social engineering that his country had embarked upon in the middle of the previous century. It also reflected the mindset with which those same problems were being addressed both in the old world and in the new. At this fleeting moment, with the slaughter of the First World War still a fresh memory, both these worlds lived in the mistaken assurance that they were entering a stage of profound social and political transformation that would bring greater justice to relations between people and nations. A corollary of that vision of the times was the conviction that youth —better prepared for this task than the generations raised in the vanished pre-war world— was destined to seize the leading role it had never had before.

On the basis of these widely shared convictions, Prebisch was to lay out a programme of life and action that could not be more ambitious. A member of one of the first classes trained in the Faculty of Economic Sciences created by the University of Buenos Aires in 1913, and an instigator of the agitation thanks to which the student body won a place in the governance of Argentina's universities, Prebisch was hardly more than a teenager. Yet he was the recognized leader of his university cohort, and he urged them to devote themselves to a profound overhaul of Argentina's socio-economic order, one in which the cornerstones would be agrarian and fiscal reform, the latter designed to eliminate the regressive features of the existing tax system.

These objectives were by no means new—the political leadership and, more unexpectedly, the corporate representatives of the landholding interests grouped in the *Sociedad Rural Argentina* ("Argentine Rural Society") had been decrying the evils of concentrated land ownership embodied in the *latifundio* for decades. But what *was* new was the strategy that Prebisch proposed to his fellow students for moving the programme forward. He urged them, in effect, to "find in State agencies and other institutions" observatories from which to gain an accurate understanding of the workings of the economic system they hoped to change. Half a century later Eduardo Malaccorto, who was be one of Prebisch's most effective collaborators in the Argentine phase of his career, would recall that, in response to the challenge of a young man who was

"already a revolutionary at the age of 22 […] every one of us wanted to get into some sector of national life, where we could develop our own ideas and perfect our knowledge".[1]

No one would do this more successfully than Prebisch himself. His early contributions to introducing statistical methods in economic analysis had already attracted the attention of Professor Alejandro Bunge, who in 1916, with his *Riqueza y renta de la Argentina* ("Wealth and income in Argentina"), had brought new rigour to a field hitherto dominated by amateurs. In 1922, the Argentine Rural Society had already made Prebisch the head of its newly created Statistical Office. The following year the Minister of Finance, Raphael Herrera Vegas, who hoped to introduce income tax in Argentina and was facing strong counter-arguments that it would be impossible to enforce such a tax in a country with an agricultural economy, asked him to go to Australia and New Zealand and to find out how those two countries, which shared this economic profile with Argentina, had succeeded in implementing such a tax. Yet on the eve of Prebisch's departure, Herrera Vegas was replaced in the ministry and his successor cut the mission short. This did not prevent Prebisch from completing the assigned task, however. What is more, was also able to familiarize himself with the government statistical agencies of those British dominions, which were pioneers in the use of the "statistical machines" that were revolutionizing working methods in this field. As well —motivated by his interest in Argentina's land problem— he explored in situ the outcomes of the rural colonization plan in the Australian province of New South Wales. Meanwhile Tomás Le Breton, whom Prebisch knew from his time with the Argentine Rural Society, and who had recently been appointed Minister of Agriculture, was planning to introduce a very ambitious agrarian reform. He summoned Prebisch, upon his return, to work with him in preparing the draft of that plan, which, however, would never be addressed by Congress.

In the following years, Prebisch played a leading role in government statistical work, first as Deputy Director of the National Department of Statistics and later as organizer and first Director of the new Economic Research Division created by Banco de la Nación Argentina, based on the model in use at the United States Federal Reserve. He also became senior adviser to the Argentine Rural Society, the largest organization representing the landholding class, from which position he contributed more than anyone to articulating proposals for dealing with the increasingly critical situation facing the rural economy.

This summary suggests an early career that, at first glance, could not have been more successful. Yet, perhaps not so, in the light of the objectives that Prebisch had set himself. What was, at that time, his vision of the world he hoped to change? What did that vision tell him about the place from which he could influence that change? He was not yet 20 years old when, responding to a survey on the social question conducted by the *Revista de Ciencias Económicas*, he argued that the key to the matter lay in the misfit between the economic structure that was being steadily transformed by "the advance of productive methods due to technical progress" and "a parallel change in the social superstructure that governed the old relations between those who produced and those who managed production" that was lagging far behind. Although he recognized his debt to Marx with respect to this point, he had made it clear that he was not prepared to follow Marx in making the class struggle the exclusive and central theme of human history, and he found "more logical" the arguments of the socialist Filippo Turati, who "in certain cases" saw "class cooperation as a counterweight to class struggle".

The existence of this alternative, he concluded, allowed a non-revolutionary solution to the social question, by "creating new forms, reforming existing institutions, and taking advantage of what works". From this premise, Prebisch reached a conclusion that was by no means implicit, but one that appeared so obvious to him that he mentioned it merely as an aside: "Social evolution," he added, "cannot be contained: it is useless to try to stop it; it is logical to try to channel it (and this is the task of governments)".[2] It is not surprising that this conclusion appeared so obvious to him, in a country that was just emerging from a stage in which the State had assumed the dual task of organizing itself and forging a new society; it thus seemed reasonable that the demiurge of that society should not be denied the —altogether more modest— role of arbitrating any conflicts that would divide its creation.

In this implicit vision of the context that Prebisch hoped to influence, he was (perhaps without realizing

[1] 1971 interview with Ernesto Malaccorto (Halperin Donghi, 2004, pp. 469 to 471).

[2] Raúl Prebisch Foundation (1991, vol. I, pp. 11 and 12).

it) relying on being able to do so successfully from the increasingly influential positions which his talents and his efforts secured throughout the 1920s. Yet as that decade closed, the results could not have been more discouraging: none of the reform projects he had helped prepare, not even the one to which he had rallied the most powerful segment of the landowning class, had taken so much as a first step towards implementation. He had forged his links with that sector in his first venture into public life which, like so much in his career, was nothing if not precocious: it occurred in 1922, when he arbitrated the dispute that was dividing the powerful livestock industry. The stance he took in that early role was that of someone setting an agenda for the sector that it would surely adopt if only it had the foresight to do so. On this point, Prebisch made no attempt to conceal his opinion of the landowning class, which he described as a "barn aristocracy". It had, he insisted, only an "incoherent, disoriented and negative class instinct, most of the time" and therefore lacked a "clear awareness of its economic interests", which would have led its members to "associate to organize the sales from their haciendas" as their rivals in the United States and the British dominions were then successfully doing.

These shortcomings obliged the State to intervene in conflicts between sectors of the landowning class and the meatpacking interests that dominated the export trade. Yet Prebisch did not think the State should do so by using public money to create an alternative marketing mechanism to the regime of the meatpackers and shipping companies, as the self-proclaimed victims were proposing. What was needed was to compensate for the failings of a class that did not know how to defend its own interests, by establishing a permanent audit of the meatpackers' books. This would yield the information needed to impose a well-founded "minimum elastic price" on meat for export, which would be adjusted as necessary to fluctuations in overseas demand. Such a mechanism would eliminate both abusive profits for the meatpackers and the possibility of windfalls for producers stemming from an excessive minimum price (which would also hurt export demand). Prebisch was already aware that for the State to play this role successfully it would need "high moral standards among the public officials entrusted to administer and oversee the industry […] and a technical capacity somewhat foreign to our bureaucracy, which has been formed with a penchant for satisfying the appetites of Creole politics rather than selecting the most capable people".[3]

An essential first step towards achieving the goals that Prebisch had set for himself and his generation was the creation of a capable technical bureaucracy to provide the State apparatus with the skills to intervene effectively in the economy. But was it solely as a result of the shortcomings of certain groups with conflicting economic and social interests that the State had to intervene? The range of projects with which Prebisch was associated attributed to the State the more ambitious purpose of serving objectives that would be shared by society as a whole. This consideration was already evident in his proposal for resolving the livestock conflict. There, he not only attempted to overcome the obstacles that prevented the return on the different factors of production from being proportional to their contribution to the productive process, but he also sought to ensure that the sector could develop to the fullest extend possible in the economic context of the time. This approach was decidedly central to the draft law on agrarian colonization: this proposed a radical transformation in the socio-economic structure of the grain-growing basins of the pampas, where the social pattern implanted in the past half-century of feverish expansion of the farming frontier had been criticized for decades.

In setting the socio-economic objectives of the projects they were promoting, Prebisch and the group that formed around him were not trying to be particularly original. On the contrary, what they wanted was to give the State and the conflicting interest groups in the economic and social arena the necessary competence to realize aspirations on which there was very broad consensus in Argentina. Nor did they seek to introduce original perspectives in the field of economic theory. Once again, the testimony of Malaccorto encompasses all the members of this group, when he declares that in his time at the Faculty of Economic Sciences its members had embraced "economic theories that could be found in any textbook: Marshall, Pantaleoni, Barone or the disciples of Pareto". The portrayal of this array of economists with such widely differing theories as the exponents of a body of knowledge so unified in theory and practice that one could turn to any of them with indifference could be expected from persons who needed to believe that any of these economists could

[3] Raúl Prebisch Foundation (1991, vol. I, p. 349).

provide them with totally reliable criteria for intervening successfully in socio-economics—something they could not have obtained, of course, from a discipline that had failed to overcome the lengthy coexistence of rival doctrines. So, given the role they had attributed to economic theory as the source of legitimacy for their eminently practical plans, it was all the more unthinkable that they would deviate from the principles that theory had taught them in their formative years. Indeed, they would adhere closely to those principles in the following decade, despite growing evidence of their inability to offer answers to the increasingly acute dilemmas posed by a world economy that seemed to have entered a freefall.

It was precisely the depth of the world crisis unleashed in 1929, and dramatically worsened in 1931, that radically changed the Prebisch group's standing in the country. The general collapse of prices and the sharp contraction of international trade badly hurt an economy that had enjoyed robust growth for more than a century, fuelled by flourishing exports. In the face of this emergency, with exports drastically reduced in volume and even more drastically in value, their much-diminished proceeds had to be distributed among the different sectors of the economy and society, and the volume of output for export controlled in order to avoid oversupply, which would drive prices down even further. The only agent capable of handling these tasks was the State. In effect, circumstances were now thrusting upon the State the role of arbitrator between groups with conflicting economic and social interests, a role which Prebisch and his followers had from the beginning insisted it should adopt.

In this unexpected context, often the very people who, up to the eve of the crisis, had consistently and fiercely resisted any attempt to use State power to limit their freedom of action were now urging it to intervene in the field they would have previously forbidden. This totally exceptional situation gave Prebisch the chance to introduce a profound fiscal and banking reform, with the technical cooperation of the group that he himself, more than anyone, had helped to form. Moreover, he was able to use the institutions created by that reform to effect trade-offs between economic and social interests, something he had always believed to be an essential duty of government. For nearly nine years following 1935, Prebisch himself, as head of the Central Bank, would be responsible for checking and regulating the daily pulse of the Argentine economy, with results that won him the backing of Keynes in his *General Theory* of 1936 and led others to compare his performance with that of Hjalmar Schacht in Germany. Yet this was not a comparison that Prebisch would find particularly flattering: more than the successes he reaped at this time (in which he was aware that good fortune had played a considerable part), he prized his role in the effort to forge a techno-bureaucracy that would equip the Argentine government to act authoritatively and effectively in fields that until recently had been completely foreign to it.

But it was not merely the catastrophic turn taken by the world economy that gave Prebisch the chance to advance the ambitious programme he had set in 1922 for himself and the contemporary group of young economists whose acknowledged leader he was. His influence was given a decisive boost by the new political framework that emerged from the first military coup which, in September 1930, overturned the institutional order established by the Constitution of 1853-1860. He was appointed Undersecretary of Finance by General José Felix Uriburu, who had been installed by the revolution as provisional President of the Republic. From that position, Prebisch was able to make radical changes in fiscal arrangements, which had revolved around the taxation of overseas trade since 1809, when the last Viceroy of Rio de la Plata had opened the future Argentina to world commerce and thus set it on the road that until 1929 took it to ever loftier heights. What Prebisch did was to introduce the income tax. For decades there had been a broad consensus that this was necessary and yet two Argentine presidents had failed, under the constitutional framework, to secure congressional support for it. With the suspension of that framework by the revolution's victory, that obstacle was gone: having obtained General Uruburu's authorization to prepare the draft bill on a Friday afternoon, Prebisch put it together over a weekend of feverish work, and by the following Monday it was the law of the land.[4]

Such experiences might understandably give Prebisch some concern over the impact that the imminent return to representative institutions might have on his plans for even more radical changes. Yet for some years this concern seemed to have been totally unjustified. Indeed, after some initial hesitation, General Agustin B. Justo, who as constitutional President faced the challenge of governing a country that was hopelessly divided by the experience of living under a military regime (a regime which, in bequeathing

[4] Raúl Prebisch Foundation (1991, vol. I, p. 349).

him power, also bequeathed him the overwhelming unpopularity that had led to its demise), accepted the far-reaching reforms included in the economic plan prepared by his ministers of agriculture and finance, with the coaching of Prebisch, and went on to secure its approval by a Congress that, restored in 1932, was embarking on one of the most brilliant chapters of its entire history.

But this admirable parliamentary performance was facilitated by the boycott called by the party that had been overthrown in 1930, in response to the deliberately humiliating conditions that the military authorities had imposed as a condition for its return to the electoral arena. The Radical Party's decision in 1935 to rejoin national affairs was enough to reveal just how artificial this happy experience was. Although the political forces holding the reins of government owed their position to the Radicals' boycott of the electoral arena, that party still maintained its majority status despite having lost power. The governing forces showed themselves ever more determined to retain power, resorting increasingly to electoral fraud. Factional tensions that until 1935 had remained beneath the surface now erupted violently. The reform phase of the Justo government came to an abrupt end in 1936 in a huge parliamentary scandal, in which some of the sponsors of its initiatives were the target of accusations that, while never proven, were (and are still today) widely accepted by public opinion. That reaction is understandable, since (though phrased in the language of slander and insult) those allegations voiced the frustration felt by the majority parties that had been thrust aside by the regime reinstated in 1932—a regime that held power and was governing the Argentine economy only because the citizens had been humiliatingly stripped of their right to freely elect their governors.

In the midst of the political and institutional collapse of the regime emerging from this incomplete constitutional restoration, the management of the institutions created in 1935 to handle the new economic and financial functions of the State lost nothing of its original effectiveness. Indeed, it was rewarded by the success with which Argentina coped with the challenges posed by the Second World War, different but no less severe than those sparked by the economic crisis. Yet this did not save those institutions from the growing disrepute of the regime that had created them, and of which they were still a part. It was not surprising, then, that four short months after 4 June 1943, when the now terminally vitiated constitutional order was toppled by a military coup headed by General Pedro Pablo Ramirez (who had been Minister of War in the government he overthrew), that General, now President of the Republic, signed a degree dismissing Raúl Prebisch and putting an end to his career in Argentina.

One aspect of this stage of his career warrants further attention, not only because it contributed decisively to the dismal anticlimax that ended years of growing success, but also because, in a narrower scenario, it hints at what would happen during a more complex career in ECLAC. We already noted that Prebisch saw an essential difference between what he and his group were trying to accomplish and Schacht's contribution to the impressive revival of the German economy in the first five years of Hitler's regime. To this it must be added that his rejection of any affinity with Schacht's work reflected something more than his abhorrence of the regime to which the German economist had devoted his formidable talents as a financial wizard. Schacht, after all, had at his disposal the admirably efficient institutional, economic and financial apparatus of the State which the new regime had just taken over. By contrast, Prebisch and his group had been obliged to create such an apparatus from scratch, and had done so masterfully, but their approach had more in common with that of the *grands commis d'État* and their retinue of the mercantilist era. He also shared with them a trait that had become even more prominent in the Iberian version of this current, which reached the apogee of its influence under the banner of enlightened despotism. At that time, the monarch's financial policy advisers did not confine their ambitions to securing the resources needed to defend Spain's place on the international chessboard. They also believed they could use the power of the absolute State to imprint a new profile on Spanish society. Prebisch and his entourage implicitly shared this premise, without realizing how anachronistic it was becoming in a swiftly modernizing society and in a context of representative democracy. This unperceived anachronism did much to explain both the futility of the group's efforts in the 1920s and the painful outcome of the following stage, when it owed its leading place to a regime that survived only through brazen subversion of the democratic system that had been formally restored in 1932.

But what was anachronistic in Argentina, which from 1912 to 1930 had elected its governors in fully competitive and honestly tallied elections, was not anachronistic in most of the rest of Ibero-America, where the crisis had sparked similar problems to those confronting Argentina. Financial and economic circles

in the rest of the subcontinent had been following with growing interest the new institutional framework that was allowing the Argentine government to address these challenges with notable success. In particular, it would not be anachronistic for another half-century in Mexico, where Prebisch (barely three months after his dismissal as Governor of the Central Bank of Argentina, on 17 October 1943) engaged with his Mexican central banking counterparts in a "round of discussions", in which he would try to draw from his experience "some positive lessons for monetary and financial policy". The invitation to discuss this topic with his Mexican peers reflected (as Celso Furtado recalled in 1985) the international admiration that his work had earned for the Central Bank of Argentina, and it is no surprise the discussions that closed each of his six lengthy and dense presentations reflected his listeners' interest in the practical operation of the complex financial mechanisms that had allowed the Argentine State to act so efficiently in this new framework. But though this was his colleagues' main concern, Prebisch already had a different one. As he stated in his initial presentation, the first "positive lesson" he drew from his experience was that, while the lead players had "frequently been barely within the limits of sound monetary doctrine […] we must ask if that sound doctrine was really sound for us, if it really responded to the nature and structure of the Argentine economy." And he wondered, "Has the time not come to formulate our own principles, derived precisely from our reality, and to develop our own sound doctrine, taking and adapting everything that is useful from general principles to establish a national monetary policy?"

Prebisch explained, in terms that leave no room for doubt, why he looked back at his Argentine experience from a different perspective from that of his Mexican colleagues: it was now time for him (though not for them) "to examine the events from afar without any need for immediate action, to judge them with a critical spirit and an overall vision, and to extract positive lessons for monetary and financial policy".[5] The sober tone in which Prebisch referred to the painful episode that had recently stripped him of the position he had devoted two decades to achieving in Argentina reflects more than a scruple for elegance. If he could form a retrospective balance that reflected neither rancour nor nostalgia, it was above all because he had now discovered the path he must pursue. He took the first step in that direction when, looking anew at the experiment that had ended in this abrupt anticlimax, he asked whether the successes he had reaped from it were not in fact a reward for his readiness to stray from "sound monetary doctrine" whenever warranted by circumstances. This was a question that he and the ministers he advised had refused to entertain while they participated in that experiment. Usually, he had defended his unorthodox decisions against those who could see no positive outcome to them with the argument that the dominant countries in the world trading system had not hesitated to use their power to restructure trade along lines far removed from "sound doctrine", and in this way to shift onto their weaker trading partners a disproportionate share of the fallout from the crisis. Consequently, Argentina, which accounted for no more than 2% of the total value of international trade, and therefore had very little influence on its new configuration, could not avoid making changes to its monetary and financial policy. Although they might be condemned from the viewpoint of "sound doctrine", those changes had in fact proven essential for preventing this newly emerging mercantile order from wreaking all its destructive potential on the national economy.

Only when circumstances permitted —or, more accurately, obliged— Prebisch to "examine from afar" this stage in which he had played a leading role, would he cease to see that new mercantile order as a given that it would be pointless to debate, and recognize it as a problem instead. But neither in his presentations at the Bank of Mexico nor in his contribution to the seminar on Latin America hosted at that time by the Colegio de México did Prebisch go into the specific modalities with which this problem would have to be addressed in Latin America. What was new in his ideas was that he no longer felt obliged to present the innovations he had helped introduce in Argentina as necessary adjustments to a highly abnormal situation, justified only for as long as that situation persisted. Rather, he portrayed them as a reflection of a more mature attitude to economic doctrines that were not rejected but that, even after the emergency has passed, still had to serve "the goals or objectives we are pursuing".

He proposed that the countries of Latin America pursue those goals by jumping uninvited into the debate among the imminent victors of the Second World War on the future role of the gold standard in the monetary system that would govern the post-war world. They would be able to invoke their experience, which taught that "the gold standard, as we have seen

[5] Raúl Prebisch Foundation (1992, vol. III, p. 1).

it function, does not allow us to achieve" those goals and objectives. Yet Prebisch did not propose that they should oppose, on that basis of that experience, the return to a monetary standard that had "much that was good". It would be sufficient to "use it better, learning from the lessons of past experience" which suggested "stripping it of its excessively automatic operation and supplementing it with other features that have proven effective".

Viewed in this way, national economic and financial policymakers everywhere would be well advised to distance themselves from "sound doctrine". He stated this explicitly in a 1948 paper, which left no doubt that his objections to classical doctrines were directed less at what they taught than at the attitude that inspired them. He did not deny that classical economists carried "logical reasoning to its extreme, and later they enlisted mathematics to give to all this theoretical structure a rigour, a precision, and a scientific elegance that it had hitherto lacked", but he saw in this a victory purchased at too high a price: "the more they reasoned, the more they removed the body of doctrine from the living reality […] of the real world that economics was supposed to explain, in order to give us the means to act upon it".

Of course he mentioned that this "living reality" was that of "our countries", and he added that "to prepare our own ideas and to develop a national economic policy adapted to them" it would be useful to compare notes with "other similar countries". But he did not yet go so far as to outline the problematic aspects of the relationship between those seeking to secure for "our countries" a tolerable place in the new and inhospitable post-Depression mercantile order, and the doctrines emanating from the central core of the economic system enveloping them. Although that centre had been more severely devastated by the crisis than the Latin American periphery of the system, it still wielded power as it groped towards an exit from the ruins, and it would be illusory to think it would refrain from using that power to protect its interests at the expense of the periphery.

None of this was yet present in Prebisch's propositions, but there was something perhaps more important. Although he had not so much as sketched the stance Latin America should adopt in the coming debate, he had already decided that the region must insist upon its right to participate in it. This effectively defined the direction that his career would take thereafter. As we know, this new stage began with a victory even more spectacular than those that had crowned his previous work, since he was to make the newly established ECLAC into an instrument that would allow Latin America's representatives to take part in the debate on the course of the world economy in the wake of history's most terrible war. In retrospect, it is easy to understand that this plan faced formidable obstacles; for its success made one of the first cracks in the bipolar structure that the two rival coalitions recently formed by the victors in the great conflict were determined to impose on the entire planet.

In this eminently political undertaking, Prebisch fell back on what he had learned from his previous experience as an observer and a participant in the labyrinthine accords and disaccords among those who were steering the course of a crisis-devastated economy from the commanding heights. Celso Furtado has given us, in *"A fantasia organizada"*, an unforgettable vignette of Prebisch at his moment of triumph. He had just received from Getulio Vargas, recently returned to the presidency of Brazil, the support that (together with that of Mexico and Chile) would allow him to take ECLAC in the direction he wanted, and his comments reflect an admiration for the Brazilian leader that Furtado finds excessive. What Prebisch saw in Vargas, above all, was a statesman who never flagged in his effort to give the Brazilian State the mechanisms that would impress new efficiency on its performance in the economic and financial field, while steering a political process even more tormented and convulsive than that of contemporary Argentina. Furtado complains of Prebisch's blindness to other, less positive aspects of the Vargas regime (a blindness that Prebisch shares with many other Argentines), and attributes this to a conviction that the world was living in an age of dictatorship, in which the best that could be hoped for was enlightened despotism. Whether Prebisch's attitude reflected that conviction or the lessons of Argentina's experience (which seemed to suggest that the changes to which he had devoted his life were harder to introduce in democracy), he certainly did not regret that his recent change of fortune, in other respects so harsh, could restore him to those commanding heights, where the disruptive influence of democratic politics was hardly felt, and where his native instincts had always allowed him to navigate with rare skill.

What Prebisch admired most about Vargas was the care he took to endow the Brazilian State with an institutional apparatus that would serve it efficiently in the new activities opening up in the economic and social sphere. That admiration foreshadowed some of the criteria that Prebisch would use at the helm

of ECLAC: his first priority would be to give the recently created agency the institutional soundness and operational effectiveness that had marked his handiwork in his native country. What made it easier was that this time his locus was in Chile. One of the keys to both the brilliant successes and the sad anticlimax of his Argentine career was that his capacity for creating solid and effective institutions was completely exceptional in a country where the need for such virtues was seldom recognized, and in the end it was not appreciated enough to protect him. Chile, on the other hand, prided itself, and not without reason, on having a sharper institutional sense than any other Hispanic-American nation. In this more hospitable domestic climate, ECLAC was not to only survive amid political cataclysms of overwhelming intensity, but would constitute the nucleus from which other research and educational institutions would emerge, and they too would prove capable of surviving the direst adversities.

In this more propitious setting Prebisch, now turning 50, was able to repeat the feat that had launched his Argentine career three decades earlier. And Joseph Hodara (whose work, *Prebisch y la CEPAL*, offers the passionate testimony of someone who has lived the experience he narrates) is surely right when he indicates that, now as then, the secret of Prebisch's success as a builder of institutions is that in them the institutional bond is reinforced by the charismatic ties among the people recruited for an undertaking that seeks not only to advance knowledge but to transform the reality it explores. Thirty years earlier Prebisch had been able to lean on pre-existing ties as he enlisted his classmates in a collective project that he proposed as a life undertaking for them all, and enshrine himself as the *primus inter pares* in that group. Now, as Hodara again tells us, Prebisch was surrounded by a group that came into being solely in response to his call to work on an agenda that evoked "ardent enthusiasm among a young generation of economists determined to observe the evolution and practice of development from within, without regard to accidents of nationality", and that group recognized him as "a master who inspired reverence by his style, his energy and his age". In its members he commanded a "compulsive loyalty and an almost apostolic devotion"[6] even more intense than he had evoked when both the leader and his followers were barely beyond adolescence.

Nor do I believe that Hodara was mistaken when he relates the bond that Prebisch had forged with his collaborators to make the Commission "a charismatic island within a frankly bureaucratic landscape", with what could be called the hybrid nature of its relationship with economics. On one hand, his leadership bears traces of the "profound wellsprings of the Latin American cultural and institutional tradition", while the "particular style" with which he exercises it perpetuates in some respects that of those two very traditional figures of the Latin American scene, the *caudillo* and the thinker.[7] But even in his Argentine phase he had been a prime mover in professionalizing the social sciences, a process that banished forever "the image and the working method of the traditional thinker"; now, in ECLAC he was going to reap "the fruits of that process and hasten it substantially, particularly in the economics field".[8]

For this reason, the entourage attracted to ECLAC by his inspiration and teaching would find in both a dual validation of the undertaking for which he had assembled them. On one hand, with this project they were again taking up an illustrious and deeply rooted Ibero-American intellectual tradition; on the other, they spearheaded the effort to equip the aspiring champions of Latin America with the scientific and technical skills that would give them full rights to take part in advancing the social sciences, of which they had for too long been distant spectators. There was something in Prebisch's ideas that made it easier to integrate both sources of validation: from the legacy of the thinker came both the firmness with which he demanded the status of social science for economics and the insistence that practical economics could transform reality. Both these traits could be seen in the stamp that Prebisch placed from the outset of his career on his efforts to enhance the scientific standards of the economic research that he would direct. This was strongly empirical: as early as 1921, while still referring only to university, he complained of "the old spirit of teaching", entrusted to professors who "read, assimilate, synthesize and repeat theories, and even refute some of them", whereas what was needed is to "study objectively the facts of our economic life", something that required "searching and selecting data from among complex reports and statistics, examining them in detail, and organizing them".[9]

[6] Hodara (1987, p. 11).

[7] Hodara (1987, p. 12).
[8] Hodara (1987, p. 34).
[9] Raúl Prebisch Foundation (1991, vol. I, p. 64).

We have already seen how, in 1948, he remained firmly committed to this principle. He therefore lost interest in developments in economic theory which, in his view, "strayed too far from the real world, which economics was supposed to explain in order to give us the means to act upon it". This distancing does not betray any ambition to replace the theoretical tools developed in the great centres of economic knowledge with other tools forged from concrete Latin American experience. On this point his attitude still reflected that adopted a century earlier by Juan Bautista Alberdi, who incarnated more than anyone in Argentina the figure of the thinker. Indeed, when Prebisch claimed the right "for us to have our own sound doctrine, and to use and adapt everything that is useful from general principles", he invited Latin Americans (just as Alberdi did in 1837) to distance themselves from Europe as a teacher. He continued to recognize the Old World as the irreplaceable source of those general principles, but at the same time he assumed the supplementary and no less indispensable task of selecting and adapting from those principles what was useful for analysing the realities he wanted to transform in practice.

This measured distancing seems all the more reasonable because the juncture at which economics now found itself as a discipline seemed to suggest that it might be the right approach even for those pursuing it within those great centres. In effect, in the revision of economics proposed by Keynes, the practical consequences were much more radical than the theoretical innovations, which merely made superficial adjustments to the majestic architecture of the neoclassical doctrines and (like Prebisch) did so with the benefit of practical experience accumulated by someone who since 1918 had followed the economic process from what were still the "commanding heights" for the entire planet. This circumstance meant that the frontier between theoretical elaboration and the analysis of concrete economic processes lost something of its original clarity, and despite the caution Prebisch observed whenever he ventured to draw general conclusions from specific analysis there were growing ranks of critics who saw behind such analysis the influence of a doctrine that was there even if only as a spectre. These complaints accused ECLAC of straying ever further from the neutral information mandate that the United Nations had set for its regional commissions and they were sufficiently well-founded that the same people who, in the name of the institution, denied them any validity find it more flattering than problematic that Albert Hirschman recognized the paper on "The Economic Development of Latin America and Its Principal Problems" (1949) as constituting the "Latin American Manifesto" that Prebisch certainly intended it to be.[10]

That paper, in which ECLAC spoke out in debates over the future path of economics for the first time, showed some signs that the attempt at a unified diagnosis of the problems that integration into the post-war economic order was posing for all of Latin America must have been influenced by previous experience in a narrower framework. Thus, although in the report that Hirschman called the "Latin American Manifesto" Prebisch constantly stressed the specific modalities with which these problems appeared in each national context, the fact remains that he presented them as variations on a theme in which one of those national experiences —not surprisingly, that of Argentina— clearly stood front and centre. It is easy to recognize this, for example, in the central role that he assigned to the transit from a global system centred on Great Britain to one revolving around the United States, which meant that in some passages the anti-imperialist message that some complained of appeared to reflect instead a state of mind akin to that denounced in India at that time as nostalgia for the days of the Raj. But what was here a problem of nuance took on much broader consequences when, from its base in Santiago, ECLAC began to develop a more detailed picture of the process experienced by the Latin American economy in the twentieth century in which (again not surprisingly) Argentina and Chile occupied centre-stage.

From the perspective of this southern extremity of South America, the narrative focused on the difficult transition between a period of "outward-oriented growth", rapid economic expansion based on agricultural and mining exports (which were already losing steam when the 1929 crash triggered the collapse of the world economic order that had made it possible) and one of "inward-oriented growth", in which the leading role was played by industrialization based on the substitution of imported consumer goods, which the sharp decline in exports sparked by the crisis had placed beyond the reach of these economies. The paper also stressed how much this transition had been facilitated by the creation, during the previous period of export-led prosperity, of a broad consumer market for those now unaffordable goods, and of transportation and marketing networks that were readily available

[10] Gurrieri (1982, vol. I , p. 14).

for the goods that would now replace them. On this point, the problem ascribed to Latin America was based mainly on the experience of Argentina. On the other hand, the adverse consequences attributed to the contrast between sectors of the national economy with productivity levels that were close to being internationally competitive and other, much broader sectors with extremely low productivity related mainly to Chilean agriculture, which was criticized for being so outmoded that high protective barriers were needed to keep it alive, and for affording rural populations such a low standard of living that domestic demand could not expand rapidly enough to provide the desired stimulus for industrialization.

The aspects of Latin American reality that occupy the central place in these first diagnoses by ECLAC did not, of course, apply only to this southern corner of the region. They extended well beyond it, in configurations sufficiently distinct from those of the South that no one should be surprised by the differences of stress and nuance between these ECLAC diagnoses and the one that Arthur Lewis was then beginning to sketch out from his Caribbean perspective. This other diagnosis, based on a partially different perspective, did not invalidate those offered by ECLAC from a decidedly "Southern Cone" viewpoint, but we must recognize that it was the latter one that affected the direction the Commission's thinking was to take when, starting from what were essentially assessments of the recent past, ECLAC set out to formulate proposals with a view to the future.

When this happened, the Commission's necessarily cautious institutional interventions were to be accompanied by more explicit ones arising from the constellation of academic institutions springing up around it. The profile of the personnel of these new establishments reflected the criteria that guided their recruitment, wherein economics was viewed, above all, as a social science with the exquisitely practical purpose of guiding society in its efforts to transform itself. This explains why Prebisch was so eager to bring to ECLAC the Spanish sociologist José Medina Echevarría, whom he enlisted from the ranks of Republican exiles in Mexico. Only two years younger than Prebisch and, like him, quickly recognized in this new field as "a teacher who inspired reverence by his style, his energy and his age", Echevarría, a convinced social democrat, laid the primary blame for the catastrophic turn taken by European history after the First World War on the path down which Lenin had led the Socialist movement, a movement which —although this could not have been its original intention— had shown itself by then capable of promoting gradual changes in the balance of social forces and held the promise of other, more far-reaching changes. Faced with this reformist current, Lenin had not been content to propose a return to the revolutionary sources of Marxist socialism, but handed the leadership of the movement in this new stage to a fresh collective player, a "party of a new kind" that in Russia was embodied by the Bolsheviks. Thereafter the rekindled class war had yielded a succession of increasingly catastrophic upheavals, which had begun in Europe with the triumph of fascism in Italy in 1922, and had led in Spain, after three years of savage civil war, to the outcome that drove so many Spanish intellectuals to seek new roots in the Hispanic-American world in 1939.

This vision, which made explicit the assumptions that had instinctively guided Prebisch from the beginning of his career, would turn out to be prophetic, in that it anticipated the coming changes in both the political and the socio-economic context of Latin America and the world. Those changes vindicated the Commission's ideas, rescuing them from the marginal status they had managed to achieve since its foundation, to such an extent that 10 years later those ideas seemed to have attracted nearly universal consensus. But they were soon to face a decidedly inhospitable climate during the no less savage political upheavals and social conflicts that would follow this brief season of fleeting hopes. As the 1950s advanced, it became increasingly clear that what in the Old World had begun as an unexpectedly successful post-war economic reconstruction was continuing on a worldwide scale in a wave of growth with no foreseeable end. This climate of growing optimism about the future was quite appropriate as the culminating phase of the *"trente glorieuses"* approached—those "30 glorious years" following 1945, which the French economist Jean Fourastié would recall nostalgically in 1979 as the golden age of the capitalist order, whose survival had aroused well-founded doubts half a century earlier, but which now seemed to be promising an ever more brilliant future.

But it was not only the capitalist order that seemed to hold this promise. Until 1960, the economy of the Socialist bloc had been growing even faster than that of the countries hitched to capitalism, and many concluded from this that both blocs were coming to grips successfully with the shared problem of economic development. So much so, that in 1960 Walt W. Rostow, in his "non-Communist manifesto" (*The Stages of*

Economic Growth) imbued with the spirit of the Cold War, presented the Soviet Union's triumphant entry into the era of self-sustained development as the culmination of a process that had begun under capitalism in the empire of the czars. A sign of this reborn confidence in the future was the willingness to wager on it with the formulation of what (after that confidence evaporated) came to be described —and condemned— as "grand narratives", which looked to this mystery-free future for the key to reconstructing the past. (After a long century in which greater caution had reigned here, this was an aspect that the "non-Communist manifesto" of 1960 picked up on from the Communist manifesto of 1848). Narratives like Rostow's offered grounds for celebration to societies that were coming to be known as the "first world", to which the future promised further progress and constantly rising prosperity, but read from Latin America they seemed to herald, not without anxiety, the mortal challenges that the region would face in that all-important transition. Hence the new-found confidence in the future underpinning these narratives inspired in what would soon be known as "ECLAC thinking" an ambition to decipher the enigmas of the past.

If there were grounds for anxiety, it was not because Latin America's growth was lagging behind the first world —in the second half of the 1950s Brazil's rate of growth was the highest anywhere outside the Socialist orbit, and in the first two decades after the Second World War even Argentina's lustreless performance produced a growth rate slightly higher than that of the United States. Rather it was because not even these growth rates, which would be hard to surpass, were enough to significantly reduce the gap that separated Latin America from the developed world.

Because of this recognition of the way things were, the dual perspective toward the past and future (an essential feature of development economics), would take a different slant in "ECLAC thinking", distinct from that of economists in the developed world. In a Latin America that was beginning to recognize itself as part of the Third World, examination of the past started from the future —whose positive signs were less a sure promise than an inescapable imperative— and stretched back far beyond the brief interval that separates the present from the beginnings and flowering of the Industrial Revolution, to discover in more remote ages the reasons why, in the era of development, it remained so hard to make up Latin America's ingrained lag. In 1958 and in 1959 two books by ECLAC undertook this exploration by two different routes. In *Chile, un caso de desarrollo frustrado* ("Chile, a case of frustrated development"), Aníbal Pinto Santa Cruz recast in the vocabulary of development economics some ideas and diagnoses matured in a long century of thinking about this lag. He especially praised the ideas of Francisco Encina and constantly acknowledged his debt to that author's work, *Nuestra inferioridad económica, sus causas, sus consecuencias*, ("Our economic inferiority, its causes and its consequences"), published in 1912. Encina's works abound in intuitions of which some are admirably penetrating and others excessively arbitrary, but there is no doubt that Santa Cruz found in them a very useful inventory of issues that had to be tackled by any scholar wishing to tackle the old yet ever new problem of Latin America's lagging performance. In *A formação econômica do Brasil* ("The economic formation of Brazil"), Celso Furtado took a different road: he used the tools of retrospective economic analysis to try to pinpoint the time at which the economies of English-speaking and Portuguese-speaking America began to diverge. He found it in the decades between the independence of the United States and that of Brazil, and he also demonstrated that, although Brazil's growth rates were thereafter again comparable with those of the United States, the gap that had opened up at that time would not be closed. He reached the same conclusion for Mexico and Spanish-speaking South America. It is tempting to conclude from this that the earlier independence of the United States gave that country something more than a chronological leg-up, by allowing it to become an independent participant in the Atlantic economy before the advance of the Industrial Revolution opened a gulf between its centre and the periphery, to which the new Iberian nations found themselves relegated from their beginnings.

While these perspectives developed in ECLAC made a significant contribution to contemporary thinking about the issues and methodologies of the social sciences, which in those years were attracting increasing attention in Latin America, they also began to have an influence in the realm of day-to-day politics. Evidence of this was seen in the mid-1950s, when the term *desarrollismo* ("developmentism") appeared in the political vocabulary, and on its heels a recognition that Latin America's post-war political and social climate differed vastly from the conditions that had prevailed between the outbreak of the Great Depression and the end of the Second World War. In that earlier time Prebisch had been able to influence the course of Argentina's economy, for the two reasons indicated above —on one hand, the proven incapacity

of the market economy's automatic mechanisms to end a deepening crisis meant that interests traditionally opposed to State intervention in the economy now turned to the government in desperation, while at the same time the establishment of a new political order, however shaky, had done away with universal suffrage and had severely confined the manoeuvring room of labour and social movements, with an analogous effect in those sectors. By contrast, by the post-war era, the situation had changed radically in the first aspect, with consequences that were being felt as well in the second.

With the economic upheavals triggered in 1929 behind them, Prebisch and the ministers he advised had been able argue in 1935 that their efforts to boost industry were driven not by ideological or doctrinaire leanings but by the recognition that this was the only way under the circumstances for Argentina to make up some of the ground it had lost. And when the victors of the Second World War made it one of their objectives to restore the global market, which in fact had ceased to function in 1929, it seemed once again quite feasible, as an alternative to the model improvised over the previous decade and a half, to go back to the one that had served Argentina so well for more than a century.

This alternative took shape most clearly in Argentina but gained a greater or lesser hold virtually throughout Latin America, and had a political impact that, among the larger countries, could only be effectively blunted in Mexico (which from the beginning of its revolution followed its own path in this respect). Those not prepared to renounce the economic and social changes made during the previous stage were obliged to rally support for the industrialization model from a broader public than the owners of industry. Hence the rise of political currents that later came to be called "populist", which sought to win the support of the urban masses for the industrialization alternative as a counterweight to the growing reluctance of the propertied classes. This shift consolidated and accentuated the features that, from their beginning, differentiated the social framework of the industrialization taking place in Latin America from that of the earlier Industrial Revolution in the first world. For one thing, there was now a labour movement in place, and the populist solution would help it to progress. There were already hints (and sometimes more) of labour laws which, in a populist political setting, could not fail to have a growing influence on the day-to-day lives of the working class. All of this would merely worsen the difficulties of an industrialization effort that could no longer benefit, as it had during the war, from the absence of all competition from the developed world. But even more serious was the fact that 10 years after the end of the war this industrialization model (based on producing mass consumption goods mainly for the middle and working classes) was exhausting its growth potential. It is not surprising, then, that the political movements identified with the industrialization alternative felt the need to breathe new life into it, and this need drove the rise of what came to be known as *"desarrollismo"*.

The term alluded to the idea of opening a new phase in which the industrialization process would be deepened. As originally conceived in ECLAC, it would have to address the production of capital and intermediate goods once light industry had grown sufficiently to create a broad market for such products. The political leaders who adopted this attractive label for their plans started this new phase by promoting the production of durable consumer goods targeted at the upper and upper-middle classes. It is easy to see why they did so, since the serious and imminent threat to their supporters represented by the industrial sector's incipient stagnation enhanced the attractiveness of offers by first-world corporations, hungry for the monopoly rents that were there for the picking in industrial economies closed to any significant external competition. But while this strategy rapidly permitted the hoped-for industrial revival able to restore the original drive to the populist movements, it was not long before the innovations made to give those movements a new lease of life were opening the door to changes in the socio-economic framework that had facilitated the previous advance of populism. This happened for two reasons that ultimately fuelled each other. On one hand, local production in these new branches of industry, far from replacing imports which had in fact been virtually suspended for decades, was creating a need for new and different imports. This meant constant resort to external investment and credit and, consequently, increasingly limited the decision-making freedom of economic policymakers in the receiving nation. On the other hand, the fact that these new industries (whose growth contrasted with the stagnation of the older industries that catered to an already saturated mass lower- and lower-middle class market) could survive and even prosper amidst an income redistribution pattern contrary to that which the populists had originally intended helped to weaken the political power of a movement that in 1945 believed the future belonged to it.

By the end of the 1950s, both external and domestic forces were becoming increasingly effective in countering the populists and their supporters and this was reflected in an ongoing struggle over income distribution among the social sectors, interrupted by truces that were doomed to be shattered as soon as a new burst of inflation made them obsolete. This led to fear that what had been hailed as an admittedly difficult transition between two industrial models would end up in stagnation and instability that would drag on indefinitely. In the context of a rapidly growing world economy, with which Latin America was finding it increasingly difficult to keep pace, it became clear that in order to avoid chronic stagnation deeper changes were needed in the region's economic and social structures than those introduced under the banner of populism. In 1958 the Commission produced an essay describing this broadening of perspectives, one that resonated far and wide. In *La inflación chilena, un enfoque heterodoxo* ("Chilean inflation, a heterodox approach"), Osvaldo Sunkel called for "lifting the monetary veil" to discover the structural causes of inflation, which he attributed to the damaging economic and social consequences of the low productivity of Chilean agriculture, as mentioned above. This was at first glance a rather arbitrary conclusion, since industry suffered similar constraints, but it was justified by Sunkel's proposal to go beyond that diagnosis and suggest a way to overcome the impasse in the Chilean economy through a deep-reaching economic and social reform, which could only start with agriculture.

In 1959 the triumph of the Cuban revolution had the immediate effect of rallying a Latin American consensus around the more ambitious agenda that was beginning to take shape. By 1961, that agenda was drawing murmurs of approval from Washington. This agreement on the basic socio-economic problems of Latin America lasted longer than might have been imagined possible when Latin America was becoming a battleground for the Cold War, which had been exiled from the developed world and was preparing to bloody the farthest reaches of the Third World. Shortly after his victory, Fidel Castro launched an idea that was then taken up by Brazilian President Kubitschek in his proposed "Operation Pan-American". This was ultimately given shape in the Alliance for Progress, which the United States would offer its southern neighbours as an alternative to the socialist path that Cuba was championing.

In 1960 this consensus, which essentially mirrored the Commission's thinking, seemed to be on the ascendant everywhere. While in Cuba, with the coaching of Felipe Pazos, the attempt to overcome stagnation and expand the narrow domestic market through a huge boost in mass consumption capacity gained for a time almost unanimous support for the revolutionary regime from Cuban society, in Chile the Christian Democrats came to power in 1964 with a programme that reflected the essence of ECLAC thinking, defeating a leftist, similarly inspired alternative. In fact, the Alliance for Progress had now adopted as key themes the agrarian and fiscal reforms that Prebisch had proposed to his followers back in 1922.

As we know, things were soon to take a different turn. Why was the shift that Lenin had introduced in the socialist movement, and which Medina Echevarría had thought so catastrophic for the Old World, now having repercussions in the new? Certainly, that shift can be blamed for much of what was tragic in the stage that began with the defeat in Latin America of revolutionary and reformist movements alike, from the overthrow of Brazilian President João Goulart in 1964 (the same year in which the Christian Democrats launched their "Revolution in Freedom" in Chile), to the removal of Maria Estela Martinez de Perón in Argentina in 1976. But we must ask if there were not other problems that had less to do with the contents of the ECLAC project than with where it came from, and which would also explain the ultimately insurmountable problems involved in putting it into practice.

Celso Furtado offers moving testimony in the three books that trace his career, from *A Fantasia organizada*, covering the hopeful years at ECLAC, to the increasingly sombre *A Fantasia desfeita* and *Os ares do mundo*. This is the testimony of one who, alone among Prebisch's recruits to ECLAC, rose to occupy in his native country a position comparable to the one that Prebisch had held in Argentina, only to discover that it was now impossible to steer the economic and social process from that position, as Prebisch had been able to do when Argentina was seeking a new path amid the ruins of capitalism's greatest crisis. The triumph of a response imposed by the most savage of means put an abrupt end to the project with which Furtado hoped to continue the work of Prebisch, and this stamped a bitter and indelible mark on his memory. But that bitterness did not prevent him from recognizing that the triumph of a blind and brutal reaction had been not the cause but rather the consequence of a failure that, in hindsight, seemed to him inevitable.

This is how he put it in a book that dates from the time when, as a result of the lurch to authoritarianism

in Brazil, he was "crossing an invisible line that would mark [his] life definitively".[11] In that book, in which he tried to draw some lessons from this abrupt reversal of fortune, he recalls how "in underdeveloped economies, the market for the factors of production works to increase income concentration, because there are no social forces capable of opposing that trend" and he adds that the State, the only institution that "can fill that gap by arbitrating between accumulation and distribution, will act in one direction or the other depending on the social forces that control it. What is important to note here is that whichever side holds the levers of power —authoritarianism or populism— the result is an unstable situation, because the excessive concentration of income causes social instability, and excessive redistribution frustrates growth".

And events proved that the "political education effort" that could make it acceptable to seek a balance between these two excesses would be impossible in the authoritarian framework imposed by force in Brazil, which "restricts citizen participation in political activity and degrades the exercise of power by stripping it of social control". By contrast, in the open society previously assured by the prevalence of representative democracy, "populism [would have been] capable of improvement"[12] because "practical politics" would still have been able "to indicate the paths to building an institutional framework that could give effect to the ideas of freedom, prosperity and tolerance, which are the essence of modern civilization".[13]

This is the sad but honest conclusion of one who had taken it upon himself, in the name of the State, to arbitrate between accumulation and distribution in Brazil, as Prebisch had done three decades earlier in Argentina, only to discover that the State had fallen under the control of social forces that were now less inclined to respect the arbitrator's verdict than to impose whatever best suited their perceived legitimate interests. He then realized that there was no longer a place for him in his native land. Societies willing and able to take charge of their economies, like those that Iberian and Iberoamerican reformers, from Pombal to Prebisch, had used as models, had now been built. However —as Furtado also stresses— in the industrialized countries, market forces in principle guarantee economic growth because they have achieved a balance of social forces organized and integrated into the productive system, thanks to which the historical rise in real wages reflects the increasing relative scarcity of labour. In underdeveloped countries, on the other hand, where no such equilibrium exists, "liberalism —an ideology devoted to preserving the social status quo through gradual reforms— was replaced by authoritarianism", while "socialism —an ideology focused on social justice— was turned into populism". It was difficult for Furtado not to deduce from this a corollary that struck too close to home. Here was someone who had hoped to carry on the two-centuries-old struggle to advance Latin America, from his position at the pinnacle of the State. But as he would discover, that State was no longer capable of steering the path of society, and 1964 marked the end of his homeland career, one that had been just as brilliant as that Prebisch had enjoyed in Argentina up to 1943. It is easy to understand that Furtado continued to re-live this setback, with an intensity of feeling that is fully reflected in the works he would compile more than a quarter-century later into *Os ares do mundo*.

As Hodara notes, the shift in the political as well as the economic and social climate in Latin America that had derailed Furtado's previously triumphant career made it impossible for the Commission's interventions in the now permanent debate about Latin America's future to regain the "prophet-caudillo" status they had under Prebisch.[14] But that would not stop ECLAC from formulating them, nor from extending its analyses of the present into a future now more uncertain than it had been in the euphoric times when Rostow had examined it nor, indeed, from arriving at conclusions that were perhaps more accurate than those set out in *The Stages of Economic Growth*. Let me at this point offer a personal anecdote from a seminar given in Berkeley in 1980 by Osvaldo Sunkel, in which he announced that the convergence between the developed world and the Third World that had been frustrated in the 1960s would be achieved through a change of direction opposite to the one in which such great hopes had been placed. The first world, he said, would take on a more opulent version of the deplorable social profile that had been maturing in its Latin American periphery. If I retain such a vivid memory of that seminar it is because I also recall my scepticism about that prophecy —I was convinced that Osvaldo was disregarding (as economists often do) the obstacles to such changes posed by the forces of inertia (to which we historians

[11] Furtado (1993, p. 127).
[12] Furtado (1993, p. 148).
[13] Furtado (1993, p. 149).

[14] Hodara (1987, p. 229).

are more sensitive)— and my surprise when the future he announced to us duly began to unfold over the two following decades.

Looking back, I should not have been so surprised, given the signs of an impending change of scene that had been building up over the previous decade. In 1971, President Nixon ended the dollar's fixed-rate convertibility into gold. That move reflected changes in the world economic balance that were undermining the absolutely dominant position the United States had achieved in the course of the Second World War. The first oil crisis in 1973 was an even more ominous sign of an end to the good times that people had thought would go on forever. In fact, it was something more than that: it was the first announcement that the magic was gone from the economic formula which had guaranteed prosperity for the first world, and which to survive would have needed an overabundant flow of raw materials (and to a lesser extent of food) shipped at very low prices from the periphery. This upset could be attributed to the creation of the Organization of Petroleum Exporting Countries (OPEC), an initiative of the main oil-producing countries along the lines of that proposed in vain by Prebisch half a century earlier to the Argentine livestock raisers. As we know, the first world's response was to allow carefully controlled inflation to ensure that the slump provoked by the sharp hike in oil prices would not spiral into depression, something those with vivid memories of the political fallout from the capitalist economy's crisis of 1929-1931 were determined to avoid at all costs.

The inflation to which the First World resorted to manage stagnation had the immediate objective of preserving the welfare state introduced after 1945 in Europe, and with less superstructure but with comparable results in the United States. This was deemed essential to avoid a return to the social upheavals of that earlier nightmare. But the economy's next turn would quickly reveal as excessively optimistic the notion (which had become popular during the previous boom) that government officials tracking the situation had adequate tools to keep the economy broadly on the desired path, and needed only, perhaps, to improve their fine-tuning. The flaws in that notion would become clear in the unexpected outcome of efforts to keep the economy on track, which, in fact, drove it ever further away from that track without anchoring it firmly in any alternative channel. Thus, when the slow but incessant redistribution towards wage-earners of a GDP no longer growing as fast as hitherto brought the term "negative real interest rates" into common use, there were those who saw in this the first sign of an unexpectedly peaceful end of the capitalist chapter of world history. But when inflation in the United States reached levels that were seriously alarming to the general public, President Carter decided, in this unsustainable situation, to throw his support to those who (according to a formula that had become suddenly popular) were ready to squeeze inflation from the monetary system as one wrings water from a sponge. This decision, taken in an effort to save the essentials of the post-war economic and social order, helped take the world economy in a direction opposite both to that expected by those who believed they were witnessing the euthanasia of the capitalist order and to the one Carter himself had intended it to take. In effect, he had not counted on the huge inertia that had built up in a gigantic national economy too accustomed to growth, and he was obliged to enter his re-election battle with inflation not yet beaten. With the harsh fallout from a spike in interest rates that brought them to previously unimaginable levels, and with no sign on the horizon that the long-promised victory was within reach, his defeat at the hands of Ronald Reagan was inevitable. Reagan's contagious optimism reassured a public overwhelmed by gloomy forecasts that, just by willing it, the country would soon be bathed in the light of a new dawn. And in fact his victory heralded the dawning of a new era. The effort launched in the hope of securing a new lease of life for the postwar socio-economic order would now be used to give capital the chance to retake from labour and government nearly all the ground it had lost since the Great Depression of 1929, when for a time the very survival of capitalism had seemed under threat.

The first victim of the abrupt change of direction imposed by this model from the very centre of the First World would be the Socialist bloc formed by Eastern Europe and the Soviet Union. There, since the early 1960s, rapid post-war growth had given way to deepening stagnation. The bloc then sought to alleviate the consequences of that stagnation, during the economic and financial boom years that its adversaries in the Western bloc were still enjoying, by opening up to the credit and investment flows spilling over from the West. The fallout from the end of that boom is visible in the backdrop to the dizzying process that in 1989 saw the absorption of the self-proclaimed first German workers' and peasants' state' by the very bourgeois Federal Republic of Germany. This marked the beginning of the collapse that would be consummated in 1991 with the dissolution of the

Soviet Union. That unexpected cataclysm had few precedents in world history, and would close the cycle of revolutions in modern Europe with the collapse (which looked much like suicide) of the most ambitious of all those revolutions. At the same time, it inspired in those who had won such an overwhelming victory the assurance that they were witnessing an end to history whose features were curiously similar to those of the beginning of history proclaimed imminent by Marx and Engels in their 1848 manifesto. They were convinced that in the era now opened by this colossal triumph humanity would be governed to the end of time by the principles enshrined in the purest version of the economic as well as the political and social credo that had guided capitalism in its vigorous youth. But they were no less convinced that the economic model prevailing during the three most glorious decades in capitalism's entire history had just been condemned as well by the implacable verdict of history. Indeed, it was undeniable that both in Europe and in the United States the political forces still tied to that model were backed into a defensive corner from which, in an effort to save what was salvageable, they seemed resigned to yield one position after another to an increasingly self-confident adversary.

It is not surprising that the 1980s would soon be remembered in Latin America as "the lost decade". To a degree even more alarming than in the Soviet bloc, Latin American countries had over-borrowed abroad. Even Mexico and Venezuela, buoyed by the oil boom, found themselves at the end of the credit boom in trouble just as deep as their less fortunate neighbours, with debts they could not pay off and or easily roll over, even at the exorbitant interest rates that had now replaced the previous, temptingly low ones.

As that decade opened, the lurch to authoritarianism had already extended to the three most southerly countries of Latin America. While in Brazil the military government succeeded in releasing the *desarrollista* drive, which had proven incapable of overcoming obstacles within a democratic political setting, the Southern Cone saw an attempt to impose a plain and simple return to the outward-oriented development model through a kind of State terrorism that in Chile and Argentina (and to some extent in Uruguay) reached levels previously unthinkable in the region.

These regimes had staked all on an economic project that turned out to be unsustainable, and they would suffer severely from a far less accommodating financial climate than the welfare states that had flourished in Europe during the previous boom. Their external debts kept growing as fast as in the previous phase, as they resorted to rollovers that provided no new resources for their national economies and merely postponed the inevitable day of reckoning, when settling accounts would be even more costly. The decline of the authoritarian regimes sparked by this unexpected (although expectable) change of fortune paved the way for political transitions. But Argentina was the only country to have a fully representative democratic system restored by the beginning of the decade, and it faced the impossible task of administering the financial legacy (which was particularly crushing there) left by the military government. By then, in most Latin American countries, including those that had not suffered State terrorism, the hangover from the previous boom, while less stifling than in Argentina, made it even harder to address the consequences of what was increasingly recognized as an irreversible change of era, and one that was by no means limited to the financial and economic sphere.

In this new context, "ECLAC thinking", which since 1949 had been tracking developments in Latin American economies and societies with explicit analyses and less explicit forecasts, would now offer, through the contribution of Fernando Henrique Cardoso, what we might call a posthumous picture of the phase that had just ended. On this basis, Cardoso would propose a more modest agenda for change, as an alternative to the one that ECLAC had championed under Prebisch, and he would also suggest some practical ways to implement that agenda, which again represented alternatives to the instruments Prebisch had tried to use throughout his public life.

In 1968, when intensified political and ideological repression by the four-year-old regime in Brazil forced Cardoso to seek refuge at ECLAC, he had already absorbed some ideas gleaned from the Commission's work into his vision of Brazil's and Latin America's problems. At the same time, having been trained as a sociologist in the traditions of both Marx and Weber, he associated himself closely with the perspectives that Medina Echeverría had introduced in ECLAC in this area. The first fruit of his temporary sojourn at ECLAC was a report prepared in collaboration with his Chilean colleague Enzo Faletto, which the following year became a short book, *Desarrollo y dependencia en América Latina. Ensayo de interpretación sociológica*, ("Development and dependency in Latin America: a sociological interpretation") which, as we know, generated ripples that are still felt today. In that book we can already make out the path that Cardoso was

to take upon the close of that turbulent stage in which reform, revolution and reaction once again vied for the future of Latin America with an intensity not seen since the crisis of independence.

The direction that Cardoso would take in the future is suggested most clearly in the care he took in this 1969 book on sociological interpretation to distance himself from the generalized explanations for Latin America's laggardness inspired by the rival views of history on which these mortally antagonistic alternatives were based (although not always explicitly). That distance was reflected in his refusal to offer any global dependency theory to counter those already competing: Cardoso and Faletto both objected that experience offered many situations of dependency with traits that did not all fit those theories. Based on this premise, they outlined a typology of these varied situations, looking above all at the balance (different in each case) between the forces and influences wielded by agents external to the process that led to underdevelopment and those available to the dominant local players, whose support of those agents was essential for the continuity of that process. They drew on a very concise reconstruction of the historical experiences in which these situations had matured. More than their conclusions about any of these situations, we are interested here in the other, implicit premises underlying their argument that there was a multiplicity of "dependency situations". Behind the conviction that there are different roads to underdevelopment, and that these roads shape the profile of the economies and societies forged in the process, it is easy to discern a more general conviction about the mechanisms through which every historic process must pass, which is entirely incompatible with any view of history. This in turn led implicitly to a corollary that had immediate practical relevance: even after the much-heralded "decade of decisions" of the 1960s had come to the most disastrous end imaginable, that closure was not an end of history, but a turning point which, while undeniably negative, had not removed from the scene those who had just suffered utter defeat.

At the very first sign that the military regime in Brazil was about to enter its decline, Cardoso drew from this analysis of defeat a corollary that affected him even more personally: he concluded that the time had come (even before full restoration of the freedoms that the military had suspended) for him to enter politics. His political role would not be to offer up arguments for the "political education effort" that Furtado had thought so essential for persuading a divided society that only a solution far removed from the "excesses" of both authoritarianism and populism could offer escape from the labyrinth in which it was locked. Rather, he would gamble on his vision of the future by throwing himself into the political arena. As we know, that gamble was unexpectedly successful, however desperate it might have looked, undoubtedly because, on the one hand, our colleague had a very sound understanding of the limits that the fast-advancing new world socio-economic order set on those who refused to give up on their long-standing goals in this now decidedly adverse context. On the other hand, he also displayed an unexpected skill for manoeuvring in the field of day-to-day politics.

Cardoso's career may have shown that, after two centuries of proposals for overcoming Latin America's lag, there was still a road open to those seeking to follow in the footsteps of that illustrious tradition if they decided to pursue it through democratic politics. But the end of those two centuries left ECLAC with the same problem. Of course, the road chosen by Cardoso was closed to the Commission: in the midst of profoundly altered circumstances it now had to find an effective way to continue the task that Prebisch had assigned it, by introducing a Latin American perspective into the debate on the socio-economic order, which once again, as at the end of the Second World War, was entering a time of radical changes.

The task that awaited it would not be easy. The decade of the 1980s had already witnessed the crushing victory of the business and financial world over both labour and the State. As the following decade dawned, the collapse of so-called "real socialism" in its original Eurasian embodiment was seen by the victorious credo's adherents as irrefutable vindication of the economic (as well as the social and political) doctrines enshrined in that credo, and in the debates in which ECLAC staunchly participated those doctrines would form the core of a new orthodoxy that was reluctant to recognize the legitimacy of any dissenting opinion.

In this context, however unrewarding, ECLAC played the role of a sceptical observer and in response to the relentless advance of the new ideological orthodoxy it invoked the ever more glaring gap between the effects of the policies inspired by that orthodoxy and what it had promised to deliver. And we may note that, confirming this argument's validity, in the 1990s the economies of Chile and Brazil, whose economic and social policies reflected that same scepticism, were the most conspicuous exceptions to the generally disappointing performance of the Latin American

economies in a decade that for several was even more "lost" than the preceding one.

With the opening of the new millennium it was already clear that the shift in relations between the State and the groups that had occupied centre-stage in the industrial society, far from heralding the end of history, had opened the way to a great historic mutation whose ultimate goal was impossible to foretell, but whose course lent itself less and less to confirming the simple lessons that the new orthodoxy insisted on drawing from it. And today, while that goal remains in the shadows, it is even clearer that the stage at which we are now will bring changes far deeper and broader than the startling shifts we have already seen, and that both those who upheld this ephemeral orthodoxy and those who are glad to see it dissipate are witnessing the opening scenes of a drama whose plot is yet to be revealed.

What should the Commission's role be in response to this gloomy present and uncertain future? Perhaps it should retain the role it played in the final two decades of the past century, which sowed the seeds for everything we are now reaping. That means bearing witness and remaining faithful —in the words of Celso Furtado, and changing only the tense of the verb— "to the ideas of liberty, prosperity and tolerance, which *were* the essence of modern civilization".

(Original: Spanish)

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KEYWORDS

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Trade and investment rules: Latin American perspectives

Pierre Sauvé

This paper depicts the changing international landscape of investment rule-making from a Latin American perspective. It does so by looking first at the recent evolution of investment rules, pointing out differences and synergies between these closely intertwined processes and the role that Latin American countries have had in shaping them. Against the backdrop of repeated failures to develop a comprehensive set of investment disciplines at the multilateral level, the paper reviews the main arguments that have been recently advanced in favour of and against global rules for investment. The paper dissects the main reasons why investment fell off the negotiating agenda of the Doha Development Agenda of the World Trade Organization (WTO). It concludes with a number of policy lessons regarding the most optimal institutional settings in which to pursue various elements of investment rule-making and sketches a few forward-looking scenarios on investment rule-making at the multilateral level.

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I
Introduction

Investment rules governing cross-border investment flows usually consist of rules on treatment and protection of foreign direct investment (FDI), contributing to what is generally referred to as the "investment climate". Investment rules exist at the bilateral, regional and multilateral level. The question of how investment rules affect investment decisions has long generated heated policy debates. In general terms, a stable and transparent investment climate can be in the interests of investors when they were previously disadvantaged by unpredictable investment conditions. It is not clear whether this would lead to additional FDI or simply to more comfort for the investor. The predictability of the investment climate may be enhanced when domestic policies are enshrined or locked into international treaties. Much will also depend on existing practice. If treatment of existing investors is already good in practice, new rules will do little by way of generating new investment flows or a better investment climate, other than offering greater long-run security. Empirical evidence that addresses the effects of individual investment provisions on induced FDI remains scant, and results are largely indeterminate.

Against this background, host country governments have exhibited differing attitudes towards international investment rule-making. Latin American countries are probably among those that have shown the greatest activism. In the recent past, triggered in particular by the debt crisis of the 1980s, Latin American nations have recognized the importance of increased foreign investment flows into their economies. FDI can, at least partly, compensate for sources of capital that may otherwise become unavailable from international lenders in circumstances of heightened macro-economic turmoil. As a result, the region has witnessed a steady opening of investment regimes. Alongside domestic (or autonomous) investment regime liberalization, Latin American countries have engaged in a large number of international negotiations. Virtually all of them are today World Trade Organization (WTO) members, are party to one or more free trade other integration agreements, and are signatories of numerous bilateral investment treaties.[1]

This paper depicts the changing international landscape of investment rule-making from a Latin American perspective. Following the introduction, section II reviews the WTO disciplines. Section III looks at the scope and content of bilateral and regional agreements. Section IV provides an overview of the main arguments that have been advanced in favour of and against investment rule-making at the multilateral, bilateral and regional levels. Section V explores some of the reasons that investment fell off the negotiating agenda of the Doha Round. Section VI concludes by drawing policy lessons and sketches a number of forward-looking scenarios on investment rule-making at the multilateral level.

II
WTO disciplines

Multilateral rule-making on investment has a troubled history. The investment chapter of the 1948 Havana Charter was one of the main reasons for the downfall of the proposed International Trade Organization project. In the General Agreement on Tariffs and Trade (GATT) that survived, no further investment-related negotiations took place until the Uruguay Round negotiations in the mid-1980s.

□ This is a revised version of the work contained in Sauvé (2006). The views expressed here are those of the author and do not necessarily reflect the views of the Organization.

[1] Brazil is one exception in this last respect, as it has signed numerous bilateral and regional investment treaties and agreements, including in the context of the MERCOSUR, but none have yet been ratified by its Congress.

Several other attempts at crafting a global investment regime would prove stillborn, including most spectacularly the proposed Multilateral Agreement on Investment (MAI) initiative launched within the Organisation for Economic Co-operation and Development (OECD) in the late 1990s. The MAI represented a major attempt at crafting a multilateral (if far from universal) regime for investment.

Finally, and most recently, efforts to include investment negotiations proper within the negotiating purview of the WTO have proven deeply contentious, contributing significantly to the derailing of the December 2003 ministerial meeting in Cancun. As part of the price for imparting forward momentum to the stalled Doha Development Agenda, WTO members agreed in July 2004 that foreign investment would (alongside two other so-called "Singapore Issues", i.e., trade and competition, and transparency in government procurement) be taken off the WTO negotiating table for the duration of the current Doha Development Agenda.

Accordingly, in terms of legally-binding multilateral rules, what survives the multiple initiatives of the past half-century are the rules that were agreed upon in the Uruguay Round of trade negotiations, concluded in 1994. Of these, the most important elements are the Agreement on Trade-Related Investment Measures (TRIMs), the Agreement on Subsidies and Countervailing Measures (ASCM), the General Agreement on Trade in Services (GATS), the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), and the Dispute Settlement Understanding (DSU).

The WTO has produced a rich harvest of investment-related provisions. This may come as a surprise in light of the determined attempt of many GATT members to eschew a meaningful discussion of investment matters at the outset of the Uruguay Round. That the Marrakesh Agreement establishing the WTO contains so many investment-related provisions, most notably in the TRIMs Agreement and, particularly in GATS, must be ascribed to the rapidly changing policy environment within which the Uruguay Round took place.

This fertile environment, characterized by a number of far-reaching changes in policy and rule-making approaches which gained currency in a growing number of developed and developing countries, was one the multilateral trading system was able to internalize (if only partially) by the time the Uruguay Round was completed. Among such changes are: (i) a growing recognition of the increasingly complementary relationship between trade and investment in a globalizing world economy; (ii) heightened awareness, particularly among developing countries, of the policy signalling benefits to be derived by credible commitments in the areas of trade, investment, and intellectual property protection; (iii) a greater appreciation of the key contribution of investment as the principle means of securing market access and enhancing the contestability of markets; and (iv) a significant worldwide push towards investment regime liberalization, often pursued on a unilateral basis and closely tied to efforts aimed at regulatory reform in key sectors (including energy, telecommunications, finance and transportation services).

While the Uruguay Round has set an important precedent by laying down markers with which to develop more comprehensive rules on investment, the limitations of existing provisions must also be borne in mind. For one, the TRIMs Agreement remains extremely limited in scope and is largely attuned to the concerns of an era of policy-making characterized more by suspicion of, and need to control, foreign investment than by keenness to compete for and attract such investment. WTO rules on investment remain unbalanced given the asymmetry of disciplines applying to performance requirements, the incidence of which tends to fall primarily on developing countries, as opposed to weak disciplines governing the distortive practice of investment incentives, the incidence of which tends to be greater among developed countries.

Moreover, while the GATS negotiations have brought out quite vividly the central importance of investment to trade in services and generated far more by way of commercial presence commitments than had been expected, their treatment of investment-related matters is embodied in provisions that display a number of architectural shortcomings. The latter lack definitional clarity, do not generate adequate transparency; generate limited pressures for liberalization; and afford weak and only indirect protection to investors.

Much, therefore, remains to be done to equip the multilateral trading system with a comprehensive panoply of investment disciplines, and it comes as no surprise that attempts would be made in the post-Uruguay Round era to address such shortcomings. Yet, despite the continued improvements in host country investment climates and policy regimes, attempts at crafting a comprehensive set of multilateral disciplines on investment have met with very limited success.

III

Scope and content of bilateral and regional agreements

1. Bilateral investment treaties

Starting in the 1960s, bilateral investment treaties (BITs) have become the most common international instrument dealing with investment protection issues. The number of such treaties has grown manifold, a trend that now engulfs countries at all levels of development. The number of signed BITs stands at some 2,300, although a smaller number (estimated at around 1700) is actually in force. The network of BITs grew significantly throughout the 1970s, prompted in large measure by a defensive impulse on the part of home (i.e., capital-exporting) country governments in the wake of the increasing number of expropriations and nationalizations, including in Latin America.

The trend accelerated again in the 1990s, albeit in a markedly changed policy (and ideological) environment, as host country (i.e., capital-importing) governments in developing countries and transition countries sought to exploit the putative signalling properties of BITs. The period saw a significant increase in treaties linking a wide range of countries along South-North lines, as well as, more recently, along South-South lines.

BITs are designed to protect, promote and facilitate foreign investment, and they constitute to date the most widely used instrument for these purposes. BITs have traditionally been negotiated between developing countries seeking to attract international investment and developed countries as the principal homes to foreign investors.

The content of BITs has become increasingly standardized over the years and has largely influenced rule-making at the regional level, particularly during the last fifteen years, though, as a consequence of the growth in the sheer number of BITs, the formulation of individual provisions remains rather varied.

There are notable differences between the provisions of BITs signed some decades ago and the more recent ones. A typical treaty's main provisions deal with the scope and definition of foreign investment; admission of investments; national and most-favoured-nation treatment; fair and equitable treatment; guarantees and compensation in respect of expropriation; guarantees of free transfer of funds and repatriation of capital and profits; and dispute-settlement provisions, both State-to-State and investor-to-State. The acceptability of investor-State arbitration was significantly advanced by the conclusion in 1965 of the Washington Convention, overturning the practice of sovereign immunity long embedded in the Calvo doctrine.

As noted earlier, perhaps the most relevant new development in international practice of the last few years is the frequency with which developing countries and countries in transition are concluding agreements with each other. In content terms, it bears noting that South-South practice does not depart significantly from the content of BITs concluded along North-South lines.

BITs remain primarily, if not exclusively, investment protection instruments. Over the years there has not been any significant change from their original objectives. It is thus still true that "a striking feature of BITs is the multiplicity of provisions they contain that are specifically designed to protect foreign investments, and the absence of provisions specifically designed to ensure economic growth and development" (Zampetti and Fredriksson, 2003).

2. Investment rules in regional integration agreements

The universe of regional instruments on investment does not reach the magnitude of the BIT phenomenon, but is still vast, diverse and growing. As such, regional agreements have also begun to create an intricate web of overlapping commitments. While BITs have a distinct focus on investment protection, regional integration agreements (RIAs), and interregional ones, are often geared towards investment regime liberalization even though many of them also address investment protection issues. In the case of European Union RIAs the focus on liberalization is particularly pronounced, as core investment protection issues are not within European Union competence and are generally addressed in BITs concluded by individual member States.

At the regional level, only a few instruments are entirely devoted to investment, such as the Andean Community's Decision 291 (adopted in 1991). However,

a growing number of regional trade agreements have in recent years embedded what are often comprehensive disciplines on investment. The North American Free Trade Agreement (NAFTA) and MERCOSUR Protocols are examples of this trend, albeit less comprehensively and still subject to ratification shortcomings.

The general aim of these agreements is to create a more favourable investment climate through liberalization measures, with a view to increasing the flow of investment within or between regions. As a result, the commonality of substantive rules is much less marked than in the case of BITs.

Latin American countries have been among the most active in pursuing such regional trade agreements, which, since NAFTA, typically include investment rules geared towards the twin pursuits of investment protection and liberalization.

Until recently, the United States and the European Union represented the region's most important partners, as hubs. However, there is now growing interest in Asia. In 2004, Mexico concluded the first free trade agreement (FTA) between Japan and a Latin American country.[2] Chile and China have just completed talks on an FTA; Panama has entered into an agreement with Taiwan Province of China; and China, Japan and the Republic of Korea are actively considering new integration agreements or other means of enhanced economic cooperation, including in the investment field, with Latin American partners.

3. Bilateral and regional advances in investment rule-making

Prior to the 1990s, relatively few investment-related provisions appeared in RIAs. Most such provisions were intended to protect property and were found in BITs. Investment-related provisions now commonly appear in RIAs in every region of the world and especially in those involving Latin American countries. Prior to the 1990s, and unlike BITs, which had historically tended to associate countries at very different levels of development, such as advanced capital-exporting nations and poorer host countries, RIAs were negotiated principally among States within the same region and at similar stages of economic development. RIAs now commonly link States in different regions of the world and often seek to integrate economies at very different stages of development.

The number of RIAs with investment-related provisions has increased dramatically since the 1990s. Although interregional agreements are becoming more common, the majority of RIAs that have been concluded by States in the Americas are with other States in the region. A large number of those States are party to at least one RIA, typically modelled after NAFTA. The CARICOM States, however, have not generally concluded RIAs outside of CARICOM.

Many investment-related provisions in RIAs address the same issues as their counterpart provisions in BITs and relate to compensation for expropriation and guaranteeing freedom of transfers. Although investment protection provisions in RIAs are often similar to those found in BITs, there appears to be greater substantive variance in the content of provisions between RIAs. One explanation may be that most countries, such as the United States, use a model negotiating text for their BITs, which tends to create uniformity across bilateral treaties. The participation of a greater number of States in the negotiation of a number of plurilateral RIAs, and the need to accommodate differing levels of commitment towards investment liberalization, has tended to require greater flexibility and thus more creativity in the drafting of legal provisions.

It remains true, however, that RIAs have in large measure codified pre-existing BIT practice in respect of investment protection issues. This is true even though RIAs have most recently been used to correct some of the perceived shortcomings of traditional BIT provisions, notably regarding investor-State arbitration over matters of indirect expropriation. In so doing, RIAs can arguably be said to fulfil their role as laboratories for experimenting (notably in light of evolving jurisprudence) with a number of rule-making advances that have proved to be obstacles to previous attempts at crafting multilateral investment disciplines, notably under the proposed OECD multilateral agreement on investment. Such advances, and the testing grounds that RIAs afford them, could facilitate the future adoption of similar multilateral disciplines in a WTO context.

The commonly found provisions in RIAs that go beyond traditional BITs are those that prohibit anticompetitive business practices, protect intellectual property rights, liberalize admission procedures and

[2] See the "Agreement between Japan and the United Mexican States for the strengthening of the Economic Partnership". The purposes of the Agreement are to promote freer cross-border flow of goods, persons, services and capital between Japan and Mexico. It also aims to promote a comprehensive economic partnership, which includes competition, improvement of business environment and bilateral cooperation in such fields as vocational education and training and support for small and medium-sized enterprises.

open up trade and investment in services, including in the form of commercial presence, which is akin to FDI. As in the case of BITs, issues related to taxation and investment incentives are generally absent from RIAs.

RIAs in the Americas have been heavily influenced by NAFTA, which contains an investment chapter modelled after the provisions of the BITs of the United States, though more elaborate in some respects. The same can also be said of the Mexico-Japan Economic Partnership Agreement. European RIAs, including those with Latin American partners, are chiefly concerned with liberalization (post-agreement market access), limiting anticompetitive practices, and protecting intellectual property. The European approach leaves investment protection to BITs concluded by European Union member States. Accordingly, RIAs involving the European Union, including those agreed with Latin American countries, do not feature provisions on investor-State dispute settlement.

The fact that RIAs tend to contain greater variation in legal provisions than is the case of BITs does not mean that RIAs are necessarily weaker agreements. Indeed, RIAs demonstrate that it is possible to achieve high-standard agreements outside the context of a BIT. Though it remains true that the strongest agreements tend to be bilateral in nature (reflecting in many instances power asymmetries between signatories), RIAs binding on multiple States and providing for high standards of investment protection and liberalization have been successfully concluded.

RIAs also tend to feature a larger number of provisions that take account of the special circumstances of developing countries than is the case under BITs. This is to be expected to some extent, given that some RIAs have only developing countries as parties. Finally, and as noted above, whether limited to developing countries or including countries at different stages of economic development, RIAs appear to offer greater scope than BITs for experimenting with different approaches to promoting international investment flows.

IV

Main arguments in investment rule-making debates: Bilateral, regional or multilateral approaches

The advantages and disadvantages of international investment agreements differ depending on whether such agreements are bilateral, regional or multilateral in scope. Advantages and disadvantages can also be viewed from different perspectives, such as those of the host versus home countries, and specifically with regard to the issues covered, the inclusion of development-related provisions, impacts on the regulatory sovereignty of host States, the impact on FDI flows, and relative bargaining power.

One of the main reasons for the popularity of BITs is the fact that they provide flexibility to the host country, affording it the possibility of screening and channelling FDI (as admission is generally subject to the domestic laws of the host country), while at the same time extending the necessary protection to foreign investors. However, BITs often involve countries at different levels of development, with unequal bargaining power and negotiating capabilities. Furthermore, available empirical evidence does not suggest a significant impact of BITs on investment flows.

Finally, investor-to-State dispute settlement mechanisms, which complement investment protection provisions, may give rise to high costs and liabilities for developing countries in addition to raising potentially controversial issues relating to the right to regulate in the public interest. The recent spate of litigation involving Argentina is an obvious case in point, as is the more general trend of heightened judicial activity observed since the late 1990s under BIT and RIA treaties.

At the regional level, while investment protection issues are often addressed, international investment agreements tend to have a broader focus, which includes the liberalization of restrictions to entry and establishment of FDI, followed by the reduction of discriminatory operational (post-entry) restrictions.

These elements are generally part of wide-ranging agreements addressing a host of other policy areas, from trade liberalization for both goods and services to intellectual property protection. As such, regional integration agreements may provide signatories with more space for trade-offs. However, the broader focus of these agreements, coupled with recourse to investor-to-State dispute settlement mechanisms, means that, like BITs, they are hardly immune from potential public policy controversies relating to investor-State arbitration, as experience under NAFTA has shown, notably in respect of litigation relating to the alleged confiscatory effects (e.g. indirect expropriation) of environmental or health regulations.

Even to a larger extent than BITs, regional instruments use all the panoply of traditional international law tools, such as exceptions, reservations, transition periods and the like, to ensure flexibility in obligations so as to cater to the different needs and capacities of parties at different levels of development. From the perspective of developing countries this, together with the growing recognition of the links between trade and investment flows, may explain why investment rules are increasingly found in RIAs, which had initially been concerned primarily with trade issues.

As RIAs addressing investment issues and BITs have multiplied in number, they have also created an intricate web of overlapping commitments. This is one of the main arguments cited in favour of creating a common, multilaterally-agreed, framework for investment that, in the words of the WTO Doha Ministerial declaration, would "secure transparent, stable and predictable conditions for long-term cross-border investment, particularly foreign direct investment" (WTO, 2001).

Proponents of a unified WTO compact on investment have argued that a new multilateral framework of rules could ensure autonomous as well as bilaterally- and regionally-negotiated liberalization and extend the benefits of such openness on a most favoured nation (MFN) basis, preventing possible policy reversals where liberalization measures have yet to be consolidated.

The counter-argument that has been voiced recalls that a multilayered set of investment rules already exists under BITs and regional instruments, and also at the multilateral level, especially under the WTO Agreement on Trade-Related Investment Measures (the "TRIMs Agreement") and the General Agreement on Trade in Services (GATS).

Existing rules may be far from perfect, but it has generally proven difficult for the "friends" of investment at the WTO to advance proposals suggesting that a clearly superior set of rules could be agreed upon in a WTO framework. Furthermore, the complexity of overlapping investment rules and regulations will likely persist, unless BITs and investment rules in regional instruments are superseded by a multilateral agreement.

At the same time, it remains the case that in the current WTO system an imbalance exists between the treatment enjoyed by investors in service sectors, which is already covered to some extent by GATS rules, and treatment enjoyed by all other investors, to which only the TRIMs Agreement may be deemed to apply in a direct manner.

From a development perspective, the question of the appropriate rule-making 'level' —bilateral, regional or multilateral— cannot be separated from an examination of the actual or potential content of investment rules and commitments. All international investment agreements are instruments of cooperation between countries that are entered into voluntarily. Furthermore, like all treaties, international investment agreements as such are neutral instruments: what determines their impact on the development prospects or regulatory sovereignty of countries is their content, and so far the development-specific content of such agreements at all levels has been rather modest. There is, accordingly, considerable scope for increasing the attention paid to development issues in international rule-making on investment.

This is particularly true in light of the power and negotiating capacity asymmetries that typically characterize multi-issue negotiations where a single undertaking prevails at the end and where great care needs to be exercised in ensuring that the interests of developing countries are properly addressed or preserved.

At the same time, negotiations at the multilateral level offer developing countries greater leverage than do regional or bilateral negotiations, since they are able to advance common ideas on substantive issues of importance to them. Moreover, the multilateral level could allow all developing countries, if adequate capacity-building efforts were put in place, to meaningfully participate in the design of new rules, which are otherwise going to be increasingly shaped by a restricted number of key countries participating in bilateral or regional initiatives.

In this regard, it is important that all international investment agreements are shaped so as to allow enough policy autonomy and flexibility. More specifically, the legal obligations entered into should not unduly limit the sovereign right to regulate in the public interest.

RIAs (more than BITs) have in recent years gone some way towards clarifying (and generally circumscribing the scope of) a number of investment protection-related provisions that could be deemed to unduly impair the regulatory autonomy of host States.

The quest for policy autonomy on the part of developing countries extends beyond protection matters to issues of admission and treatment, including support (subsidies and incentives) for domestic industries and performance requirements. While there seems to be an unambiguous collective preference for regulatory inaction on the issue of investment-related subsidies (i.e. investment incentives), the question of discipline on performance requirements has revealed an interesting paradox. Though the latter featured prominently in the Uruguay Round's implementation debate (as did the widespread perception of the Round's inequitable treatment of developing countries), it has generated little resistance in the context of RIAs, the great majority of which proscribe a more exhaustive list of measures than that mentioned in the TRIMs Agreement.

V

Anatomy of failure: investment and the Doha development agenda

At the fourth WTO Ministerial Conference, held in Doha, Qatar, in November 2001, WTO members agreed to launch negotiations on foreign investment after the fifth session of the Ministerial Conference "on the basis of a decision to be taken, by explicit consensus, at that Session on modalities of negotiations" (WTO, 2001). The decision identified a number of subjects that would be the focus of further work in the Working Group on the Relationship between Trade and Investment (WGTI) until the fifth Ministerial Conference and defined certain basic considerations that would need to be taken into account in negotiations on the envisaged multilateral framework.

While the work of the WGTI is widely seen to have been highly pedagogical in character and resulted in an unprecedented level of technical assistance and capacity-building being directed towards the investment policy field, it also proved highly contentious. Indeed, of the four "Singapore Issues" discussed by WTO members since 1996 (investment, trade and competition, trade facilitation and transparency in government procurement), investment was the subject matter most centrally involved in derailing the September 2003 WTO Ministerial Meeting held in Cancun.

The impasse surrounding investment and its treatment in the WTO system was ultimately resolved by the WTO General Council's July 2004 decision to confine Singapore Issue discussions under the Doha Development Agenda (DDA) solely to the subject of trade facilitation. The most immediate fallout from the failed WTO initiative will be to shift the focus of key rule-making initiatives on investment back to the bilateral and regional levels. These will take the form of BITs or RIAs featuring the extensive array of investment protection and liberalization provisions reviewed in this paper. For countries in the Americas, this entails essentially bilateral agreements insofar as prospects for a hemispheric integration agreement, such as the proposed Free Trade Area of the Americas (FTAA), no longer seem to hold the promise they once did.

Progress on making investment rules may well be more feasible at the bilateral and regional levels. This is so for at least two important reasons: first, the fact that such negotiations, particularly bilateral ones, are characterized by significant asymmetries of economic and political power between capital-exporting and capital-importing countries. A second reason is that BITs and RIAs typically start with a blank page and do not confront the delicate task of reopening existing rules, commitments and the balance of concessions that would inevitably complicate any attempt at fitting new investment rules alongside existing ones in the WTO context.

Discussions on investment at the WTO have highlighted a strange paradox: fierce resistance at the multilateral level by a number of developing countries on a subject towards which their unilateral, bilateral or regional policy stances have been starkly different

(and considerably more accommodating). Indeed, the burgeoning network of treaties, principally at the bilateral level, reflects a growing willingness and ability on the part of developing countries to codify existing legal frameworks for international investment at the country level, in part because of the strongly unilateral character of recent liberalization decisions.

The failure of WTO members to reach agreement on negotiating modalities for investment under the DDA must be assessed against the backdrop of the value added, coherence and negotiating incentives implicit in the proposals of its WTO advocates as opposed to the respective merits of BITs and RIAs. To put it simply, what purpose should a multilateral set of investment rules serve? Should, and can, it aim to go beyond what already exists at the bilateral and regional levels? And is such a body of rules worth having (and "paying for" in negotiating terms) if its content proves to be less than a BIT or RIA, as seems most likely given the considerably greater economic and political diversity of WTO membership and the recent reassertion by many developing countries of the need for greater policy space?[3]

On all the above grounds, and as the July 2004 decision of the WTO General Council recently confirmed, what was on offer in the investment area oddly failed to garner widespread support among WTO members. Such a conclusion can be reached when one looks at DDA proposals on investment through the prism of the four core components of investment rule-making: (1) protection; (2) liberalization; (3) distortions; and (4) good governance.

1. Investment protection

The WTO is arguably not the optimal setting in which to tackle matters of investment protection. WTO members appear to concur with this viewpoint to the extent that the issue of investment protection has never been a core agenda item in WGTI discussions. One major reason for this is that one of the distinguishing features of BITs or RIAs featuring comprehensive investment disciplines (recourse to investor-State dispute settlement procedures, to which investors naturally attach considerable importance) is for all intents and purposes not conceivable in a WTO setting. Indeed, the precedent —both legal and, perhaps more importantly, political— that such an instrument would create would likely fuel strong demands for private party recourse to dispute settlement in areas outside of investment, such as the environment, labour and human rights. This is something the diverse and polarized WTO membership appears most unlikely to support.

2. Investment liberalization

The WTO is on decidedly firmer ground as regards the core investment liberalization agenda. However, here again, one needs to consider two important facts to which proponents of a WTO agreement appear to have paid insufficient attention. First is the fact that some two-thirds of aggregate annual FDI flows are today directed towards service industries. Second, and perhaps more important from the perspective of the value added of any new WTO investment rule-making initiative, is that some four fifths of impediments to cross-border FDI are also found in service industries.

The predominance of services as the principal locus of investment restrictions, and thus of investment regime liberalization, stands out vividly, with the share of non-conforming measures in services ranging from 76.9 percent in the case of Canada and the United States, to 81.6 per cent in the study's Latin American sample countries (Argentina, Bolivarian Republic of Venezuela, Brazil, Colombia, Chile and Mexico), with a high of 94.1 percent in the case of transition economies such as the Czech Republic, Hungary and Poland.

3. Investment distortions

As regards collective action responses to investment-distorting measures, which tend to affect FDI in manufacturing more than in services, it is important to distinguish three sub-categories of policy measures. A first category consists of performance requirements, for which a comprehensive ban already exists under the "TRIMs Agreement" and whose scope arguably exceeds the limited subset of measures depicted in the agreement's illustrative list of prohibited measures. The main challenge in a multilateral context would be to incorporate the "TRIMs Agreement" by reference in any new WTO investment instrument and to consider its possible extension to investment in services, something a number of RIAs have done. As noted earlier, given the salience of the TRIMs Agreement in

[3] As noted above, the quest for policy space in the investment field is itself paradoxical as it has arisen mostly in the context of WTO negotiations and against the backdrop of the implementation debate burden flowing from the Uruguay Round. Meanwhile, developing countries would appear to have been willingly ceding policy space under BITs (a growing number of which are concluded among themselves) and RIAs.

the contentious WTO debate over the implementation burdens flowing from Uruguay Round agreements, such expanded scope cannot be taken for granted, even as recent research has begun to document the prevalence of TRIM-like measures in services (Sauvé, Molinuevo and Tuerk, 2006).

A second core element of the distortion agenda relates to investment incentives, which have been in use increasingly in recent years in all regions of the world and now in a growing number of developing countries. However desirable, not least on equity and coherence grounds, the coverage of investment incentives —the granting of which are often closely related to the imposition of performance requirements— would likely prove daunting in a WTO context if one is to judge by past failures and the revealed policy preference of host country governments for legal inaction in this area.

What is more, the question arises of the most appropriate level at which to tackle such sources of distortions (such as regional or multilateral agreements), given the likely greater regional incidence of locational competition between host countries. There has indeed been intense competition among developed and developing countries (but significantly less so between the two groups) in trying to attract FDI by using investment incentives. Central governments —and subnational ones in federal countries— make great use of these instruments, particularly in developed countries.

A third cluster of distortion-related challenges relates not so much to investment measures but to trade policy measures, and involves a range of practices that distort investment decisions away from the equilibrium that would prevail in their absence. Perhaps the best example of such investment-related trade measures is the discriminatory, sector-specific rules of origin found in many free trade agreements. Many such rules targeted Japanese investors in the past, notably in the automobile sector, with significant trade- and investment-distorting consequences. Such measures are also prevalent in the textiles and clothing sector, and indeed in many host-country sectors fearful of delocalization and structural competitive weaknesses in domestic industries.[4]

4. Good governance

Of all the issues linked to what one might call the "good governance" agenda in the investment field, those relating to transparency are arguably the only ones that could reasonably easily be anchored within a WTO investment agreement. Here again, however, one would need to reflect on the implications for effectiveness and development of recourse to dispute settlement and the attendant threat of trade or investment sanctions as a means of enforcing such positive prescriptions.

For all other issues relating to good governance —spanning subjects as diverse as the fight against corruption, the promotion of home country measures, the advancement of corporate social responsibility, and best practices in investment promotion— legally binding and enforceable legal responses, a fortiori in the WTO, appear ill-suited to the task and unlikely to command much support from the investment community.

VI

Conclusion: advancing forward-looking scenarios on investment

The quest for a global, multilateral, WTO-anchored, agreement will nonetheless likely be kept in mind and influence the actions of those countries that continue to believe in the desirability of such a rule-making approach. Without prejudging what the future might hold, this paper concludes with a few possible forward-looking scenarios. As it happens, several of the policy interrogations that will determine the final shape and content of a possible future WTO multilateral framework on investment (MFI) are questions that WTO members can also reflect upon and address in the context of their ongoing BIT and, especially, ria negotiations.

Should WTO members one day decide to take up negotiations towards a comprehensive agreement on

[4] Other significant IRTMs include tariff peaks and tariff escalation, as well the anticompetitive practices made possible under national anti-dumping regimes.

investment, they would need to determine the scope of that agreement and to address a number of core components. The substantive scope consists of the disciplines of the agreement, including the definition of key terms such as investments and investors (that is, in which investments and investors would benefit from the agreement). Countries would need to assess the impact of these definitions on the provisions of the agreement and an eventual liberalization process. Should the definition of investment include FDI, portfolio investment, real estate and intangible assets? Should it be broad enough to allow for the inclusion of new forms of investment, while providing for the definition of what is not an investment (in order to exclude short-term capital flows)? Should it extend to the pre- and post-establishment phase of an investment or could disciplines follow a variable geometry approach, with a broader definition applying to investment protection matters and a more circumscribed definition (for instance, limited to FDI flows only) adopted for purposes of investment liberalization?

Should an eventual investment agreement also apply to commitments made under the GATS in regard to commercial presence and under the "TRIMs Agreement" in respect of performance requirements? While the definition of commercial presence under article XXVIII of GATS is narrower than that typically found in BITs or in RIAs featuring comprehensive investment disciplines, it does cover pre- and post-establishment investment issues.

Basic provisions on national treatment and MFN are another key element of any prospective multilateral agreement on investment. WTO members would need to decide whether to apply the MFN and national treatment provisions across the board to all members and sectors (subject to negative list reservations), or to adopt the GATS approach, that is, to have an all-encompassing MFN provision with temporary exemptions and a conditional national treatment and market access standard, which would apply only to sectors and sub-sectors in which members would voluntarily schedule commitments. The choice of negative or hybrid list approaches to liberalization can have far-reaching implications for future regulatory conduct and the attractiveness of investment rules for many developing-country governments.

WTO members would thus need to assess whether a WTO Agreement on Investment would include commitments to investment liberalization in both goods and services, raising complex questions of an architectural overhaul and the treatment of acquired rights (and the attendant balance of benefits) flowing from current agreements.

Another relevant question (including at the bilateral and regional level) is whether the liberalization commitments made by WTO members should reflect the regulatory status quo. Securing such an outcome would entail a potentially significant departure from a long-standing tradition in goods trade under the GATT (for tariff negotiations) that was extended to services under the GATS in the Uruguay Round, whereby countries have traditionally maintained (and exercised) the right to bind less than the status quo.

Any comprehensive investment agreement would also need to address the issue of performance requirements, resulting most likely in the incorporation by reference of disciplines found under the "TRIMs Agreement". The question of whether such disciplines should be extended to services would need to be addressed, and would no doubt prove contentious given the recent focus on preserving policy space and the fact that service industries are still nascent in many developing countries.

However desirable, not least on equity and coherence grounds, disciplines on the granting of investment incentives would likely prove more contentious in a WTO setting if one is to judge by past failures and revealed policy preferences in this area. As noted earlier, provisions on investment incentives could nonetheless address issues related to their scope, codification, and the prohibition of (or encouragement to refrain from) some types of incentives. The principles of transparency and non-discrimination (national treatment and MFN treatment) should ideally apply to such practices, though progress is likely to prove difficult for obvious political reasons in important host countries.

An alternative scenario would be to expand the current WTO investment framework without negotiating a comprehensive agreement on investment. Several options are possible in this regard. Given that the bulk of investment restrictions arise in service sectors, WTO members could focus on investment liberalization in the GATS and ensure that commitments reflect more closely the investment regime in place in each member country (that is, encourage or mandate the scheduling of status quo commitments for mode 3 trade).[5] The latter issue

[5] The WTO defines a number of modalities for the provision of services in international trade. These include *Mode 1*, cross-border trade, where the service provider crosses the border in order to

is one that WTO members could require or encourage their BIT or RIA partners to uphold in agreements where a GATS-like, hybrid, approach to scheduling is adopted. Recent examples include RIAs signed by Japan with a number of countries in south-east Asia.[6]

WTO members could also elect to develop complementary disciplines on investment in goods, to address the market access component of an investment agreement that is currently missing under existing WTO disciplines. This was essentially what proponents of investment in the Doha Round had been arguing for, with decidedly poor results. Such an approach would need to be complemented by efforts at extending to services the disciplines found under the "TRIMs Agreement", another arduous task given the prominence of the post-Uruguay Round "TRIMs Agreement" implementation debate in WTO. As well, more explicit multilateral disciplines on investment incentives promoting transparency (and possibly non-discrimination, including on a voluntary, but MFN, basis) could be added to the Agreement on Subsidies and Countervailing Measures and once more possibly extended, in whole or in part, to investment in services.

Another scenario would be for WTO members to negotiate a multilateral agreement on investment, which would be comprehensive in nature, covering both investment protection and liberalization, and whose benefits would either extend solely to signatories or be concluded and applied on an MFN basis once an acceptable critical mass of cross-border investment activity had been met (as is the case of the WTO Information Technology Agreement). The European Commission floated the idea of a plurilateral approach for a short while in December 2000, but there were generally few takers, as the establishment of new plurilateral disciplines under the WTO requires the explicit consensus of all member countries, a situation that never prevailed on the Singapore Issues in general and on investment matters in particular.

A final forward-looking scenario, which WTO members can also seek to pursue at the bilateral and regional levels, would involve a negotiating quid pro quo to be envisaged as linking the movement of capital (investment) to that of labour (people).

Such a factor-movement-based negotiating bargain would respond to a thematic area —the temporary mobility of skilled and semi-skilled workers— that is high on the list of export priorities of a large (and growing) number of developing countries. Worker remittances are, after FDI, the second largest source of external finance in developing countries, and such flows dwarf FDI in many of them, particularly poorer ones that tend to attract little by way of FDI inflows. Furthermore, a capital-labour quid pro quo would also address the paucity of qualified workers that is becoming acute in a number of ageing societies. This challenge is particularly important in the case of developed countries, given prevailing demographic trends.

There is little doubt that the politics of labour movement are harder to contend with than those relating to capital mobility, a reality that is equally prevalent in developing countries. Still, despite these challenges and the genuine public policy concerns they give rise to, scope exists for countries to explore in an imaginative way the factor mobility linkages that could be exploited in RIAs (today) and the WTO (tomorrow).

For this to occur, WTO members could mould their RIAs on the tripartite architecture first used in NAFTA and found in a number of subsequent RIAs (particularly prominent in Latin America) that feature a complementary set of disciplines on: (i) cross-border trade in services (modes 1 and 2 of GATS); (ii) generic (horizontal) disciplines on investment applicable to goods and services in an undifferentiated manner; and (iii) generic disciplines on the temporary entry of business people.

Pursuing a capital-labour mobility agenda is arguably easier to contemplate at the bilateral and regional level than in a WTO setting, as negotiators in Geneva would inevitably need to contend with fitting any new investment disciplines into existing agreements, reopen the delicate balance of concessions embedded in them and possibly review the architecture of the WTO family of agreements. This is most clearly the case of the GATS, whose scope would need to be reduced to dealing exclusively with cross-border trade in services (modes 1 and 2) in order for new horizontal agreements to be pursued in the areas of investment (in goods and services) and the movement of people (across all sectors).

provide it. In *Mode 2* it is the service consumer who crosses the border. *Mode 3* involves a permanent commercial presence of the service supplier by means of an investment, and *Mode 4* involves transitory migration by natural persons working in a service enterprise in one country in order to provide the service in another.

[6] Recent Japanese FTAs feature a dual innovation: (i) an obligation to bind the regulatory status quo in investment commitments while keeping with a GATS-type voluntary approach to scheduling sectors in which commitments are made; and (ii) the publication for transparency purposes of non-binding lists of non-conforming measures affecting trade and investment in services.

As this paper has tried to show, the reasons for the current impasse on investment at the WTO are numerous. They involve a complex interplay of procedural, tactical and substantive concerns and involve a paradoxical quest for policy space in multilateral discussions at the same time that such space continues to be ceded in the context of unilateral, bilateral or regional policy initiatives.

That impasse provides a good opportunity for a thorough and much-needed rethinking of the objectives that negotiations on investment should pursue, including, at the regional and bilateral levels, the value added that any renewed attempt at placing investment on the WTO agenda can hope to achieve, and the parameters within which such discussions should be conducted if they are to balance the interests of home and host countries alike.

(Original: English)

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KEYWORDS

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Poverty and employment in Latin America: 1990-2005

Simone Cecchini and Andras Uthoff

What factors led to the reduction of poverty in Latin America from 1990 onwards? This article looks into the key factors that have played a part in reducing poverty in the region, including, in particular, employment and remuneration for work. With data from household surveys, the authors discuss the ways in which changes in the working age population, in its participation in economic activity, in employment rates and in income from work and other sources affect the per capita incomes of families in the lowest deciles of income distribution and hence in poverty indicators.

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I
Introduction

The best – and most dignified – way for Latin American families to get out and stay out of poverty is for their active members to participate in the labour market and get well-paid jobs. Hence, if poverty is to be reduced, economic growth must be reflected in higher family incomes generated through productive jobs at adequate wages.

The significance of the role played by labour-related factors in poverty reduction was recognized by the United Nations in the new target for the Millennium Development Goals, namely, "Achieve full and productive employment and decent work for all, including women and young people" (Target 1.B). This new target, which was proposed by the Secretary-General of the United Nations in 2006 and was adopted in 2008, was added to the first Millennium Development Goal ("to eradicate extreme poverty and hunger") to emphasize the close relationship that exists between the labour market and the improvement of the material aspects of human wellbeing.

The magnitude of the problem of poverty in Latin America is evidenced in the most recent estimates developed by ECLAC, which show that in 2006, 37% of the region's population (194 million people) was living in poverty, and 13% of the population (71 million people) was living in extreme poverty. Although the number of Latin Americans living with limited resources is still too high, this poverty rate is significantly lower than it was in 1990, when 48% of the population was poor. The situation with regard to indigence is similar, as the current rate is more than nine percentage points below the 22.5% of 15 years ago (ECLAC, 2007d). Nevertheless, the regional results mask the fact that there are huge differences between countries, some of which have not managed to reduce poverty at all over the last 15 years.

The purpose of this article is to find out what factors have contributed to reducing poverty in Latin America from 1990 onwards.[1] In order to accomplish this, a methodology is proposed which entails breaking down the changes in per capita income of the most vulnerable households in order to determine how labour-related variables –as well as demographic variables and family structure and behaviour– have contributed towards reducing the incidence of poverty in the countries of the region by raising per capita family income above the poverty line. Given the growing importance of targeted State transfers to lower-income families, the analysis also includes a variable –non-labour income– to account for State transfer programmes targeting families, as well as other sources of income such as remittances, pensions or retirement funds.

The study described in this article covers the period 1990-2005, i.e., the first 15 of the 25 years that countries of the region have to meet the first target of the Millennium Development Goals– to halve, between 1990 and 2015, the proportion of people living in extreme poverty. Although the authors realize that poverty is a complex and multidimensional phenomenon that includes deprivation in many aspects of individual and collective wellbeing (ECLAC, 2003; Sen, 1985), this study uses indicators of monetary income, as was done in the follow-up to the first Millennium target. In particular, it follows ECLAC methodology and refers to poverty in terms of people's inability to meet their most basic needs.[2]

Considering that much of the discussion on social wellbeing in the region has centred on the concept of "total poverty"[3] and that ECLAC (2005a) has suggested

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[1] This article reflects a renewed interest in assessing the impact of labour-related and demographic variables on poverty reduction. Recent studies on factors determining changes in poverty as measured by income include the following: Kakwani, Neri and Son (2006) in the case of Brazil, and Núñez, Ramírez and Cuesta (2006), on Colombia.

[2] Under the approach followed by ECLAC in estimating poverty, a person is classified as "poor" when the per capita income of that person's household is lower than the value of the "poverty line", i.e., minimum amount needed to satisfy his or her basic needs. Poverty lines, expressed in the currency of the country concerned, are determined by the value of a basket of goods and services according to the cost-of-basic-needs method. For further information, see ECLAC (2007d), box I.1.

[3] "Total poverty" simply refers to the sum of the percentage (or number) of indigent and non-indigent poor persons.

a more ambitious target for Latin America –halving the proportion of the population living in total poverty rather than just the population suffering the greatest deprivation– the focus of this study will be on all the poor and not just the extremely poor. Accordingly, it is recognized that people whose per capita income is above but very close to the indigence line are in a highly vulnerable situation, since they can easily fall into extreme poverty in the event of an economic crisis or of circumstances that would temporarily or permanently reduce the family's resources (sickness, disability of a breadwinner, birth of a child, death and others).

In section II, on factors that contribute to poverty reduction, a simple disaggregation methodology is proposed using microdata from household surveys conducted in 16 countries of the region. In section III, the data are analyzed to determine how changes in the per capita income of persons in different deciles of income distribution –and consequently, of poverty indicators– can be explained by changes in the number of employed persons in the population, in labour income per employed person and in non-labour income of the total population. Finally, in section IV, the findings of the study are summarized and some policy implications are discussed.

II

Factors associated with poverty reduction

1. The labour market

In Latin America, employment is the main source of household income, given that pay for work represents, on average, more than 80% of household income (ECLAC, 2007c). However, underemployment and unemployment, high dependency rates that limit the participation of working age women, low levels of human capital and the low productivity of many occupations account for the high poverty rates. In particular, ECLAC (2007c) argues that in the region, the deterioration of the quality of jobs has weakened the relationship between the growth of gross domestic product (GDP) and the reduction of poverty. Hence, job creation and improved labour productivity –especially among the poor– are the fundamental mechanisms whereby economic growth is reflected in poverty reduction and which make it possible to translate growth into better incomes for the poor (Islam, 2004; Osmani, 2002).

The sustained economic growth of recent years has had a favourable impact on results in Latin American labour markets. Since 2003, the regional unemployment rate has shown a downward trend, reaching 8% in 2007 –0.6 percentage points lower than it was in 2006– despite a significant increase in the number of employed persons and the rapid incorporation of women into the labour market. Real wages in the formal sector have also risen (ECLAC, 2007b; ILO, 2007).

The positive results of the period 2003-2007 should not mask the persistence of structural problems that have a bearing on poverty. The regional unemployment rate is still two percentage points higher than it was in 1990, partly as a result of increased participation in economic activity. Unemployment –especially among the poor– is still very high, totalling about 17 million persons in the urban areas of Latin America (ECLAC, 2007b). The informal sector[4] is still very large, as approximately 48.5% of all urban employed persons were engaged in informal work in 2005 (ILO, 2006), and coverage of health care and pension benefits for workers is very low in the region. In addition, participation rates are still very low and unemployment rates very high for women compared with men, and inequality is sharp in terms of labour income. In every country of the region, women's wages are lower than men's, even when women have the same level of schooling and experience as men (ECLAC, 2007a). The unemployment rate among young people is more than twice as high as that of adults: 16% compared with 7% at the beginning of the current decade (Weller, 2006).

[4] The International Labour Organization (ILO) defines the informal sector as the sum of non-professional own-account workers, domestic servants, unpaid family workers and employees in firms with fewer than five employees (ILO, 2006).

2. Intergenerational reproduction of poverty

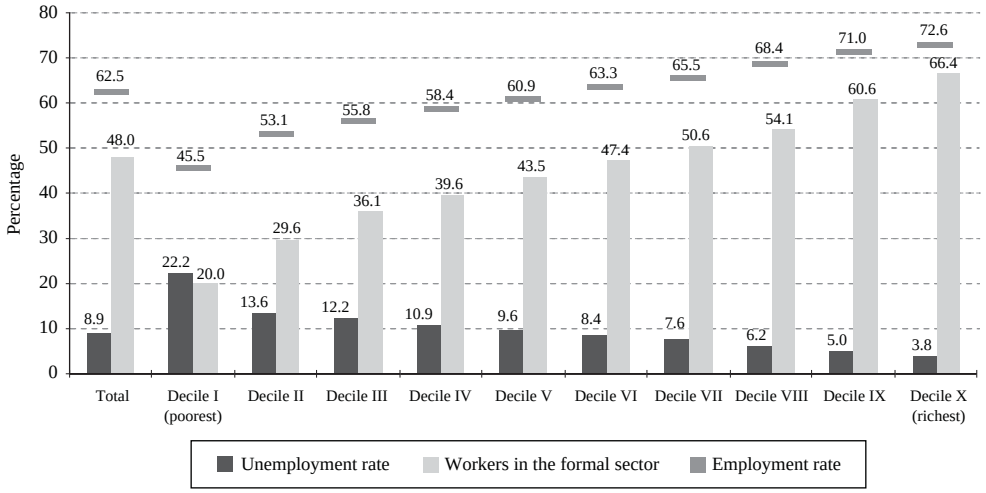
Two main factors cause poverty to be reproduced and perpetuated. One is the low income of workers in poor families, which is explained by their limited human capital and low productivity. The other is the high rate of demographic dependency among poor families, which means that their income must be distributed among more individuals. Thus, not only do the poor receive a lower labour income, but they also have to stretch that income to ensure the survival of a larger number of dependents. In both situations, especially in the second, the families' behaviour and decisions play a fundamental role.

The human capital of the active members of poor households is inadequate because of their limited educational options and the family's decision as to whether or not to keep their children in school. This explains, at least partially, why their opportunities for employment are limited and creates a vicious circle whereby poverty is reproduced: on the one hand, members of poor families have little education and do not get steady jobs; and on the other, children and young people from such households have few opportunities to get a proper education and receive quality training (ECLAC, 2007d). Lacking the necessary social capital, they take low-productivity jobs when they enter the labour market. Unemployment is thus higher among the poor, and those who do get jobs are less likely to become wage-earners in formal jobs (figure 1).

A family's ability to generate a better income is enhanced when its decisions on size and composition –as well as on its members' participation in the labour market– increase the percentage of working age members with respect to those who are dependent. To some degree, the results of these decisions are inertial, as they are related to a particular stage in the family life cycle, as well as fertility-related demographic changes. There is also a more circumstantial effect that is the result of decisions regarding location and family composition and breakups, and new types of family living arrangements. Changes in family structure and family breakups can change the dependency ratio, as active members leave the household or younger couples care for inactive members or new family unions are formed to share expenses.

FIGURE 1

Latin America (18 countries, simple average): unemployment rate, employment rate and percentages of workers in the formal sector of the economy (with respect to total employed persons), by income deciles, national total, around 2005 [a, b]



Source: Prepared by the authors on the basis of household surveys in the countries concerned.

[a] Data on Argentina, Bolivia, Ecuador, Paraguay and Uruguay only refer to the urban population, not total population.

[b] The employment rate refers to the number of employed persons divided by the working age population (E/WAP, gross employment rate).

Poor families have more members than non-poor families and most of those members are children, leading to high dependency rates. Although the dependency ratio is falling in every country of the region, giving rise to the so-call "demographic bonus",[5] it is still very high in the most vulnerable socioeconomic strata owing to their high fertility levels (ECLAC, 2005b). At present, the largest families may be found mainly in the 20% of poorest households, while smaller households are concentrated in the highest income quintile. In Latin America, urban families in the poorest quintile have on average between 4.2 and 6.2 members (Dominican Republic and Guatemala), while the average size of families in the wealthiest quintile is between 2.1 and 4 members (Uruguay and Nicaragua) (Sunkel, 2006).

It should be borne in mind that the size and the structure of Latin American families are determined by many factors, including the stage in a country's demographic transition, its economic development level and the crisis of the patriarchal family model. In countries where the demographic transition is well advanced, for example, the proportion of nuclear families made up of childless older couples is higher, as is the number of one-person households made up of older persons and economically independent young people. In countries undergoing a moderate or full demographic transition, there are more families with small children. At the same time, in countries with a lower level of development, there is a higher proportion of single-parent families and of extended and composite families[6] (Arriagada, 2004; ECLAC 2007a).

It is also important to consider the effect of cultural factors relating to the division of labour within the household, which sharply limits the participation of women in economic activity. Around 2005, 37% of Latin American women in the poorest decile and 61% in the wealthiest decile participated in economic activity. In the case of men, however, the difference was minimal: among the poorest, the participation rate was 76%, and among the wealthiest, it was 80% (figure 2). To this must be added the limited coverage of the care economy, which has prevented women from reconciling the care of children and the elderly and the performance of household duties with paid work.

[5] See section IV.1 below.

[6] Extended families are made up of the father or mother or both, with or without children and other relatives; composite families are made up of the father or mother or both, with or without children, with or without other relatives or other non-related persons – not including domestic servants living with the family or their relatives.

In brief, low productivity, low participation rates, frequent episodes of unemployment and high demographic dependency rates all work together to multiply the links that make up the chain of scarcity within any given household living below the poverty line.

3. Breaking down per capita income

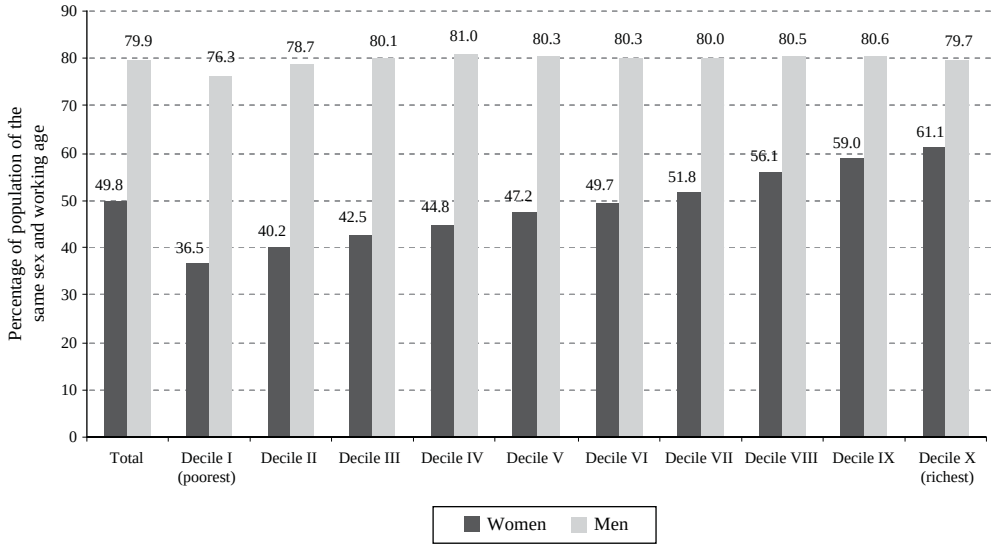
Trends in poverty indicators may be analyzed by identifying the relative importance of changes in labour markets, in demographic structure and in family structure and behaviour. The incidence of poverty may vary as a result of changes brought about by improvements in labour income per employed person –a proxy variable for labour productivity– and non-labour income, and of changes in the number of employed persons with respect to total population (or "global employment rate") –that result from the interaction between changes in family structure and decisions and the behaviour of household members in the labour market. All other things being equal, any increase in labour income per employed person, particularly in the lower deciles of income distribution, will help reduce monetary poverty. By the same token, any increase in the number of employed persons as a percentage of total population or in non-labour incomes will help reduce the percentage of persons living below the poverty line.

The per capita income of a population *(Y/N)* –an indicator used to classify families in terms of monetary poverty– measures the ability to generate income in the labour market as well as from other sources, such as State transfers, remittances or profits from ownership of financial capital. This indicator is analyzed by breaking down three main factors:

- Global employment rate (or number of employed persons *E* divided by total population *N*): this measurement covers the age composition of a given population and the rate of participation in the labour market, as well as the capacity of the economy to absorb the labour force. It was adopted in 2008 as a new official indicator for following up on the Millennium Development Goals, and is also known as the employment-population ratio.
- Labour income per employed person *(YL/E)*: a measurement that is a proxy of labour productivity.
- Per capita non-labour income *(YNL/N)*: this measurement refers to a variety of income sources, including State transfers and private transfers to

FIGURE 2

Latin America (18 countries, simple average): rate of participation in economic activity by income deciles, women and men, national total, around 2005[a]



Source: Prepared by the authors on the basis of household surveys in the countries concerned.

[a] The data on Argentina, Bolivia, Ecuador, Paraguay and Uruguay refer only to the urban population, not to the national total.

households, property rent and income available in the form of imputed rent.

$$\frac{Y}{N}=\left(\frac{E}{N}\times\frac{YL}{E}\right)+\frac{YNL}{N} \qquad (1)$$

The global employment rate may in turn be broken down into the following elements:

- Demographic dependency rate: ratio of the working age population *WAP* to total population *N*.
- Participation rate: economically active population *EAP* divided by working age population *WAP* and
- Net employment rate: number of employed persons *E* divided by the economically active population *EAP*; this is the complement to the unemployment rate (*E/EAP* = 1 - unemployment rate).

$$\frac{Y}{N}=\left[\left(\frac{WAP}{N}\times\frac{EAP}{WAP}\times\frac{E}{EAP}\right)\times\left(\frac{YL}{E}\right)\right]+\frac{YNL}{N} \qquad (2)$$

To analyze trends in per capita income over time –between 1990 and 2005– the values of its three main components –global employment rate, labour income per employed person and per capita non-labour income– are calculated according to the following formula:

$$\frac{Y}{N}(2005)-\frac{Y}{N}(1990)=\left[\frac{YL}{E}(2005)\times\left(\frac{E}{N}(2005)-\frac{E}{N}(1990)\right)\right]+ \qquad (3)$$
$$\left[\frac{E}{N}(1990)\times\left(\frac{YL}{E}(2005)-\frac{YL}{E}(1990)\right)\right]+\left(\frac{YNL}{N}\right)(2005)-\left(\frac{YNL}{N}\right)(1990)$$

Increases in the number of employed persons, in labour income per employed person and in income from other sources can help reduce monetary poverty among families that started out poor.

4. Effects of the economic cycle

Throughout the economic cycle, labour income per employed person is determined largely by labour productivity and therefore tends to be procyclical, i.e., to increase during periods of economic growth and decrease during recessions. The degree to which income is procyclical depends on the relative importance of adjustment mechanisms in a given labour market and whether they rely more on quantity (employment/unemployment) or on price (wages). Other factors could also affect labour income, such as the level of protection afforded to and the bargaining power of the labour force (levels of unionization, existence of collective bargaining and other aspects).

Non-labour income, which includes transfers such as remittances, income in kind and income from rent, is not necessarily procyclical, and public transfers to poor families should in fact be countercyclical (in other words, they should increase in times of crisis).

The net employment rate has a strong procyclical component, since the number of employed persons is expected to rise in conjunction with GDP and to fall during periods of recession.[7] During periods of economic growth, however, the economically active population (the denominator of the indicator) may also increase, since more working age persons will probably want to enter the labour market. This may neutralize the procyclical effect.

The participation rate indicates the behaviour of the working age population in terms of deciding to participate in economic activity. Thus, it measures the supply of labour, establishing the relationship between the number of people who work or who wish to work (active population) and those who are in a position to do so (Navarrete, 2005).[8] People are affected by needs, incentives and limitations that hinder them from participating in the labour market. When they have no skills, are disabled or need to perform duties that prevent them from working outside the household, these or other limitations can easily discourage them from looking for work. In other cases, the incentives offered may be enough to encourage some people to consider the possibility of entering the labour market, since they will feel that their time is more highly valued in the labour market than elsewhere. Other people enter the labour market because their basic needs are such that they are forced to engage in any kind of economic activity that will enable them to earn a living. All these factors could cause the participation rate to rise, as long as broad sectors of society (especially women) who had previously been doing unpaid domestic work are able to start working for pay. However, since different groups of people have different needs, incentives and limitations throughout the economic cycle, the linkage between total participation and the economic cycle is not always clear.[9]

The relationship between the working age population and total population is a structural component that is determined by demographic trends and by changes in family structure. It should be noted that the working age population represents only a potential source of subsistence income for the family because this segment includes inactive persons and, among those who are active, some are employed and some are unemployed. Moreover, some of those who are employed are fully employed and others are underemployed (Uthoff, Vera and Ruedi, 2006).

[7] Likewise, when GDP is falling, the proportion of jobs in the informal sector will probably rise along with the unemployment rate (ILO, 2006).

[8] "Inactive" persons are those who do not participate in economic activity; they are usually persons who perform unpaid domestic work and students, although the category of inactive persons also includes retired persons, persons with independent means and persons with disabilities.

[9] Kakwani, Neri and Son (2006) found that during the period 1995-2004, participation rates among the poor in Brazil were more procyclical than the corresponding rates for the total population.

III

Effect on poverty reduction of changes in global employment rates and in labour and non-labour income

The factors involved in poverty reduction may be studied by breaking down data on per capita income of households living below the poverty line; this disaggregation takes into account the proportion of employed persons, labour income per employed person and income from non-labour sources.[10] The effect of improvements in human capital and productivity will be evident in the component of labour income per employed person, while the influence of demographic and family changes will be reflected in the component identifying employed persons as a percentage of total population. Family decisions on the participation of members in the labour market are determined by the pull of new jobs created on the labour market and the restrictions inherent to the care economy in the different countries.

Table 1 shows, for each decile of income distribution, the values of per capita family income (expressed in multiples of the poverty line) and estimated variations in those values resulting from changes in labour income per employed person, global employment rates and per capita non-labour income (see formula 3 above).

On the basis of table 1, table 2 groups the Latin American countries according to the variations that occurred, during the period studied, in the three components of per capita income among the deciles that were living below the poverty line around 1990 and the variation in total incidence of poverty in each country during that period.

1. Relative importance of factors of change in poor households

Three considerations come to mind when one looks at trends among the deciles whose average income is at or below the poverty line. Firstly, countries have undertaken their commitment to the Millennium Development Goals at a time when poor families have a higher proportion of active members except, most notably, in the urban areas of Uruguay and, to a lesser degree, the Metropolitan Area of Asunción, Paraguay. The global employment rate has improved mainly as a result of the decline in the demographic dependency rate and the increase in female participation in the labour market, and in a few cases, as a result of a drop in the unemployment rate. Secondly, throughout this period, labour income per employed person has not risen enough to benefit the poorest families, except in Chile, Brazil and Ecuador (urban areas). Thirdly, non-labour income among the poor has risen in general terms, for reasons that go beyond the scope of this study. Without a more detailed breakdown of the sources of income that are included in this third component, it is impossible to draw any conclusions regarding the relative importance of State transfers to families, remittances and other sources (such as pensions and other retirement income).[11]

Only five of the 16 countries studied have achieved substantial reductions in poverty since the early 1990s: the three that achieved improvements in labour income per employed person (Chile, Brazil, urban areas of Ecuador), and Mexico and Panama, where the proportion of employed persons rose significantly. In both Mexico and Panama, the female participation rate rose considerably, and in Panama, it was also

[10] In studying poverty trends, it is important to observe what happens –in terms of trends in labour income per employed person, as well as in total employment rates and non-labour per capita income– among households living below the poverty line. Increases in average incomes may mask situations that are not favourable to the poor, such as improvements among the wealthiest deciles and deterioration among the poorest deciles.

[11] In recent years, State transfers to low-income families have usually been conditional on changes in behaviour in order to help families improve productivity by increasing their investment in human capital, improving their use of time or increasing their access to productive assets (ECLAC, 2006). For a discussion of the impact of remittances on poverty and inequality, see ECLAC (2005b).

TABLE 1

Latin America (16 countries): per capita family income and breakdown of variation by changes in labour income per employed person, global employment rate and per capita non-labour income[a] (in multiples of the poverty line), by income-distribution deciles, 1989/1995 to 2001/2005

Country	Per capita income (Y/N)	Total	Decile I	Decile II	Decile III	Decile IV	Decile V	Decile VI	Decile VII	Decile VIII	Decile IX	Decile X
GROUP 1. ***Sharp reduction of poverty*** *(variation in the poverty headcount index under -1.5% per year)*[b]												
Chile	Y/N 1990	2.41	**0.3**	**0.5**	**0.7**	**0.9**	1.1	1.4	1.8	2.4	3.7	11.1
	Y/N 2003	3.71	**0.5**	**0.9**	1.2	1.5	1.8	2.2	2.8	3.7	5.5	17.2
	Δ Y/N (Δ YL/O)	0.85	0.06	0.15	0.21	0.23	0.40	0.48	0.64	0.83	1.23	4.21
	Δ Y/N (Δ O/N)	0.31	0.02	0.05	0.10	0.14	0.11	0.17	0.21	0.35	0.48	1.51
	Δ Y/N (Δ YNL/N)	0.14	0.10	0.11	0.12	0.15	0.14	0.14	0.14	0.09	0.10	0.37
Ecuador[c]	Y/N 1990	1.19	**0.2**	**0.4**	**0.5**	**0.6**	**0.7**	**0.9**	1.1	1.4	1.9	4.3
	Y/N 2005	1.83	**0.2**	**0.5**	**0.6**	**0.8**	1.0	1.3	1.6	2.1	2.9	7.4
	Δ Y/N (Δ YL/O)	0.27	-0.01	-0.02	0.01	0.04	0.06	0.12	0.16	0.30	0.48	1.86
	Δ Y/N (Δ O/N)	0.24	0.04	0.08	0.11	0.11	0.15	0.18	0.24	0.20	0.36	0.63
	Δ Y/N (Δ YNL/N)	0.13	0.03	0.02	0.04	0.05	0.04	0.08	0.11	0.19	0.22	0.64
Brazil	Y/N 1990	2.40	**0.2**	**0.3**	**0.5**	**0.7**	**0.9**	1.2	1.7	2.4	4.0	12.1
	Y/N 2005	2.95	**0.2**	**0.5**	**0.7**	1.0	1.3	1.6	2.1	2.8	4.4	15.0
	Δ Y/N (Δ YL/O)	-0.23	-0.01	0.04	0.05	0.04	0.04	-0.03	-0.11	-0.25	-0.45	-1.22
	Δ Y/N (Δ O/N)	0.22	0.04	0.04	0.07	0.09	0.09	0.17	0.09	0.35	0.36	0.53
	Δ Y/N (Δ YNL/N)	0.56	0.02	0.07	0.09	0.13	0.23	0.27	0.47	0.33	0.52	3.51
Panama	Y/N 1991	2.17	**0.2**	**0.4**	**0.6**	**0.8**	1.0	1.3	1.8	2.4	3.6	9.5
	Y/N 2005	2.68	**0.2**	**0.5**	**0.8**	1.0	1.4	1.8	2.3	3.2	4.7	11.0
	Δ Y/N (Δ YL/O)	0.02	-0.06	-0.05	0.01	0.02	0.08	0.10	0.08	0.04	0.01	0.24
	Δ Y/N (Δ O/N)	0.34	0.04	0.05	0.08	0.15	0.13	0.20	0.28	0.39	0.72	1.01
	Δ Y/N (Δ YNL/N)	0.16	0.02	0.06	0.07	0.08	0.13	0.13	0.22	0.30	0.32	0.25
Mexico	Y/N 1989	1.87	**0.3**	**0.5**	**0.6**	**0.8**	**0.9**	1.2	1.5	1.9	2.7	8.5
	Y/N 2005	2.27	**0.3**	**0.5**	**0.7**	1.0	1.2	1.5	1.9	2.4	3.4	9.8
	Δ Y/N (Δ YL/O)	0.03	-0.04	-0.04	-0.01	-0.03	0.01	-0.01	0.07	0.05	0.06	0.30
	Δ Y/N (Δ O/N)	0.36	0.04	0.08	0.10	0.16	0.19	0.30	0.24	0.44	0.58	1.39
	Δ Y/N (Δ YNL/N)	0.01	0.04	0.05	0.04	0.06	0.05	0.04	0.10	0.03	0.07	-0.31
GROUP 2. ***Slight poverty reduction*** *(variation in the poverty headcount index between -1.5% and - 0.5% per year)*[b]												
El Salvador	Y/N 1995	1.42	**0.1**	**0.3**	**0.5**	**0.7**	**0.8**	1.0	1.3	1.6	2.3	5.6
	Y/N 2004	1.55	**0.2**	**0.4**	**0.6**	**0.7**	**0.9**	1.1	1.4	1.9	2.6	5.7
	Δ Y/N (Δ YL/O)	0.00	-0.12	-0.03	0.01	0.02	0.03	0.04	0.09	0.11	0.09	-0.04
	Δ Y/N (Δ O/N)	0.06	0.01	0.04	0.02	0.05	0.06	0.01	0.03	0.09	0.05	0.00
	Δ Y/N (Δ YNL/N)	0.07	0.05	0.03	0.05	0.01	0.00	0.07	0.06	0.06	0.20	0.12
Costa Rica	Y/N 1990	2.17	**0.3**	**0.7**	**0.9**	1.2	1.5	1.8	2.2	2.8	3.6	7.0
	Y/N 2005	2.78	**0.4**	**0.8**	1.1	1.4	1.7	2.1	2.6	3.4	4.7	9.8
	Δ Y/N (Δ YL/O)	0.16	0.02	-0.02	-0.02	-0.02	0.00	-0.02	-0.02	0.09	0.45	1.21
	Δ Y/N (Δ O/N)	0.33	0.02	0.08	0.13	0.17	0.22	0.27	0.39	0.47	0.46	0.96
	Δ Y/N (Δ YNL/N)	0.13	0.07	0.05	0.04	0.07	0.03	0.05	0.04	0.05	0.21	0.62
Colombia	Y/N 1991	1.52	**0.2**	**0.4**	**0.5**	**0.6**	**0.8**	1.0	1.2	1.6	2.3	6.6
	Y/N 2005	2.08	**0.2**	**0.4**	**0.6**	**0.8**	**0.9**	1.2	1.5	2.0	3.1	10.2
	Δ Y/N (Δ YL/O)	0.10	0.01	-0.01	-0.01	0.01	0.03	0.06	0.06	0.12	0.26	0.55
	Δ Y/N (Δ O/N)	0.06	-0.02	0.01	0.03	0.04	0.06	0.06	0.12	0.12	0.13	-0.12
	Δ Y/N (Δ YNL/N)	0.41	0.03	0.04	0.05	0.05	0.05	0.07	0.10	0.16	0.37	3.18
Guatemala[d]	Y/N 1989	1.18	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.7**	**0.9**	1.2	1.8	5.7
	Y/N 2002	1.47	**0.2**	**0.3**	**0.5**	**0.6**	**0.7**	**0.9**	1.2	1.6	2.4	6.3
	Δ Y/N (Δ YL/O)	0.00	0.03	0.02	-0.02	-0.03	-0.04	-0.08	0.12	0.06	0.14	0.51
	Δ Y/N (Δ O/N)	0.24	0.03	0.05	0.12	0.13	0.13	0.15	0.16	0.30	0.32	0.24
	Δ Y/N (Δ YNL/N)	0.05	0.03	0.04	0.04	0.03	0.06	0.16	0.06	0.08	0.15	-0.08

TABLE 1 (concluded)

Country	Per capita income (Y/N)	Total	Decile I	Decile II	Decile III	Decile IV	Decile V	Decile VI	Decile VII	Decile VIII	Decile IX	Decile X
Nicaragua	Y/N 1993	0.99	**0.0**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.8**	1.1	1.6	4.5
	Y/N 2001	1.16	**0.1**	**0.2**	**0.3**	**0.4**	**0.6**	**0.7**	**0.9**	1.2	1.8	5.5
	Δ Y/N (Δ YL/O)	-0.06	0.00	0.00	0.00	-0.01	-0.03	-0.11	-0.07	-0.15	-0.18	0.59
	Δ Y/N (Δ O/N)	0.24	0.03	0.05	0.06	0.10	0.11	0.20	0.18	0.25	0.32	0.47
	Δ Y/N (Δ YNL/N)	-0.01	0.00	0.00	0.00	0.00	0.01	0.00	-0.02	0.00	0.02	-0.10
Honduras	Y/N 1990	0.87	**0.1**	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.9**	1.4	4.4
	Y/N 2003	0.95	**0.1**	**0.2**	**0.2**	**0.3**	**0.4**	**0.6**	**0.8**	1.1	1.6	4.4
	Δ Y/N (Δ YL/O)	-0.13	0.00	-0.02	-0.02	-0.02	-0.05	-0.03	-0.05	-0.10	-0.11	-0.68
	Δ Y/N (Δ O/N)	0.09	0.00	0.02	0.03	0.06	0.06	0.06	0.06	0.10	0.14	0.07
	Δ Y/N (Δ YNL/N)	0.13	0.02	0.02	0.03	0.02	0.06	0.06	0.13	0.19	0.18	0.52
GROUP 3. ***No progress*** *(variation in the poverty headcount index between -0.5% and 0.5% per year)*[b]												
Venezuela	Y/N 1990	1.80	**0.3**	**0.5**	**0.7**	**0.9**	1.1	1.4	1.7	2.2	3.0	6.5
(Bol. Rep. of)	Y/N 2005	1.97	**0.2**	**0.5**	**0.7**	1.0	1.2	1.5	1.9	2.4	3.2	7.2
	Δ Y/N (Δ YL/O)	-0.13	-0.06	-0.07	-0.08	-0.11	-0.11	-0.10	-0.07	-0.08	-0.07	0.11
	Δ Y/N (Δ O/N)	0.34	0.06	0.12	0.19	0.22	0.28	0.30	0.28	0.31	0.32	0.60
	Δ Y/N (Δ YNL/N)	-0.03	-0.09	-0.06	-0.07	-0.06	-0.06	-0.06	-0.04	-0.03	0.02	0.04
Bolivia[e]	Y/N 1989	1.67	**0.1**	**0.4**	**0.5**	**0.7**	**0.9**	1.1	1.4	1.9	2.8	7.0
	Y/N 2004	1.71	**0.3**	**0.5**	**0.6**	**0.7**	**0.9**	1.1	1.3	1.8	2.7	7.3
	Δ Y/N (Δ YL/O)	-0.38	0.01	-0.07	-0.10	-0.10	-0.19	-0.24	-0.35	-0.45	-0.58	-1.10
	Δ Y/N (Δ O/N)	0.21	0.13	0.11	0.10	0.09	0.14	0.14	0.15	0.10	0.20	0.27
	Δ Y/N (Δ YNL/N)	0.21	0.00	0.03	0.05	0.06	0.07	0.08	0.16	0.26	0.31	1.13
Argentina[f]	Y/N 1990	3.10	**0.5**	**0.8**	1.1	1.4	1.8	2.2	2.7	3.5	4.8	12.2
	Y/N 2005	3.14	**0.4**	**0.8**	1.1	1.4	1.7	2.1	2.6	3.4	4.8	13.1
	Δ Y/N (Δ YL/O)	-0.27	-0.15	-0.14	-0.11	-0.09	-0.06	-0.22	-0.33	-0.45	-0.62	-0.12
	Δ Y/N (Δ O/N)	0.28	0.06	0.15	0.12	0.25	0.04	0.09	0.15	0.23	0.60	0.76
	Δ Y/N (Δ YNL/N)	0.02	-0.02	-0.04	-0.03	-0.16	-0.01	0.05	0.07	0.10	0.02	0.25
Uruguay[c]	Y/N 1990	3.09	**0.6**	**0.9**	1.2	1.5	1.8	2.2	2.6	3.2	4.3	12.7
	Y/N 2005	2.77	**0.5**	**0.8**	1.1	1.4	1.8	2.1	2.6	3.3	4.5	9.6
	Δ Y/N (Δ YL/O)	-0.36	-0.10	-0.14	-0.11	-0.15	-0.13	-0.08	-0.10	-0.07	0.20	-2.71
	Δ Y/N (Δ O/N)	0.00	0.00	0.01	0.01	0.04	0.05	0.01	-0.02	-0.03	-0.08	-0.16
	Δ Y/N (Δ YNL/N)	0.03	0.05	0.04	0.02	0.04	0.04	0.05	0.12	0.17	0.09	-0.24
GROUP 4. ***Increase in poverty*** *(variation in the poverty headcount index above 0.5% per year)*[b]												
Paraguay[g]	Y/N 1990	1.69	**0.3**	**0.5**	**0.7**	**0.9**	1.1	1.2	1.5	2.0	2.8	5.9
	Y/N 2005	1.67	**0.3**	**0.5**	**0.6**	**0.8**	**0.9**	1.2	1.4	1.8	2.6	6.6
	Δ Y/N (Δ YL/O)	-0.21	-0.11	-0.13	-0.19	-0.13	-0.18	-0.27	-0.27	-0.42	-0.50	-0.14
	Δ Y/N (Δ O/N)	0.09	0.02	0.03	0.05	-0.04	-0.02	0.11	0.08	0.10	0.11	0.62
	Δ Y/N (Δ YNL/N)	0.10	0.04	0.05	0.07	0.06	0.08	0.09	0.08	0.13	0.14	0.24

Source: Prepared by the authors on the basis of household surveys in the countries concerned.

* Figures in bold font and highlighted in grey indicate deciles in which per capita income is below the poverty line *(<1.0)*. Countries are listed by level of poverty during the period 2001/2005, from less poor to more poor.

[a] The components of variations in per capita income that are due to changes in labour income per employed person Δ *Y/N(*Δ *YL/E)*, to changes in the total employment rate Δ *Y/N(*Δ *E/N)* and to changes in per capita non-labour income Δ *Y/N(*Δ *YNL/N* (in multiples of the poverty line) are estimated according to formula 3.

[b] The yearly variation in the poverty rate for each country, allowing for the countries to be classified in groups, was estimated using the formula *VAP = [((PF-PI) / PI) *100]/A*, where *VAP* = yearly variation in poverty, *PF* = percentage of final poverty, *PI* = percentage of poverty at start and *A* = number of years included in the period.

[c] Urban areas.

[d] In the case of Guatemala, the number of deciles with per capita incomes under the poverty line is higher than the figure shown for poverty levels in *Social Panorama of Latin America*, published by ECLAC. Data-processing adjustments had to be made to deal with the lack of measurements to include the under-10 population in 1989 and the under-7 population in 2002.

[e] Cochabamba, El Alto, La Paz, Oruro, Potosí, Santa Cruz, Tarija and Trinidad.

[f] Greater Buenos Aires.

[g] Asunción Metropolitan Area.

TABLE 2

Latin America (16 countries): typology of countries by trends in global employment rate, labour income per employed person and non-labour income in deciles including poor households, 1989/1995 to 2001/2005

Trends in poverty (yearly average)	Poverty at start (%)[a]	Global employment rate (E/N)	Labour income per employed person (YL/E)	Per capita non-labour income (YNL/N)	Poverty at end (%)[a]
Sharp reduction					
(variation under -1.5% per year)					
Chile, 1990-2003	38.3	++	++	++	18.6
Ecuador, 1990-2005	61.8	++	+	+	45.1
Brazil, 1990-2005	47.4	++	+	++	36.2
Panama, 1991-2005	42.8	++	–	+	32.7
Mexico, 1989-2005	47.4	++	–	+	35.5
Slight reduction					
(variation between -1.5% and - 0.5% per year)					
El Salvador, 1995-2004	54.0	+	–	+	47.5
Costa Rica, 1990-2005	26.2	+	+ –	+	21.1
Colombia, 1991-2005	55.6	+	=	+	46.8
Guatemala, 1989-2002	70.3	++	=	++	58.4
Nicaragua, 1993-2001	73.6	++	– –	=	69.3
Honduras, 1990-2003	80.5	++	– –	++	74.6
No progress					
(variation between -0.5% and 0.5% annual)					
Venezuela (Bol. Rep. of) 1990-2005	40.0	++	– –	–	37.1
Bolivia, 1989-2004	52.1	++	– –	+	51.6
Argentina, 1990-2005	21.1	+	–	=	22.6
Uruguay, 1990-2005	17.8	=	–	+	19.1
Increase					
(variation above 0.5% per year)					
Paraguay, 1990-2005	42.2	+ –	– –	+	47.7

Legend:

++	Significant progress
+	Progress
= / +-	No change / progress and deterioration
–	Deterioration
– –	Significant deterioration

Source: Prepared by the authors on the basis of household surveys in the countries concerned.

[a] These percentages may not coincide with those shown in *Social Panorama of Latin America*, published by ECLAC, owing to the difference in treatment of data on domestic servants. In the case of Guatemala, data-processing adjustments were made in order to deal with the lack of measurements to include the under-10 population in 1989 and under-7 in 2002.

accompanied by a sharp drop in the unemployment rate. The remaining countries showed little or no improvement, mainly owing to the poor performance of their labour markets. In countries that significantly reduced poverty, the main factor of change was the behaviour of families in terms of composition and participation of women in the labour market. Although these phenomena are fairly widespread in all the other countries, poverty reduction efforts have not been accompanied by increases in productivity or in transfers to families.

2. The labour market as a factor influencing differences in poverty trends among countries

A comparison between countries that have achieved a greater or lesser degree of poverty reduction brings to light some striking differences in the performance of the labour market (figure 3). As shown in section A of this figure, the increase in the ratio of employed persons to total population (light gray bars) in Brazil, Chile and the urban areas of Ecuador is complemented

with an increase in labour income per employed person (black bars), indicating strong growth in the labour market; to this is added an increase in non-labour income (dark gray bars). All this works together to produce a significant growth in family income in those countries, thus lowering the poverty rate. This is suggested by the leftward shift in the per capita income distribution curve between 1990 (black curve) and 2005 (gray curve), which crossed the poverty line in the lower deciles of income distribution. In Argentina (Greater Buenos Aires), Bolivia, Paraguay (Asunción Metropolitan Area), Uruguay (urban areas) and the Bolivarian Republic of Venezuela, on the other hand, labour income per employed person fell among the poor, and that drop was not adequately offset by improvements in the global employment rate or in non-labour income. For the same reason, there was no progress in poverty reduction.

Figure 3 also illustrates three important aspects of the analysis. To begin with, the less unequal the distribution of per capita income of families –shown where the corresponding curves are less slanted– the more poverty will be reduced when income per employed person or State transfers increase.

In the second place, the figure shows that around 2005 in the countries considered, while about one third of the population had per capita incomes below the poverty line, many more were living with incomes barely above the poverty line, indicating that they would not be able to deal with a crisis.[12] The situation is similar in the other countries of the region, given that in no country of Latin America does the population in the fifth decile of distribution have an average per capita income equal to or higher than twice the poverty line (table 1).

In the third place, when measured as a proportion of the poverty line, the variation in labour income per employed person reflects the income distribution profile and is thus substantially higher among the higher deciles. This is consistent with the hypothesis that productivity increases begin in formal enterprises, that they mostly benefit workers in those enterprises and that they are distributed proportionally to the preceding income strata, so that they are not in and of themselves redistributive but rather they are transmitted slowly according to the salary scale.

3. The phenomenon of poor workers

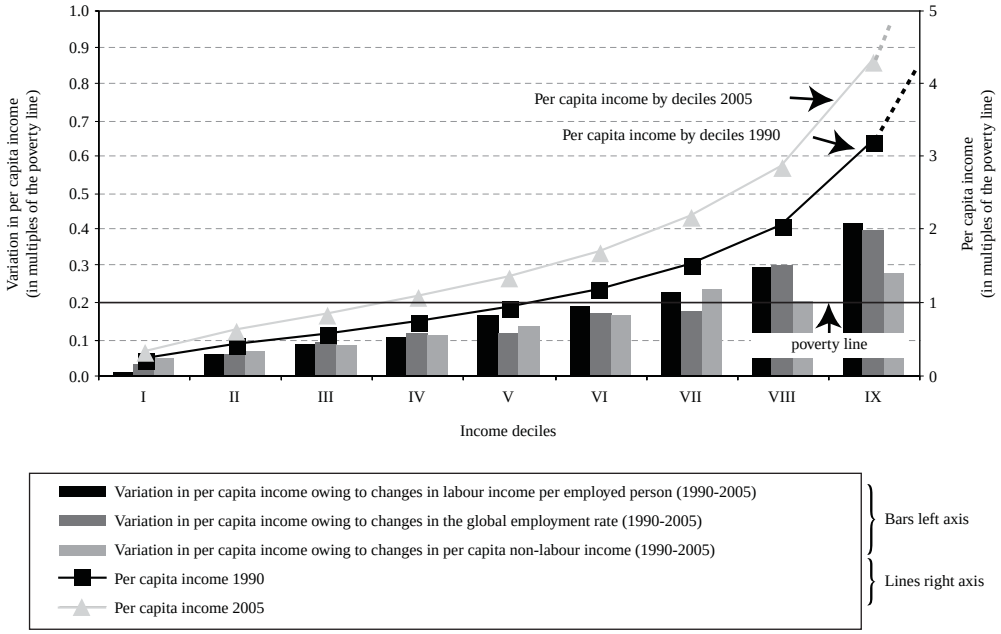
Finally, it should be noted that because of the way the labour market currently works in the region, large segments of workers are unable to overcome poverty. In the urban areas of Latin America, between 10% (Chile) and 54% (Nicaragua and Honduras) of all employed persons live in poverty (figure 4), and in the rural areas, the percentage of employed persons who are poor is even higher, ranging from 11% (Chile) to 81% (Honduras). As might be expected, in countries where the labour income of the poorest families rose significantly between 1990 and 2005 (Chile, Brazil and urban areas of Ecuador), the percentage of employed persons living below the poverty line dropped, while it rose in those countries where labour income fell: Argentina (urban areas), Bolivia, Bolivarian Republic of Venezuela, Paraguay and Uruguay. It is therefore imperative to improve the quality of insertion in the labour market of large sectors of the labour force, especially of the poorest segments. In particular, this entails ensuring adequate wages, stable contracts, workplace safety (coverage for accidents and work-related illnesses), access to health systems and insurance and membership in and contribution to social safety nets (ECLAC, 2007a).

[12] In figure 3, the per capita income curve slopes more sharply after the eighth decile, indicating that subsistence is very difficult for 70% of the population.

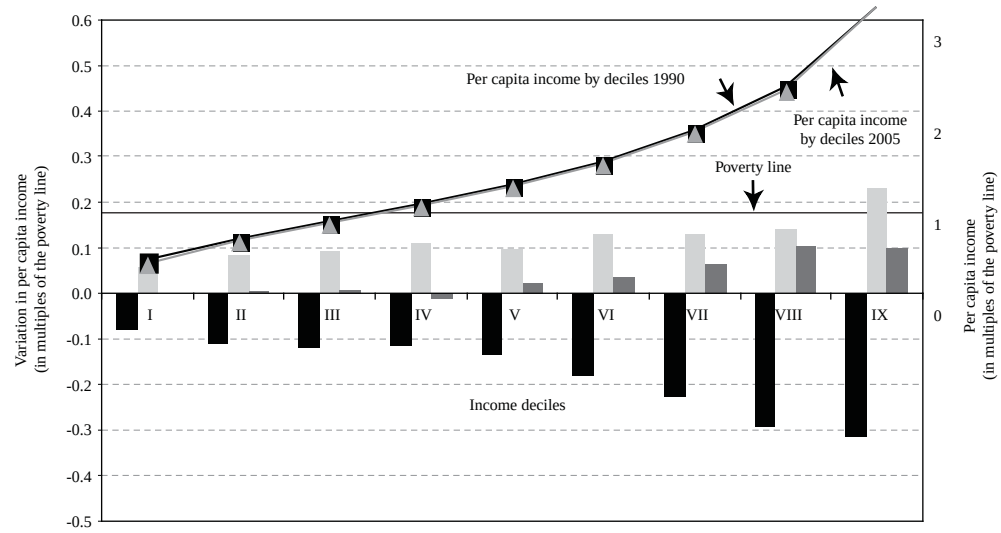
FIGURE 3

Factors influencing changes in the incidence of poverty, deciles i-ix, 1990-2005[a]

A. Countries with sharp reduction of poverty and increases in labour productivity (Brazil, Chile and urban areas of Ecuador, simple average)



B. Countries with no progress or with increased poverty (Argentina, Bolivia, Bolivarian Rep. of Venezuela, Paraguay, Uruguay simple average)

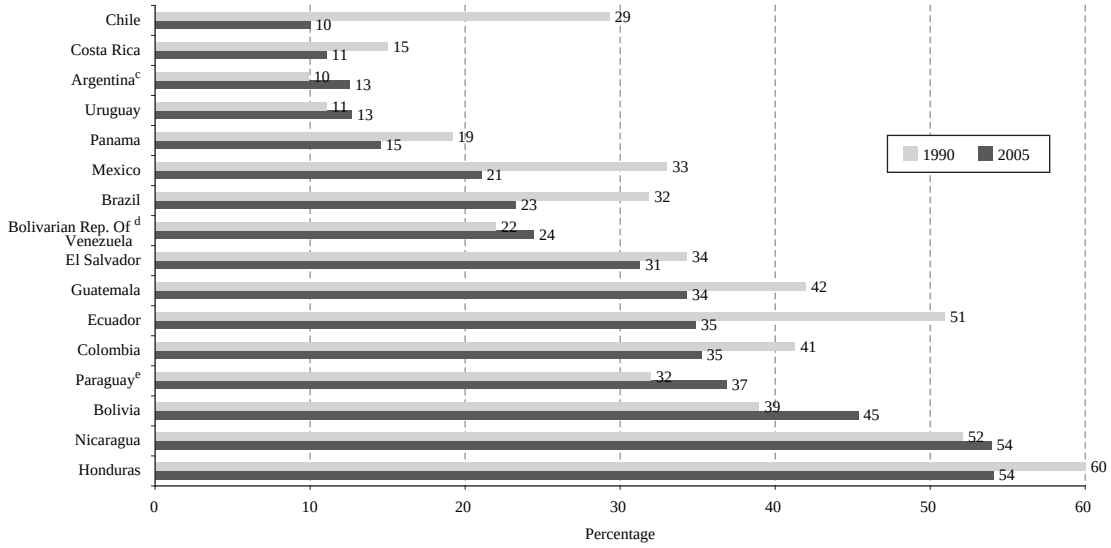


Source: Prepared by the authors on the basis of household surveys in the countries concerned.

[a] Years around 1990 and 2005.

FIGURE 4

Latin America (16 countries): percentage of working poor,[a] 1990- 2005[b]



Source: Prepared by the authors on the basis of household surveys in the countries concerned.

[a] Refers to the percentage of employed persons living in households with incomes below the poverty line.
[b] Years around 1990 and 2005.
[c] Greater Buenos Aires.
[d] As of 1997, the survey sample design does not allow for an urban-rural breakdown. Therefore, the figures refer to the national total.
[e] Urban areas: refers to Asunción Metropolitan Area.

IV

Reflections on the demographic bonus and challenges for public policy

In their poverty reduction efforts, the Latin American countries have benefited –and can still benefit– from the drop in the demographic dependency ratio which means that the burden of meeting the needs of children and the elderly is lighter for each working age person. This situation –known as the "demographic bonus"– is especially encouraging given that with fewer dependents per economically active member, households can improve their per capita income.

However, the demographic bonus has a time limit, since lower fertility and longer life spans will increase the burden of older persons, causing the dependency ratio to rise again, this time generating additional demands for health care and economic security. It is safe to say that when the dependency ratio goes up, the demographic bonus ends.[13]

Although this demographic bonus may continue for as long as working age persons –especially women– are increasing their participation in economic activity,

[13] Nevertheless, some authors have put forward the hypothesis that there is a "second demographic bonus", presumably arising from the fact that the ageing of a society creates more incentives to save, thus stimulating investment and growth (Mason y Lee, 2004).

many of its dividends are not guaranteed, since they are contingent on the capacity of the region's economies to generate employment when the demographic bonus occurs, on the capacity of the poor to find well-paid jobs that also provide social protection and on how well they are organized, in terms of family composition, for dealing with unforeseen circumstances. Thus, to take advantage of the demographic bonus, it is necessary to provide jobs for a growing active population while at the same time reducing the insecurity, precarity and informality that are typical of labour markets in the region.

In particular, although the poorest families need better incomes, there are factors that limit and discourage their participation in the labour market. Having a limited endowment of human capital, family members have fewer job opportunities and are more likely to become unemployed or to bring in a small labour income. In turn, high fertility and dependency rates and the need to care for other family members further limit the participation of women in the labour market, as well as the family's investment in human capital.

Although some countries did manage to reduce poverty from the early 1990s onward, thanks to the demographic bonus and the increase in income per employed person –Chile, Brazil and Ecuador (urban areas)– the overall results so far have not been encouraging. It must be borne in mind that the situation created by the demographic bonus, which promoted development and poverty reduction, will eventually be reversed.

The end of the demographic bonus will have a significant impact on all the countries of the region, particularly those that have reduced poverty only as a result of improvements in the ratio of the working age population to total population or in the participation rate without significantly improving employment and income per employed person, as well as on those countries where poverty increased. Around 2010, Cuba will be the first Latin American country to see its demographic bonus end, and it will be followed by Chile and Costa Rica (around 2015) and then by Brazil, Colombia, Mexico and Uruguay (around 2020).

While it is true that progress has been made towards achieving the first Millennium Development Goal –largely as a result of the demographic bonus– it is no less true that the increase in the number of persons entering the labour market and in job opportunities for the poorest sectors is still inadequate.

If the Latin American countries are to continue reducing poverty, they need to implement active public policies that will make it possible to reconcile care of the household with paid work, improve the productivity of occupations in which members of the poorest households are engaged and, if necessary, target social spending to meet the demands of these more needy groups. For the same reason, it is essential to raise to the rank of public policy those actions that will enable women, especially in poor households, to reconcile the care of dependents with paid work, in order to increase their participation rates. It is also important that women be able to fully exercise their reproductive rights and make decisions regarding the size of their households and the dynamics of their families at different stages in the life cycle. All this should be supplemented with appropriate general policies such as job training and retraining for workers in low-productivity jobs, so as to open up better opportunities for them.

These issues, which must be addressed by national socioeconomic development strategies, are not new. However, as populations grow older, these demands will become more pressing, given that when the demographic bonus peaks, demographic trends will not be conducive to increasing per capita income.

The challenge facing the region has not arisen in a vacuum. Solutions must be sought that will make it possible to reconcile three major changes that must be addressed by public policy: those that represent a response to demographic inertia, such as the ageing of the population and the falling birth rate; those that are contingent on the performance of economic agents, such as improvements in productivity in a highly competitive international context; and those changes in the political economy that have to do with the role and the size of the State.

(Original: Spanish)

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KEYWORDS

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Oil extraction and deforestation: a simulation exercise

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Existing oil fields in Ecuador are approaching the end of their economic life, and permits to exploit new fields in the Amazon region are being granted. The possibility that deforestation may occur in some areas of high ecological value, as has happened in the past as a result of induced migration, justifies posing a simple question: would it be reasonable to exploit these new fields without causing deforestation? This paper does not claim to give an exhaustive answer to this question but, based on previous research, presents a simulation exercise in which the economic value of four tropical forest services are introduced, in order to evaluate the economic loss that deforestation would entail. It is further argued that the environmental impact appraisal should take into account the corresponding premium accorded to investment. In addition, the use of a hyperbolic discount factor is recommended.

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I
Introduction

Some underdeveloped countries are facing a foreign-exchange shortage that has, over time, led to high levels of indebtedness and to a debt crisis. This debt burden poses very serious problems and greatly hinders any progress towards socio-economic development. In order to service this debt, a developing country that is experiencing balance-of-payments problems may try to obtain funds in the international financial market. Yet any such loan will carry a high risk premium and therefore impose high interest rates. The rate of return of a dollar invested in this country will then be equal to this rate of interest, as will the social internal rate of return of the last public project rejected. It should then be no surprise that, facing the need to repay an ever-increasing foreign debt, countries in this position may turn to their comparative advantage in terms of their environmental asset endowment—both by increasing their exports of natural resources and by enduring lower levels of environmental quality (Azqueta, 2007). As will be explored in more detail, the very high *shadow price* of foreign exchange in these countries makes this option seem economically rational in the short run.[1]

In all probability, however, this way of generating new foreign exchange will not only be unsustainable in the long run, but will also degrade the natural resource endowment, often irreversibly. Short-term economic calculus might lend support to such practices: logging permits produce much-needed hard currency, whereas standing, non-intervened primary forests produce hardly any at all. Yet, an elementary economic calculus may show that, not only might this be a sub-optimal allocation of resources from the global point of view, but also that, even in terms of economic rationality, the net gain is not that high and it would be worthwhile looking for better ways (although perhaps more costly ones in the short run) of exploiting natural resources.

Ecuador is a case in point. As table 1 shows, it is not only an underdeveloped country with serious poverty and destitution, but also highly indebted to the rest of the world. Though the debt burden is probably not the only cause, public expenditure in education, for example, amounted to 3.1% of GDP in 1990 with another 1.6% of public expenditure on health; these amounts fell to 1.1% in 2001 and 0.9% in 2000, respectively (with a slight improvement in later years). Furthermore, the percentage of the population below the poverty line rose from 62.1% (with 26.2% indigent) in 1990 to 63.5% (31.3% indigent) in 1999 (ECLAC, 2007).

TABLE 1

Ecuador: Macroeconomic figures
(US$ 2000)

	1995	2000	2001	2002	2003	2004	2005
Per capita GDP	1 333	1 295	…	1 382	1 411	1 501	1 550
Total external debt (US$ millions)	13 934	13 216		16 236	16 756	17 210	17 237
Total debt/GDP ratio (%)	69.0	85.1		67.0	61.0	56.2	47.2
Exports of goods and services (US$ millions)	5 278	5 905		5 809	6 366	7 370	7 917
Imports of goods and services (US$ millions)	5 454	4 939		7 194	6 915	7 683	8 720

Source: ECLAC, 2007.

□ The authors would like to express their gratitude and recognition to César Ajamil, who passed away shortly after working on the project. His warm humanity will always be remembered.

[1] The shadow price of foreign exchange reflects its true scarcity and is expressed as a ratio that shows the actual deviation between this shadow (efficiency) price and the official exchange rate. In Colombia, during the 1980s, this ratio oscillated between 1.18 and 1.75; in Panama between 1.13 and 1.21; and in the Bolivarian Republic of Venezuela it was 1.08 in 1989 (Londero, 1992). Unfortunately such information is not available for Ecuador.

The main sources of foreign exchange, apart from Ecuadorian workers' remittances,[2] show the country's dependence on exploitation of its natural resources endowment of crude petroleum, bananas and fish. As a result of this pattern of specialization, in 2004, 79% of Ecuadorian exports were primary products (51% from the energy sector), and another 14.2% were industrial products based on natural resources (ECLAC, 2006).

This pattern of specialization has entailed very serious environmental consequences:

(i) Transforming mangroves into shrimp farms along the Pacific Coast has caused the almost complete disappearance of one of the most ecologically valuable ecosystems worldwide (Costanza, D'Arge and others, 1997).

(ii) The intensive use of pesticides, fungicides and fertilizers in banana plantations leads to eutrophication and degradation of aquatic ecosystems.[3]

(iii) The rapid increase in tourism-related development in the Galapagos is creating mounting pressure on this fragile area. In 1997, 21 out of 57 sites exceeded their visitor carrying capacity. This could harm the future prospects of the tourist industry: more than 50% of the visitors interviewed believed that there was congestion in the islands, and 21.8% declared themselves highly annoyed by it (García, 2000).

(iv) Lastly, oil production for export in the Amazon region constitutes a recent and grave threat to this unique ecosystem.

It is to this last challenge that we would like to turn our attention.

II

Oil exports from Ecuador

Ecuador is one of Latin America's largest crude oil exporters, though it has recently been finding it increasingly difficult to raise production levels. According to the International Energy Agency (*Oil Market Report*, various issues), in 2002, PetroEcuador, the State company that accounts for more than 55% of total production, recorded 0.4 million barrels per day (bpd), a 10-year low. This figure has improved somewhat in recent years and reached 0.53 million bpd in 2006.

Most production is located in the Eastern Amazonian region, called the "Oriente" (Shushufindi, Sacha, Libertador, Cononaco, Cuyabeno, Lago Agrio and Auca oil fields), with the majority of the 4.6 billion barrels of proven reserves also located in the eastern part of this region. At this time, the oil is transferred from the city of Lago Agrio, in the Amazon basin, to the Balao terminal near the city port of Esmeraldas on the Pacific coast, through the Trans-Ecuadorian Pipeline System (or SOTE, the acronym of its Spanish name). This pipeline, built in the early 1970s, has been upgraded several times (June 2000 being the most recent), and has a capacity of 300,000 bpd.

Continued oil exports could be expected to have positive consequences for the Ecuadorian economy. As mentioned above, foreign exchange earned via oil exports reduces the need to turn to the international financial market and therefore reduces the internal rate of return of acceptable public investment, thus potentially promoting socio-economic development. Yet, along with this positive effect on the economy and the inflow of foreign exchange, oil extraction also has negative impacts on the environment. Experience shows that oil-related operations (exploration, exploitation and crude transfer) have significant impacts on the ecosystem in which they take place, which in this case is a primary tropical rainforest (Gupta and Asher, 1998). Oil-related operations introduce changes in land uses that are both direct (land occupied by wells, roads, campgrounds, etc.), and indirect (new activities taking place as well as old activities being abandoned). Of course, oil-related operations also affect the functioning of the ecosystem itself, and the flow of natural services it provides.

[2] Remittances from Ecuadorian workers in the United States amounted to US$ 1.4 billion in 2001 (Jacôme, 2004).

[3] It is also causing serious damage to shrimp farms (Colburn, 1997).

The impacts of oil activities can be grouped under three main headings.[4]

(i) *Direct impacts*. These impacts are directly linked to the main oil operations (exploration, extraction, transport and pumping), including:

— Atmospheric emission of pollutants, whether from accidental releases or from gas burning. Volatile organic compounds (VOCs) from oil remediation ponds should also be included.
— Accidental and recurrent oil discharges and spills onto the ground and into aquatic systems (ground and surface water) which may eventually affect human health. A study of river pollution conducted in 2001 in the municipality of Shushufindi found that most surface water carried high levels of chemical contamination from the local oil industry; this problem was also found in urban wells.[5]
— Discharges and spills of media (the water that accompanies oil when pumped, which is highly polluted).

(ii) *Indirect impacts*. These impacts are not directly related to oil operations, but are closely linked. Among them is the construction of new access roads, which favour the movement of would-be colonists and the actual colonization of new land.

(iii) *Induced impacts*. These are linked to auxiliary activities, including the development of urban settlements, which provide basic services such as health, education, and retail trade to the local population (oil sector workers, settlers, etc.).

III

Settlement and deforestation

At present, the main oil fields being exploited are located near the Cuyabeno Reserve, one of the country's most valuable ecological areas. The Cuyabeno Reserve is home to six different indigenous nations, in several communities: Siona, Secoya, Cofán, Quichua (Naporunas), Shuar and Achuar.[6] The Siona, Secoya and Cofán were there at the time of the Spanish colonization; the Shuar and Achuar moved into the territory as cheap labour in the second half of the nineteenth and the beginning of the twentieth century in the wake of the rubber boom. The Quichua (Naporunas) were the last to arrive as settlers in the mid-twentieth century.

This situation changed dramatically in 1967, when Texaco opened the first oil field in the region (Lago Agrio) and the building of new roads began. In 1971 the road connecting Quito with Lago Agrio, built by Texaco, was opened; the Lago Agrio-Tarapoa road (built by PetroEcuador-City) was finished; and, in 1979, both the Pacayacu-Los Tetetes and Tarapoa-Palma Roja roads (also built by PetroEcuador-City) were opened

[4] To these impacts must be added those related to oil transfer, i.e., to the pipeline. The new heavy crude pipeline (OCP) under construction, which will connect new fields with the coast, is "in substantial non-compliance with World Bank Group Social and Environmental Safeguard Policies", according to an independent report issued in September 2002 by Robert Goodland (2002), former head of the World Bank's Environmental Department. Environmentalists fear that the construction of the pipeline will do serious harm to one of the world's most important bird sanctuaries: the Mindo Nambillo Cloudforest Reserve, which is also a major eco-tourism destination. Ecuador's Environment Ministry temporarily suspended the OCP licence in March 2002, following damage to the forest caused by road construction. As for the existing pipeline (SOTE), in June 2002 villagers from the Napo province occupied the El Salado pumping station and shut off some valves, stopping the flow for several days. In November 2002, PetroEcuador announced that it would re-route the Papallacta-Lago Agrio section because of the danger of landslides following eruption of the Reventador volcano.

[5] In 1993, the Cofán people sued Texaco for alleged spills of more than 30 billion gallons of toxic products in the period 1964-1992. The New York Court of Justice rejected this claim in 1996 on the grounds that the case should have been brought before an Ecuadorian court. However, in 1998, the Court of Appeal overruled this decision stating that the Cofán people were entitled to sue Texaco before a United States court; this they did once more, only to be rejected again in May 2002 by Judge Jed Rakoff of the United States District Court for the Southern District of New York.

[6] The Tetetes, another indigenous people in the area, seem now to be extinct. Ironically, this is the name Texaco gave to one of its first operating oil wells.

up. Altogether, more than 200 km of new roads were opened in less than 20 years.

The opening of new roads facilitated the migration of people from other parts of the country. They settled as farmers alongside the roads, burning and clearing the tropical forest to transform it into agricultural and pasture land. As a result, the population of the Oriente region increased from 70,000 in 1950 to 372,533 in 1990, an increase of 432%, or 10.8% growth per annum (Brown, Digiacinto and others, 1996). In a matter of a few years, more than 200,000 people entered the area as settlers. Typically, such farmers occupy an area of 250m along the road, with a depth of 2,000m, adding another 2,000m depth as "reserve". When the first portion of cleared land is exhausted (after five or six years), they use the reserve, and then move even deeper into the interior.[7] Furthermore, to provide the public and private services required by the newcomers (both oil workers and migrants), new urban areas emerged, with their own demands on nature (water, waste, and so forth), and on forest land: Lago Agrio, Shushufindi, Pompeya, Tarapoa, and some others.

Significant deforestation has resulted from this migration. The country overall had 13.9 million hectares (ha) of forest area in 1990, 11.9 ha in 2000 and 10.9 ha in 2005 (ECLAC, 2007). According to the findings of the PETRAMAZ Project, more than 26,000 ha of primary forest were lost in the area of oil operations during the period from 1976 to 1986, and another 55,330 ha were lost in the following decade; of that area, 6,774 ha were devastated by tornadoes in 1984. This gives an average loss of 3,230 ha per year in the first period, and 5,532 ha in the second.[8]

The relationship between this deforestation and the arrival of new settlers was straightforward: in 1997, 59.7% of the loss of primary forest took place in a band of 5 km around the main roads, and another 38.6% within the adjacent kilometre. The rate of deforestation for the entire area of influence of these operations was 2-2.5 times the average rate of deforestation in the country, which was already very high (1.4% per year in 1997-2000 and 1.7% in 2000-2005). Although this mostly took place outside the protected areas, it endangered not only the buffer zones but in some cases the protected zones themselves: in 1993, 50,000 ha from the Cuyabeno Reserve were degazetted by the Ecuadorian government because the land had been occupied by settlers.

IV

The economic consequences of settlement

Unfortunately, this migration does not seem to have significantly improved the standard of living for the newcomers. Between September 1998 and March 1999, a survey was carried out along the two main axes of settlement in the area: the Chiritza-Tarapoa-Palma Roja road (105 km), and the Chiritza-Pacayacu-Los Tetetes road (54 km). Overall, 1,644 farms (883 along one road and 761 along the other), with a population of 9,248 inhabitants (5,211 and 4,037, respectively), were surveyed.[9] Of all the land area studied, 76,600 ha were used either for agriculture or as pasture land and another 57,000 ha were left in "reserve". Approximately 45% of the cultivated land was sown with perennial crops (coffee, cocoa, plantain and bananas) and 13% to annual crops (maize, cassava and rice); the remaining 42% was used as pasture land. Given the characteristics of the soil and, unfortunately, in many cases, inappropriate agricultural techniques (more suited to the migrants' region of origin), the yields obtained have been much lower than the national average:

— In the case of coffee grown as a market commodity crop, average yields were 66% of the national average (which is already low by international standards).
— For cassava, the region's second main market commodity product, the average yield was only 62% of the national average.

[7] The pattern of settlement, implemented by the Ecuadorian Institute for Agrarian Reform (IERAC) under the presidency of Velasco Ibarra, defined an "optimal unit" as covering 250m wide along the road, and extending 2.5 km deep into the forest, giving an average size of 50 ha per plot.

[8] See also Mena and others (2006).

[9] The survey was carried out by Maiguashca and Asociados Cia. Ltd., under a contract with the PETRAMAZ Project, between September 1998 and March 1999.

— Lastly, the picture is even more discouraging for crops grown for household consumption: rice, 20% of the national average yield; maize, 30%; bananas, 40%; and plantain, 30%.

For the migrants, the social benefits related to employment generation have been minimal as well: less than 1% of them are employed in oil-related operations.

Thus, it is not surprising that, according to the Inter-American Development Bank (IDB, 2001), the Northern Amazonian Region is one of the most depressed areas in Ecuador, with 57.3% of the population being destitute and a poverty level as high as 79%, compared with the rural average in the country (47%). Health services are scarce where they exist at all (Ministry of Urban Development and Housing (MIDUVI), 1999): only 12% of people in the region's rural areas have access to drinking water (compared with 80% in urban areas); 2% are served by sewerage systems (28% in urban areas); and 3% have some kind of garbage disposal service (59% of urban dwellers). The incidence of diarrhoea in the area is 2,453 per 100,000 inhabitants, compared with 1,315 and 1,724 per 100,000 in the provinces of Pichincha and Guayas, respectively (Ministry of Public Health, 2000).

V

Economic and environmental consequences of deforestation

Tropical rainforests provide environmental services that are lost altogether through deforestation. These services fall within several broad categories.

1. Economic functions

Under this heading we include those goods and services that have a market price. Chief among these are wood and non-wood products (fruits, animals, ornamental plants, medicines, latex) used by the local population. These commodities can be directly consumed by the population or used in small-scale local trade. The extraction of wood and non-wood products may be done sustainably or unsustainably (as in the case of mining), but it is the first case that is of interest here.

Grimes, Loomis and others (1994) conducted an experiment on three one-hectare permanent forest plots at the Jatum Sacha Biological Station, located near the Cuyabeno Reserve, on the southern bank of the Napo River. Two of the study plots were located in firm-ground forest, with red earth at about 400m above sea level, and the third was along the bank of the Napo River, in floodplain forest with alluvial soil at an elevation of 350m. The authors computed the net value obtained from seven fruits, three medicinal barks and one resin, taking into account the local market price for these products or their close substitutes, the average distance to local markets (30 km), the transportation mode (bus), and the time required for extraction, transportation and sales. The net annual value obtained from the three plots was US$ 146.93, US$ 136.06 and US$ 62.87, respectively.[10] In contrast, the timber value of the plot closest to the road was US$ 163 —but if the timber was to be sustainably harvested, with a rotation length of 40 years, the net present value (NPV) of the timber would amount to just US$ 189 (applying a 5% discount rate), far from the NPV of the non-wood products harvested (US$ 2,939, US$ 2,721 and US$ 1,257, respectively). Hence, logging activities have very low profitability if performed on a sustainable basis.[11]

2. Tourism and recreation functions

Tropical forests can serve as a basis for eco-tourism. When this is the case, two main benefits may accrue from its preservation. On the one hand, visitors usually experience a net gain in consumer surplus, i.e. a positive difference between their willingness to pay to enjoy the experience, and what they actually do pay, directly

[10] This is also the figure suggested by Torras (2000). It is also within the range recorded by van Beukering, Cesar and others (2003): US$ 5 per ha in the Brazilian Amazon and US$ 422 in the Peruvian jungle.

[11] See, for example, Seroa da Motta and Ferrz do Amaral, 2000. Smith, Mourato and others (2000) also find that in the Peruvian Amazon, the profitability of sustainable logging ranks second to slash and burn agriculture for settlers (see also Henrich, 2000).

and indirectly (through the expenditure of time). On the other hand, there is a multiplier effect associated with the economic activity of tourism; it benefits the country as a whole and may benefit the local population as well. Eco-tourism activities generate income, create employment and produce foreign exchange: tourism is an important source of foreign exchange for the Ecuadorian economy. Despite restrictions on the number of visitors, the Galapagos Islands are the most popular destination. The second most popular eco-tourism destination is the area discussed above, namely the Cuyabeno Reserve. Table 2 shows the number of tourists visiting the area in the 1990s.[12]

These tourists are mostly foreigners and pay an entrance fee of US$ 20 in high season; Ecuadorians pay US$ 1. There are 18 licensed companies and they charge from US$ 30 to US$ 120 per day for a three- to five-day visit (with a median value of US$ 45 per day); they paid the Ecuadorian Government US$ 8,800 in 1998 for licenses to operate in the area. According to Galvin, the average expenditure of a foreign tourist visiting the Reserve is US$ 369 (median US$ 240).

Several authors[13] have carried out insightful stakeholder analysis to discover how changes in they total economic value of natural areas will affect various groups such as the local population, the logging companies, and so on. Some figures they have obtained may hint at the importance of tourism to the local population. The Siona Community of Puerto Bolívar (160 people) earned a total of US$ 104,000 in 1998, mostly from canoe and cabin rentals. The Quichua community of Zancudo (110 people) and Playas de Cuyabeno (175) earned some additional US$ 62,800 and US$ 39,600, respectively (mainly from tour operator payments and handicraft sales), whereas the Cofán community of Zábalo (115) made a total of almost US$ 40,000 (Galvin, 2000).

In addition, contingent valuation and travel cost methods can be used to calculate the net consumer surplus gain for visitors; we estimate it to be US$ 30 per visitor.[14] The consumer surplus will not be lost to the economy because the tourist is likely to go on to another place —often, though not necessarily, in Ecuador also— and spend additional money there. In this case, the net loss will only be the required investment in new facilities and the net revenue lost until they become operative. In this exercise it is assumed, for simplicity, that eco-tourists move to an alternative location in another country.

Lastly, there is an intrinsic value that people assign to the preservation of the Reserve. If the willingness to pay for improved conservation measures in the

TABLE 2

Ecuador: Number of Tourists visiting the Cuyabeno Reserve, official figures

Year	Ecuadorian	International	Total	International (percentage)
1989	173	581	754	77
1990	333	644	977	66
1991	612	855	1 467	58
1992	945	1 433	2 378	60
1993	820	1 484	2 304	64
1994	815	3 337	4 152	80
1995	1 582	3 375	4 957	68
1996	1 994	5 445	7 439	73
1997	1 239	4 410	5 649	78
1998	1 696	6 118	7 814	78

Source: Galvin (2000).

[12] The actual figure may be a little higher because of the number of non-recorded visitors, who avoid the payment of the required fees.

[13] For example, van Beukering, Cesar and others, 2003).

[14] Baldares, Laarman and others (1990) discovered a willingness to pay an extra US$ 30 per visit to protected natural areas in Costa Rica, very close to the figure obtained by Tobias and Mendelsohn (1991) for these same areas: US$35. Adger, Brown and others (1995) offer a figure of US$3 per visit for those tourists that visited Mexican native forests within a package that included other items, and US$ 70 for those just interested in the forests.

Reserve can be considered as a good proxy for this value, Galvin (2000) found that, on average, visitors to the Reserve are willing to pay an extra US$ 35 for this purpose.

3. Environmental functions

Tropical forests provide many environmental functions and services. Three of these are of major interest. First, they protect against both water and wind soil erosion, which affect cultivated land, infrastructure maintenance costs, the economic life of dams and water quality. Second, tropical forests are a natural carbon deposit, and typically their transformation into agricultural and range land lessens their ability to hold carbon. Third, tropical forests are a reservoir of biodiversity. The Cuyabeno Reserve, for instance, houses one of the world's biggest diversity of trees (473 species) together with 514 species of birds, 117 of mammals, and 176 of reptiles.

Biodiversity loss is difficult to measure, let alone to value in economic terms. The value of biodiversity in the development of new medicines and pharmaceuticals has been assigned a wide range of values: from US$ 7 per ha (Ruitenbeck, 1992) up to US$ 20 (Fearnside, 1997; Mendelsohn, 1994), with most estimates using the methodology put forward by Pearce and Puroshothaman (1992). Adge, Brown and others (1995) arrive at a similar figure to the first one, US$ 6.4 per ha, but within a much wider array of values: US$ 1– US$ 90.

As for the damage that deforestation causes to the capacity of the carbon reservoir, Brown, Pearce and others (1993) find that transforming a hectare of open forest into agricultural or range land has a cost of US$ 300 – US$ 500 per ha (using a value of US$ 10 per metric ton of carbon). Transforming a secondary closed forest into agricultural or pasture land has a cost per ha of US$ 1,000 – US$ 1,500. If it is primary tropical forest being transformed, the loss will amount to US$ 2,000 per ha.

4. Cultural functions

Lastly, it should be noted that tropical forests form part of the cultural identity of some peoples. When the forests disappear there is a loss not only in terms of traditional knowledge (often treasured by elders in local communities), but also in terms of identity and cultural diversity.

The transformation of tropical forests because of oil extraction and related activities, both direct and induced, will cause a total or partial loss of the ecosystem's ability to provide the above functions.[15]

VI

The economic cost of developing new fields: a simulation exercise

As pointed out above, deforestation in the Oriente has taken place mostly outside the protected areas so far, although it reaches to their limits.

The future, however, looks grimmer. Permits to explore and exploit new oil fields to the east of the existing ones, even inside "untouchable areas" (the highest level of protection) are being granted, chiefly in the Tiputini-Ipishingo-Tambococha (TIT) oil field. TIT may hold 20% of Ecuador's oil reserves, totalling 920 million barrels of low quality high-density oil. TIT may produce 100,000 barrels a day for 12 years and then produce at a declining rate for another 13 years, at a cost of US$ 12 per barrel. No one would deny Ecuador's right to tap its natural resources and so obtain badly needed foreign exchange. Thus it is important to analyse the best way to proceed when dealing with this type of dilemma. In this, past experience may shed some light.

To this end, it might be useful to have an idea of the economic cost of deforestation in both the Cuyabeno and Yasuní reserves.

As mentioned at the beginning of this paper, things can be done differently: oil can be extracted while at the same time trying to minimize deforestation.

[15] These figures are in line with those produced by Adger, Brown and others (1995) and Pearce and Moran (1994): US$ 650 – US$ 3,400 per ha, taking into account that these authors use a different price (US$ 20) per carbon ton.

Clearly this would be more expensive, but would it be justified in terms of the environmental harm avoided? What would be the economically justifiable amount of investment to avoid this environmental loss? We do not claim to give an exhaustive answer, but simply to show that it may be worthwhile to develop one. A simple simulation exercise may serve to give a first, rough approximation.

We will assume that opening the new fields will require new roads to connect them to the main operating centres. A rate of deforestation similar to that seen in the past will then take place when the new oil fields are opened. We use the above costs of deforestation and apply them to an area that is experiencing a rate of deforestation of 8% per year (for simplicity, we assume this to be constant) because of oil-exploitation-related operations, including induced migration and urbanization. We assume that an initial 2,000 ha are cut down in the first year; this is similar, on average, to the rate experienced around the original oil fields (Mena, Barbieri and others, 2006; table 3).

Next, some value should be introduced for each of the above services lost. Of all the economic functions that tropical forests perform, four will be valued: the production of timber and non-timber products (NTP); eco-tourism; biodiversity preservation; and carbon sequestration. We will not consider protection against floods, erosion and fires, or water production. Therefore, the resulting value will clearly be an underestimation, but will be useful for assessing the amount of investment that would be justifiable, in efficiency terms.

Ideally, it would be convenient to relate each of these functions to a quantitative measure of deforestation, such as per hectare. This is possible for functions like carbon sequestration, but not for all of the other functions. The reason is that dose-response functions are not only non-linear, but tend to have critical ranges. There is no point in trying to estimate the economic value of biodiversity per hectare: it depends on which hectare. The first hectare lost would have zero value, whereas one close to a critical threshold would have maximum value. In between, there is a function whose shape is unknown. Nevertheless, we will assume a given value per hectare.[16] One could also work out the amount of wood and non-wood products in an average hectare of tropical forest, but this does not mean that the local population would lose those products if forest

[16] Van Beukering, Cesar and others (2003) also made the simplifying assumptions that dose-response functions (ecosystem response functions) are linear, do not show irreversibilities and are not affected by thresholds.

TABLE 3

Ecuador: Economic cost of deforestation (US$): principal components[a]
(Dollars)

Year	Deforested area (ha)	Value of non-timber product (US$ 115.3 per ha)	Number of visitors	Value of ecotourism (US$ 20 fee per visitor)	Carbon released (metric tons)	Value of carbon released (US$ 25 per ton of CO_2 equivalent)	Value of biodiversity lost (US$ 7 per ha)	Total cost (US$)
1	2 000	230 600	6 000	120 000	400 000	7 334 000	14 000	7 698 600
5	2 431	280 296	7 293	145 861	486 203	8 914 523	17 017	9 357 696
10	3 103	357 736	9 308	186 159	620 531	11 377 441	21 719	11 943 055
15	3 960	456 572	11 880	237 592	791 973	14 520 818	27 719	15 242 701
20	5 054	582 715	15 162	303 234	1 010 780	18 532 653	35 377	19 453 979
25	6 450	743 708	19 351	387 012	1 290 040	23 652 883	45 151	24 828 754
30	8 232	949 181	20 000	400 000	1 646 454	30 187 738	57 626	31 594 545
35	10 507	1 211 422	20 000	400 000	2 101 339	38 528 054	73 547	40 213 023
40	13 410	1 546 116	20 000	400 000	2 681 900	49 172 645	93 867	51 212 627
45	17 114	1 973 279	20 000	400 000	3 422 860	62 758 140	119 800	65 251 219
50	21 843	2 518 459	20 000	400 000	4 368 533	80 097 057	152 899	83 168 415

Source: Author's own calculations.

[a] The table presents the main results of these assumptions for a 50-year period.

land were to be transformed into agricultural land. In many cases, the actual cost would simply be the opportunity cost of the extra time required to fetch the same products from farther away. Again, we will assume that the product is lost or, alternatively, that the marginal value of time is equal to the value of foregone output.

The following unit values will be used:

— Non-wood products: US$ 115.3 per ha (the average income obtained in the three plots analysed in the area).
— Eco-tourism: a loss of US$ 20 per visitor (the amount paid in dollars by foreign tourists both to the Ecuadorian Government and to the local population). We assume an initial number of 5,000 visitors, 80% foreigners, growing at 5% per year, and not exceeding a carrying capacity of 20,000.
— Biodiversity: US$ 7 per ha (a value in the lower range of those given in the literature).
— Carbon sequestration: a loss of 200 metric tons of carbon for each ha of tropical forest converted into agricultural land, at a price of US$ 5 per metric ton.

Assuming a 5% social discount rate, the NPV of the environmental costs associated with the deforestation process would be:

$$\text{NPV} = \text{US\$ } 451 \text{ million}$$

Table 3 is a simple illustration of the fact that some investment may be socially warranted in trying to mitigate these costs. A sensitivity analysis is very easy to carry out, and helps to identify some critical values. If, for instance, we take a value of US$ 10 per ha for non-wood products (we consider US$ 115 to be too high), the NPV will drop only slightly, to US$ 355 million. If, on the other hand, we vary the price of a metric ton of carbon, the overall change is greater.

Two further qualifications are worth considering.

VII

The value of investment in an underdeveloped country

The above exercise is applicable to developed economies that are in an inter-temporal equilibrium and where the rate of savings is optimal. In underdeveloped countries this is not the case, and investible benefits have a premium over their consumption equivalent: the social marginal productivity of capital (the accounting rate of interest, reflecting the change over time of the social value of investment) is higher than the consumption rate of interest. In other words, the social marginal productivity of capital (ρ) is greater than the consumption rate of interest (i) (Azqueta, 2007, chapter 5).

In this case, environmental impacts that give rise to greater (or lower) present consumption possibilities for society as a whole should not be treated on an equal footing with those that affect investment flows (future consumption).[17]

To take account of this, one simple method is to clearly divide all items belonging to costs and benefits into those that affect present consumption possibilities and those that modify investment funds, to introduce a premium on those investment flows and then add it to the more conventional net consumption benefits. The consumption rate of interest would then be used to calculate the NPV of environmental impacts as a whole. This premium (λ) takes something like the following form (Azqueta, 1985, pp.: 97-101):

$$\lambda = \frac{(1 - s^r)\,\rho}{i - s^r\ \rho}$$

with s^r being the rate of re-investment of investment benefits.

[17] The same qualification should of course apply to oil exports (they give rise, directly or indirectly, to investment funds). It does not apply here though, since we are not advocating an end to oil exports but rather a different approach.

Traditionally, the value of the social marginal productivity of capital (ρ) has been obtained either by analysing the internal rate of return of the best public investment projects to be rejected because of lack of funds, or from a macroeconomic point of view, by looking at the overvaluation of the domestic currency (i.e., the shadow price of foreign exchange). Now that many developing countries have liberalized their foreign exchange markets and their import flows, the situation is somewhat different:

(i) For countries that have liberalized their foreign-exchange markets, but not yet their trade flows, the shadow price of foreign exchange (reflecting the higher domestic price in relation to the international price of a representative basket of commodities) still represents this hidden overvaluation of the local currency.

(ii) Some countries have liberalized both import flows and foreign-exchange markets. This does not mean, however, that their rate of savings is optimal. The government is likely to be facing a serious budget constraint and a foreign-debt crisis at the same time, and socially valuable investment is continually being postponed. Taking into account the relationship between these twin deficits (internal and external), a good indication of the social value of foreign exchange would be the price the authorities have to pay to gain access to credit in world financial markets, i.e., the interest rate differential that would be charged in these markets.

Thus there are ways to reflect quantitatively the fact that investment possibilities (mostly in terms of foreign exchange) are at a premium in underdeveloped economies. Following a conservative approach, we will assume that $\lambda = 2$ (the social marginal productivity of capital is double the social discount rate, which is 4%); alternatively, one could vary this value as part of a sensitivity analysis. Therefore, once environmental impacts have been identified and properly valued, they should be classified into two categories: those related to present consumption, and those affecting investment possibility flows. The latter should then be multiplied by the corresponding shadow price of investment, and the result discounted to obtain the NPV of environmental impacts.

The production of non-wood items for own-consumption, or to be traded in local markets, can be easily considered a consumption benefit. On the other hand, both biodiversity conservation and carbon sequestration can be considered as investment benefits, as long as the country is able to charge someone for this service. This would be the case, for instance, if a pharmaceutical company pays to secure access to the territory or if the role of forests is eventually recognized within the framework of the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The same applies to dollars paid as entrance fees by foreign visitors: they help ease balance-of-payment difficulties.

Taking this into account and assuming that Ecuador reaches the optimum rate of savings in 50 years, so that λ would again be equal to 1, the present value of the environmental costs associated with deforestation would be:

$$\text{NPV} = \text{US\$ } 624 \text{ million}$$

that is, an increase of 40%.

VIII

Discounting environmental impacts

Discounting environmental impacts that may last a long time, or even be irreversible, is a difficult task. The issue is actually one of uncertain intergenerational equity, coupled with the fact that those impacts arising in the very long run have a present value close to zero. The conventional way of calculating the social discount rate (the consumption rate of interest: *i*), is based on both the expected rate of income growth (*g*), and the marginal utility of global consumption (η) plus, sometimes, a pure time preference factor (δ):

$$i = g \,.\, \eta + \delta$$

$$\text{where } \eta = \frac{C}{dU/dC} \frac{d\left(dU/dC\right)}{dC}$$

and *C* is the level of consumption, and *U* the social level of utility.

Using a conventional discount factor based on this rate of discount (e.g. e^{-it}) would imply that the welfare of future generations is of no relevance to a decision to be made now. On the other hand, using a zero discount rate would be equivalent to saying that regardless of how much better off future generations are in terms of needs being satisfied, any benefit they may receive would have the same value in terms of social welfare now, as if it were to be received by the present generation (something we tend to reject on equity grounds). Thus, to avoid the tyranny of both the present (positive discount rates) and the future (a zero discount rate), some hyperbolic discount factors have been recommended (Chichilnisky, 1996; Heal, 1998):

$$e^{-i\log t}$$

This procedure, which does not change the value of the social discount rate has the advantage that the discount factor begins with a positive value, but then tends asymptotically towards zero. It also seems to be in accordance with professional opinion (Weitzman, 2001). Therefore, if we introduce a hyperbolic discount factor into the exercise, in the simple way suggested by Weitzman (ibid.), the present value of the loss would be:

$$\text{NPV} = \text{US\$ } 1.265 \text{ billion}$$

Lastly, if these two factors (investment premium and hyperbolic discount factor) are simultaneously taken into account:

$$\text{NPV} = \text{US\$ } 1{,}601 \text{ billion}$$

Table 4 summarizes the main results of this exercise under different assumptions. As can be seen, the final result is highly sensitive to both the price of a ton of CO_2 equivalent and the discount rate, whereas, for instance, the value of non-timber products makes little difference to the final cost of deforestation. The premium on investment is somewhere between the two, having a moderate influence on the final result.

TABLE 4

Ecuador: Total value of deforestation[a]
(US$ million)

SENSITIVITY ANALYSIS: PRINCIPAL RESULTS

		$\lambda = 1$	$\lambda = 1$	$\lambda > 1$	$\lambda > 1$
		Value of CO_2 equivalent $5 per ton	Value of CO_2 equivalent $20 per ton	Value of CO_2 equivalent $5 per ton	Value of CO_2 equivalent $20 per ton
r = 4%	Value of NTP $10 per ha	421	586	595	828
r = 4%	Value of NTP $115 per ha	451	616	624	857
r = 4% (years 1-5) r = 3% (years 6-25) r = 2% (years 26-50)[b]	Value of NTP $10 per ha	1 178	1 641	1 514	2 110
r = 4% (years 1-5) r = 3% (years 6-25) r = 2% (years 26-50)	Value of NTP $115 per ha	1 265	1 728	1 601	2 197

Source: Author's own calculations.

[a] r = discount rate.
[b] As recommended in Weitzman (2001).

The values range from US$ 421 million to US$ 2.197 billion. These values can be compared with both the NPV of the existing reserves of the TIT oilfield (US$ 3.5 billion) and the amount requested by Ecuadorian President Correa on 5 June 2007 for not exploiting this oil field: US$ 1.75 billion.[18]

IX
Conclusions

Oil exports provide badly needed foreign exchange to some highly indebted developing countries. Yet oil extraction may have serious negative environmental impacts. Ecuador is a case in point: oil extraction in the Amazon region has been accompanied by a significant amount of deforestation. Now that the existing fields are approaching the end of their economic life, the country is granting permits to explore and exploit new fields close to areas of high ecological value. Since most of the deforestation has been due to the arrival of settlers following the opening up of new roads built in association with oil facilities, the following question has been posed: would it be economically justifiable to look for new ways to extract oil without opening roads? In an attempt to find a possible answer, a simulation exercise was carried out in which some economic costs associated with the loss of environmental assets through deforestation were introduced. It was shown that both the direct and indirect losses associated with deforestation, mostly due to migration-induced flows into the area, may be quite high.

Developing economies cannot easily forgo oil export earnings; all the less so since the developed world is reluctant to compensate for such potential losses by paying for environmental services. Therefore, these exports will, in all probability, continue to play a critical role in the future. Nevertheless, the environmental costs associated with oil exports show the social gain that could be achieved (and the justifiable amount of investment and the differential costs that would be incurred) by minimizing these impacts. If, for instance, a country is appraising the possibility of opening up new exploration areas to oil companies because those already being exploited are beginning to show signs of becoming depleted, it should consider the benefits of investing in exploiting more fully (albeit at a higher cost) the recoverable reserves of existing wells. Not until this has been done, should the country consider bringing on stream new fields (again, at a higher cost of investment) and this should be done without opening up new roads.

(Original: English)

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KEYWORDS

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Determinants of technological innovation in Argentina and Brazil

Eduardo Gonçalves, Mauro Borges Lemos and João de Negri

This article analyses and compares the determinants of innovation in Argentina and Brazil, countries that have based their industrialization strategies on import substitution. Probit regressions in which instrumental variables are used to check for problems of endogeneity of exports reveal that, in both countries, knowledge external to firms helps to promote innovation, that internal research and development capacity is relatively weak and that external trade integration has a positive effect on firms' propensity to innovate (more so in Brazil than in Argentina). The results of this study suggest in general that there has been modest progress in the pattern of innovation among Argentine and Brazilian firms in recent years compared with the import substitution period.

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I
Introduction

Innovation is generally considered to be one of the main drivers of economic development (Rosenberg, 1976). The underdevelopment of Latin American countries is therefore frequently attributed to problems with their import substitution-based industrialization process, which has resulted in sectorally fragile production structures and a heterogeneous mix of industrial firms. Although Argentina and Brazil have progressed with industrialization compared with other Latin American countries –especially as regards sectoral diversification– both countries' industrial structures show marked fragility and heterogeneity. According to Teitel and Thoumi (1986), the import substitution processes in Argentina and Brazil were very similar.

The first phase in these two countries' import substitution processes extends from the early twentieth century until the Second World War, with the development of industries for non-durable consumer goods (such as food products) and simple consumer goods (such as furniture, wearing apparel, footwear, farm equipment and tools). The first phase is deemed to have arisen from growth in the consumer market and from agricultural sector surpluses, especially in Brazil's coffee sector and Argentina's beef and cereal sectors.

In the second phase, extending from the 1950s until the early 1970s, both countries consolidated their production capacity for durable consumer goods, as well as their industrial complex for the manufacture of basic metals and fabricated metal products. This phase was characterized by iron and steel intermediate goods and finished products such as refrigerators, washing machines, motorcycles and, later, cars and trucks. Both countries also began to manufacture some machine-tools and industrial equipment.

The third and final phase began in the mid-1960s and lasted until the late 1970s. It was characterized by the integration and strengthening of the basic chemical industry, the metallurgical industry, the pulp and paper industry and other intermediate goods industries, as well as industries manufacturing larger and more complex capital goods. However, a number of analyses have highlighted the limited and incomplete nature of this phase (Furtado, 1968; Tavares, 1978; Rodrigues, 1981; Mello, 1982), which gave rise to sectoral weaknesses in the industrialization process.

According to Bell and Pavitt (1993), in Latin American countries the development of the capital goods industry and of large-scale manufacturing sectors was not followed by the emergence of sectors manufacturing specialized and complex instruments or machinery, or making intensive use of knowledge. This belated and incomplete industrialization process has had a direct impact on the innovative capacity of the Argentine and Brazilian economies.

According to Ranis (1984), the import substitution policy adversely affected local technological activity because it prompted firms to acquire the technology available in the world market. Focusing on physical accumulation rather than on efficiency posed the problem of choosing appropriate technologies. Furthermore, as the tariff protection system distorted the prices of factors and products, it created windfall profits for the entrepreneurial class, which lost interest in seeking local technological opportunities. The import substitution model also encouraged the free entry of capital goods, whilst affording tariff protection to the intermediate and finished goods segments.

This type of criticism of import substitution policies so common in specialized literature can be more aptly applied to the model adopted by Latin American countries, where the factors and conditions for reciprocity of support to infant industry tended to be weak or non-existent. As Okimoto (1989) and Amsden (1989) pointed out, the experiences of south-east Asian countries (especially the Republic of Korea and Japan) show that the establishment of reciprocity rules on performance (in innovation and exports) and on timeframes (for the duration of the support and compliance with the reciprocity rules) allows the successive phases of import substitution and export substitution to be synchronized to build the structural foundations for long-term growth.

Lack of synchronization in the substitution dynamic perpetuates the weakness or non-existence of the capital goods industry in developing countries

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because it limits opportunities to introduce capital-intensive innovations and hinders the development of the technology base of skills, knowledge, infrastructure and organization on which technical progress relies.

According to Rosenberg (1976), the machine-tools sector is decisive in the creation and dissemination of new skills and techniques in an economy. These are developed and perfected in response to demand from specific customers and are later passed on to all sectors that use machinery. The capital goods sector is also crucial to making any sort of innovation viable, in products or processes, because a new capital good with defined specifications will need to be produced for every new consumer good planned for manufacture.

Unless the State acts to instigate and guide the industrialization process in developing countries, a condition of technological dependence is reproduced, with the result that almost all types of innovation introduced in developing countries are to improve or perfect existing processes or products (Fransman, 1985). In contrast, developed countries tend to spearhead all radical Schumpeterian-type technological changes. To enable them to join the radical technology innovators, countries that are striving to catch up with more advanced nations need to implement specific policies of new-technology training, coordinated with the substitution model dynamic. There is a major difference between Asian and Latin American countries in terms of import-substitutive industrialization.

These distinctive features of the process of technological change in Latin American countries, stemming from their chosen import substitution model, have led international technology transfer mechanisms to take on crucial importance for those countries. Examples include foreign direct investment (FDI), the import of capital goods, licensing and know-how agreements, and technical assistance.

The effects of the foreign-technology absorption process on local capacity to develop technology vary because they depend on the form and degree of dependence entailed by technology imports (Lall, 1992). Lall believes that technology imports must nurture local technology effort and never suppress it. Otherwise the presence of subsidiaries of multinationals could be detrimental, given the tendency of multinational companies to keep their research and development (R&D) functions at head office. Licensing and outside consulting can also be damaging if know-how is not transferred to local agents. Special, functional and selective measures are therefore needed to develop local technological capacity.

Dahlman (1984) took a similar stance by stressing the difference between acquiring technological capacity and acquiring technology. While technology can be acquired by means of foreign direct investment, licences, know-how transfer, technical service agreements and imports of capital, technological capacity can be developed only by training human capital, which calls for formal education, in-service training, experience and special efforts to obtain, assimilate, adapt, improve or create new technology. This requires a country acquiring technology to gear its approach to the level of learning involved in the technology transfer. This level of learning is understood to mean the acquisition of additional knowledge and technical skills by individuals and organizations (Bell, 1984).

Experiences of industrialization in Latin America show that the tendency to acquire technology rather than technological capacity even extended to the major economies. The Argentine and Brazilian cases are paradigmatic (Katz and Bercovich, 1993; Dahlman and Frischtak, 1993). When the import substitution model failed, the ability to develop national technological capacity was thwarted by the institutional changes that occurred in Argentina and Brazil, as well as in other Latin American economies, in the 1980s and 1990s.

Cimoli and Katz (2001) highlight the effects of adjustments in regional economies following recent processes of trade liberalization and market deregulation arising from globalization. The result of some structural changes in the world economy (with the increasing returns to scale in the production of knowledge and synergies and the interdependence of firms and other institutions that globalization tends to produce) was a trend towards the concentration of research and development and engineering activities in mature countries. Moreover, the developing economies specialized in low value-added commodities and in assembly or *maquiladora* (or in-bond) activities. In the case of Argentina, some production changes led to the destruction of human capital and technological capacities and their substitution by capital incorporating new technology, as well as by foreign engineering and research and development services.

Given that Argentina and Brazil's industrial structures reflect the legacy of the import substitution period and the effects of macroeconomic adjustment starting in the 1990s, this article sets out to make a comparative assessment of the current determinants of technological innovation in industrial firms in the two countries. The study focuses on company's internal determinants related to the efforts it makes to

innovate through spending on R&D, purchasing R&D from other companies, buying R&D from other firms, acquiring machinery and equipment, and expenditure on industrial projects and other external knowledge.

Section II below details the methodology and databases used. Section III shows the results of the regressions for Argentina and Brazil, and section IV presents the conclusions of the study.

II
Methodology

1. Description of databases and construction of variables

The data on innovative activities in Brazil come from the Industry Technological Innovation Survey (PINTEC), which covers innovations introduced during the period 1998-2000. This survey includes firms with more than 10 employees and was conducted by the Brazilian Geographical and Statistical Institute (IBGE, 2002). PINTEC follows the Oslo Manual of the Organization for Economic Co-operation and Development (OECD) and the methodology of the third Community Innovation Survey 1998-2000 (CIS3), in which 15 European Union countries participated. Data were also drawn from the Annual Industrial Survey (Pesquisa Industrial Anual – PIA) from IBGE, the Foreign Capital Census from the Central Bank (BACEN), and external trade data from the Foreign Trade Department of the Ministry of Development, Industry, and Trade.

The data for Argentina are drawn from the second National Survey on Innovation and Technological Behaviour in Argentine Firms *(Encuesta Nacional de Innovación y Conducta Tecnológica de las Empresas Argentinas)* for the period 1998-2001, conducted by the National Institute of Statistics and Censuses (INDEC). This survey follows the methodology suggested by the Statistical Office of the European Communities (EUROSTAT) and the Oslo, Frascati and Bogotá manuals (INDEC/SECYT/ECLAC, 2003).

The reference year for the innovation variables is 2000 in the case of Brazil and 2001 in the case of Argentina. The regressions were calculated using the expanded number of firms in the samples, which represent the universe of industrial firms in the two countries.

A comparison of the two surveys poses two problems.[1] The first is the period covered by the data derived from answers to the respective questionnaires. Whereas the Argentine survey analyses the introduction of innovations in the previous four years, the Brazilian survey covers the previous three years. If innovation is assumed to be a random variable distributed uniformly over the period in question, we could conclude that the Argentine data are overestimated by 25% compared with the Brazilian data. The second, even more serious, problem relates to the structure of the samples. The National Survey on Innovation and Technological Behaviour in Argentine Firms is a sample of the annual industrial survey. By contrast, the Brazilian survey is not a random sample of registered manufacturing firms. This industrial survey overestimates large firms. Bearing in mind that size is a positive factor for innovation, this bias leads to an overestimation of new innovations in the Argentine survey compared with PINTEC. In other words, the two problems together result in an overestimate of data on Argentine innovation, which limits the usefulness of comparing the descriptive statistics of the two surveys.

However, we believe that these biases do not compromise the results of the regressions, because the two databases were not combined. The regression equations were constructed separately and the results were compared later. As regards the first bias (the period for which information was obtained), it is highly unlikely that a one-year difference would affect the distribution of the determinants of innovative effort. As regards the second bias (the overestimation of Argentine large firms), the introduction of the dummy variable 'company size' as a control variable may have sufficed to resolve the problem.

Setting aside these points, the database indicators reveal that 56% of Argentine firms introduced some type of technological innovation in the period 1998-2001 (INDEC-SECYT-ECLAC, 2003) and that 31.8% of Brazilian firms did so in the period 1998-2000 (IBGE, 2002). The 2,541 Argentine firms that introduced new products onto the market represent around 21%

[1] This paragraph is based entirely on the comments of an anonymous *CEPAL Review* referee, who warned the authors of these problems and to whom the authors are very grateful.

of the universe of Argentine firms (11,720), whereas the 2,938 Brazilian firms which the 1998-2000 survey considered to have introduced innovative products into the domestic market represented around 4%.

One of the virtues of the two surveys is that they take into account not only expenditure on research and development but also expenditure on other types of innovative activity. Box 1 compares and correlates the methodologies of the two surveys with reference to the definitions of innovative activities used in the questionnaires. Even though the Argentine survey contained no questions concerning expenditure for introducing innovations onto the market and the Brazilian questionnaire contained no questions concerning management and consulting expenditure, the other items are fairly well matched, as the box illustrates.

In Brazil, expenditure on the acquisition of machinery and equipment predominates, representing around 52.1% of innovation expenditure in 2000. Spending on research and development represented 16.8% and on industrial projects and other technical systems, 14.8%. The rest of the expenditure was for the introduction of technological innovations into the market (6.4%), the acquisition of other external knowledge (5.2%), the external acquisition of R&D (2.8%) and training (1.9%).

In Argentina, expenditure on machinery and equipment totalled 75% of innovation spending in 2000. Expenditure on research and development activities represented 8.6% and on technology transfer, 6.5%. The rest was divided among engineering and industrial design (3.6%), training (1.8%), consulting (1.7%), management (1.5%) and the purchase of R&D (1.3%).

Apart from variables for different types of innovation expenditure and the number of employees assigned to research and development activities, this article also included control variables such as external trade integration (import and export coefficients) and structural and performance variables (degree of market concentration and productivity rate). It also included structural dummy variables to capture the different sectoral trends in innovation and the influence of company size and of the source of capital. The Central Bank of Brazil defines a firm with a foreign source of capital as one with more than 50% of its capital controlled by foreigners. A dummy variable was created that took the value 'one' if the firm was a multinational and 'zero' if it was domestic. The firms were classified into three groups according to size: microenterprises and small enterprises (between 10 and 99 employees), which was used as the reference category; medium-sized enterprises (between 100 and 499 employees) and large enterprises (more than 500 employees).

The various types of expenditure on innovation (internal research and development effort, purchase of R&D, expenditure on other external knowledge, on machinery and equipment and on industrial projects) were divided by the firm's total expenditure on innovation. The data are for the year 2000.

Box 1
ARGENTINA AND BRAZIL: DEFINITIONS OF INNOVATIVE ACTIVITIES IN THE TWO NATIONAL SURVEYS

Brazil	Argentina
Research and development	Research and development
External acquisition of research and development	External research and development
Acquisition of other external knowledge	Technology transfer
Acquisition of machinery and equipment	Acquisition of capital goods, hardware and/or software
Training	Training
Industrial projects and other technical systems	Engineering and industrial design
Introduction of technological innovations into the market	…
…	Management
…	Consulting

Source: IBGE (2002); INDEC/SECYT/ECLAC (2003).

The research and development intensity indicator was constructed by dividing a firm's research and development expenditure by its total sales revenue in 2000. The proportion of personnel assigned to research and development was calculated by dividing the number of employees working in research and development activities by the firm's total number of employees in 2000.

The other three variables were constructed with a two-year lag compared with the dependent variables in the study, which are new products and processes introduced into the market. This was done to avoid problems of endogeneity between the regressors and the dependent variable. The import coefficient, productivity and market concentration therefore all refer to the year 1998.

The import coefficient was constructed by dividing a firm's imports by its total sales revenue. The productivity variable was calculated by dividing a firm's total sales revenue by the number of employees. The concentration variable, measured in percentages, was calculated by dividing the total sales revenue of the firm (i) in the sector (j) by the total sales revenue of the sector (j) (classified in accordance with the CNAE, Brazil's standard two-digit national classification of economic activities *(Classificação Nacional de Atividades Econômicas)*.[2]

The construction of time-lagged variables was not sufficient to resolve the problem of endogeneity in the export coefficient variable. In this case, the probit model[3] reveals results in which the export coefficient variable has a sign opposite to the one expected or lacks statistical significance. This contradicts the empirical tests and the theoretical argument that exports are an important mechanism for stimulating innovation.

Indeed, the theoretical reasons for distrusting the negative sign of the export coefficient can be found in studies linking export capacity with innovation (De Negri and Salermo, 2005; Chudnovsky, López and Orlicki, 2005) and studies demonstrating the influence of innovation on exports (Pamukcu, 2003). The specific case of the non-significance of export intensity for innovation is also supported by empirical literature. Where firms do not learn about export activities, past export performance makes no contribution at all to future export performance, as Bernard and Jensen point out (1999).[4]

The probit model was therefore implemented using endogenous regressors.[5] The export coefficient was constructed by dividing firms' exports in the year 2000 (in the case of Argentina, the data were for 2001) by firms' sales revenue in that year.

Two instrumental variables were used for the export coefficient variable. The instrumental variable used for Brazil was the export pattern of firms, whose export values were weighted by the gross domestic product (GDP) growth rate of the export destination country in the period 1997-2000. The second instrument was a dummy variable indicating whether or not a firm had exported prior to 1997.

In the case of Argentina, the only data available was sector-specific data on exports to two destinations (Brazil and the rest of the world). By contrast, Brazilian export data were available for individual firms and for exports to a number of destinations, by crossing data from the Secretariat of Foreign Trade, the PINTEC industry technological innovation survey and the PIA annual industry survey of firms. So, in addition to the GDP growth rates of these two export destinations, the fact of whether or not an Argentine firm had exported in 1998 was also included as an instrumental variable. Argentina's export coefficient variable refers to the year 2001.

The use of these instruments is warranted for three reasons. The first is that they are totally exogenous with respect to the variables used in the econometric specification. The second reason, specific to the application of the time-lagged dummy variable of 'export status' (having, or not having, exported), is the likelihood of export inertia, which tends to be an exogenous factor strongly correlated with the export coefficient. The third reason is that these instruments have proven to be effective, as demonstrated by the results of the tests described in the next section. The validity of the two instrumental variables used was tested using Shea's partial R^2 (1997) to verify the statistical significance and explanatory power of each of these instruments, together with the Sargan test, which proved that the instruments were strongly correlated with the potentially endogenous variable and were not correlated with the error terms.

There is a low level of correlation among the independent variables themselves, which is necessary to avoid problems of multicollinearity. Appendix A

[2] See footnote 7 below for information on the CNAE.

[3] Probit models are models with discrete variables based on a cumulative normal distribution function.

[4] This point was added to the text based on the observation of an anonymous *CEPAL Review* referee.

[5] The STATA data analysis and statistical software programme was used to implement this method.

(tables A.1 and A.2) shows the correlation matrix of the samples.

2. Econometric method

The effects of the variables for measuring structural and performance characteristics and types of innovation expenditure on the propensity of firms to innovate were calculated using a probit model (Greene, 2003). To counter any endogeneity between a regressor and the error term, the method of applying instrumental variables to the probit model was also used (probit model with endogenous regressors).[6] In addition to the theoretical justification for the existence of a dual causality relationship between innovation and exports, a set of tests was used to evaluate the suspicion of endogeneity and the suitability of the instruments employed.

The first is the Wald test of exogeneity of the instrumental variable. If the Wald statistic is not significant, there is not enough information in the sample to reject the null hypothesis of exogeneity. In that case, the basic probit model suffices (STATA, 2005). The test is χ^2 distributed with one degree of freedom.

The second test to evaluate endogeneity is the Hausman test (1978), in which the null hypothesis assumes no systematic difference in the coefficients estimated using ordinary least squares and two-stage least squares. This is equivalent to saying that the variable under study is exogenous where H_0 is not rejected. The test is χ^2 distributed with degrees of freedom equivalent to the number of potentially endogenous regressors.

Two methods can be used to assess the validity of the instruments used. The first is to observe the individual statistical significance and explanatory power of each instrument using Shea's partial R^2 (1997). The second method is to use the Sargan test. The hypothesis is that good instruments must be closely correlated with the potentially endogenous variable and uncorrelated with the error terms (Wooldridge, 2002).

The Sargan test is used to check whether the chosen instruments are independent of the error terms. In this test, the null hypothesis is that the instruments are valid. The statistic is χ^2 distributed with degrees of freedom equivalent to the number of overidentifying restrictions, that is to say, the number of instruments minus the number of regressors (Gujarati, 2004). As the test is not directly applicable to the two-stage probit model, a two-stage ordinary least squares model was estimated to obtain the statistic.

III

Determinants of technological innovation in Argentina and Brazil

This section examines two sets of econometric results.[7] The first includes probit regressions with endogenous regressors for innovative products introduced by Argentina and Brazil. The aim of the second is to evaluate the determinants of process innovation.

1. Product innovation

This section presents the results for Argentina and Brazil of the regressions on the determinants of product innovation. The value of the probit model dependent variable is 'one' when the firm introduces innovative products into the domestic market and 'zero' in all other cases. Five variables were included to measure the relative importance of each type of innovation expenditure. Two variables of innovative effort were included: one to measure the proportion of a firm's personnel who are involved in research and development and the other to measure the intensity of its research and development activities.

[6] The STATA programme function for this model is *IVPROBIT*, with the option of maximum likelihood estimation.

[7] This section contains many references to the CNAE, Brazil's standard national classification of economic activities *(Classificação Nacional de Atividades Econômicas)*, which was established for Brazil by the Brazilian Geographical and Statistical Institute (IBGE). Appendix B describes the relevant CNAE divisions. In this article, the Brazilian CNAE divisions have also been applied to Argentina.

Control variables of firms' external trade integration (import and export coefficients) and performance and structural variables (productivity and market concentration rates) were introduced. To avoid problems of endogeneity, they refer to a period predating that indicated by firms as an innovation period. For the reasons discussed earlier, the import coefficient was considered as an endogenous regressor and was calculated using the instrumental-variables probit method. Structural dummy variables were also included to capture the influence of source of capital, company size and technological opportunities in sectors.[8]

Table 1 shows two regressions. The probit model includes estimates of coefficients, standard deviations and marginal effects without considering the possibility of endogeneity of the export coefficient. The problem is corrected in the instrumental-variables probit model.[9]

In general the instruments chosen to estimate the export coefficient were appropriate (dummy variable for exports in 1997 and GDP growth rate of countries of destination for firms' exports), as confirmed by the significance (*p*-value) of each instrument (appendix C, table C.1). As tables C.1 and C.2 also show, the Sargan test reveals that the instruments are uncorrelated with the error term of the equation in which innovation is the dependent variable, as the null hypothesis is not rejected and the Hausman and Wald tests indicate that the exogeneity hypothesis cannot be supported. Shea's partial R^2 also indicates that the instruments help to explain the endogenous variable (13% in the case of Brazil and 23% in the case of Argentina).

A comparison of the regressions in table 1 shows that the coefficients of the regressors change very little and diminish only after applying the instrumental-variables method, in addition to the change in sign and the increase in the export coefficient value. Even though the variable was constructed to include a time lag with respect to the innovation period in the probit regression, its sign is negative and its value is not significant, indicating a theoretically unexpected result that belies the facts. However, the problem is resolved by using the instrumental-variables probit regression.

The positive sign of the export coefficient in the second econometric exercise captures the stimulant effect of exports on innovation. An export-driven propensity to innovate, measured by the marginal probability, is the second most significant explanatory variable. Fransman (1985) advances four theoretical arguments to corroborate the result, all of which exist in international literature: (i) greater competitive pressure, which promotes better product quality and lower costs; (ii) more opportunities for international intercompany learning; (iii) expansion of the firm's market, which encourages firms to exploit economies of scale and increase the division of labour, and (iv) greater capacity for importing better inputs, which increases the economy's overall productivity.

In principle, imports also provide a means for acquiring more advanced technology incorporated into machinery and equipment or into finished products, which can even lead to what is known as "reverse engineering".[10] However, the mere fact of importing products can increase competition and force national producers to improve their products and processes. The Republic of Korea is a good example in the area of capital goods imports. According to Viotti (2002), its policy for capital goods importation was accompanied by complementary strategies of technology absorption, learning and active incremental innovation (that is to say, adapting or perfecting technology).

Even though the results of table 1 show the positive effect of imports on the propensity to innovate, in the case of Brazil exports are three times more important than imports in terms of marginal probability. In the case of Argentina (table 2), the marginal effects of imports are similar to those of exports after using the instrumental-variables method to correct the estimates. According to the conventional probit method, firms' export coefficient is positive and significant. However, its value is underestimated by the endogeneity problem. Once the estimates are corrected using the instrumental-variables method, the export coefficient increases to 1.68 and the import coefficient decreases to 1.71, producing similar marginal probabilities.

The stimulant effect of imports in Argentina and Brazil accords with the fairly heavy impact of capital goods imports on technology training in many of

[8] See phase one of the instrumental-variables probit regression in appendix C (tables C.1 to C.4).

[9] As different statistical programmes were used, the exact number of firms for the regressions of the two econometric exercises was not available. The SAS statistical analysis software programme was used for the conventional probit model and the STATA software programme was used for the instrumental-variables probit model.

[10] Reverse engineering is understood to mean a learning and innovation process based on analysing electronic devices, electrical components, computer programmes or machinery to find out how they work and to duplicate or enhance them.

TABLE 1

Probit Regression of Product Innovation in Brazilian Industrial Firms, 2000[a]

Explanatory variables	*Probit*			Instrumental-variables *probit*		
	Coefficient	Standard deviation	Marginal probability	Coefficient	Standard deviation	Marginal probability
Intercept	-2.60***	0.06	-	-2.44***	0.05	-
Export coefficient	-0.16^{NS}	0.14	-0.02	1.65***	0.18	0.12
Import coefficient	0.55***	0.22	0.06	0.52***	0.21	0.04
Productivity	0.00***	0.00	0.00	0.00***	0.00	0.00
Concentration	0.33***	0.06	0.04	0.29***	0.05	0.02
Personnel assigned to R&D	0.03***	0.00	0.00	0.03***	0.00	0.00
Intensity of R&D activities	0.12***	0.01	0.01	0.11***	0.01	0.01
Internal R&D effort	1.02***	0.07	0.11	0.96***	0.07	0.07
Purchase of R&D	4.05***	0.49	0.43	3.70***	0.48	0.27
Expenditure on external knowledge	1.25***	0.31	0.13	1.05***	0.29	0.08
Expenditure on machinery	0.70***	0.05	0.07	0.61***	0.04	0.05
Expenditure on industrial projects	1.17***	0.14	0.12	1.06***	0.13	0.08
Dummy variable for source of capital	0.38***	0.06	0.04	0.22***	0.06	0.02
Dummy variable for medium-sized firms	0.20***	0.04	0.02	0.11***	0.04	0.01
Dummy variable for large firms	0.74***	0.07	0.08	0.55***	0.07	0.06
CNAE-16	0.30^{NS}	0.39	0.03	0.02^{NS}	0.35	0.00
CNAE-17	0.03^{NS}	0.09	0.00	0.02^{NS}	0.08	0.00
CNAE-18	-0.41***	0.11	-0.04	-0.40***	0.10	-0.02
CNAE-19	-0.10^{NS}	0.11	-0.01	-0.26***	0.09	-0.02
CNAE-20	-0.04^{NS}	0.12	0.00	-0.28***	0.11	-0.02
CNAE-21	0.17^{NS}	0.11	0.02	0.22**	0.10	0.02
CNAE-22	0.37***	0.09	0.04	0.39***	0.08	0.04
CNAE-23	-0.93**	0.43	-0.10	-0.85**	0.42	-0.03
CNAE-24	0.45***	0.07	0.05	0.45***	0.06	0.05
CNAE-25	0.21***	0.08	0.02	0.25***	0.07	0.02
CNAE-26	0.03^{NS}	0.09	0.00	0.04^{NS}	0.08	0.00
CNAE-27	0.24**	0.12	0.03	0.16^{NS}	0.11	0.01
CNAE-28	0.06^{NS}	0.08	0.01	0.08^{NS}	0.07	0.01
CNAE-29	0.75***	0.06	0.08	0.66***	0.05	0.08
CNAE-30	-0.13^{NS}	0.29	-0.01	-	-	-
CNAE-31	0.48***	0.09	0.05	0.46***	0.08	0.05
CNAE-32	0.17^{NS}	0.13	0.02	0.19^{NS}	0.13	0.02
CNAE-33	0.08^{NS}	0.13	0.01	0.02^{NS}	0.12	0.00
CNAE-34	0.33***	0.09	0.03	0.31***	0.08	0.03
CNAE-35	0.78***	0.16	0.08	0.75***	0.14	0.11
CNAE-36	0.02^{NS}	0.08	0.00	-	-	-
Log likelihood	-3 727.51			4 004.98		
Wald statistic[b]	2 800.28 ***			2 786.45 ***		
Number of observations	6 626			6 710		
R^2 = 0.44	Probability of correct prediction: 88.4%					

Source: author, on the basis of the SAS programme.

[a] R&D= research and development. CNAE: Brazil's standard national classification of economic activities.

[b] Joint significance test of the explanatory variables ($\chi 2$ distribution with 35 and 33 degrees of freedom respectively).

* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

TABLE 2

***Probit* Regression of Product Innovation in Argentinean Industrial Firms, 2001[a]**

Explanatory variables	*Probit*			Instrumental-variables *probit*		
	Coefficient	Standard deviation	Marginal probability	Coefficient	Standard deviation	Marginal probability
Intercept	-1.42***	0.05	-	-1.45***	0.04	-
Export coefficient	0.51***	0.09	0.16	1.68***	0.16	0.41
Import coefficient	2.14***	0.17	0.67	1.71***	0.17	0.42
Productivity	0.00***	0.00	0.00	0.00***	0.00	0.00
Concentration	0.05**	0.03	0.02	0.04*	0.02	0.01
Personnel assigned to R&D	0.05***	0.00	0.02	0.04***	0.00	0.01
Intensity of R&D activities	0.26***	0.04	0.08	0.25***	0.04	0.06
Internal R&D effort	0.73***	0.10	0.23	0.77***	0.10	0.19
Purchase of R&D	1.67***	0.39	0.52	1.79***	0.38	0.44
Expenditure on external knowledge	2.63***	0.86	0.82	2.22***	0.83	0.55
Expenditure on machinery	0.73***	0.04	0.23	0.72***	0.04	0.18
Expenditure on industrial projects	2.18***	0.17	0.68	2.07***	0.16	0.51
Dummy variable for source of capital	-0.36***	0.07	-0.11	-0.41***	0.07	-0.08
Dummy variable for medium-sized firms	0.22***	0.05	0.07	0.14***	0.05	0.04
Dummy variable for large firms	0.37***	0.15	0.12	0.32**	0.14	0.09
CNAE-16	-0.28[NS]	0.81	-0.09	-1.01[NS]	0.72	-0.14
CNAE-17	0.11[NS]	0.07	0.03	0.14**	0.06	0.04
CNAE-18	-0.03[NS]	0.09	-0.01	0.10[NS]	0.08	0.02
CNAE-19	0.04[NS]	0.08	0.01	-0.16**	0.08	-0.04
CNAE-20	-1.32***	0.21	-0.41	-1.18***	0.21	-0.16
CNAE-21	-0.10[NS]	0.11	-0.03	-0.05[NS]	0.11	-0.01
CNAE-22	0.19**	0.08	0.06	0.28***	0.07	0.08
CNAE-23	0.44[NS]	0.56	0.14	0.25[NS]	0.55	0.07
CNAE-24	0.12*	0.07	0.04	0.18***	0.06	0.05
CNAE-25	0.12*	0.07	0.04	0.03[NS]	0.07	0.01
CNAE-26	0.59***	0.10	0.18	0.67***	0.09	0.21
CNAE-27	-0.15[NS]	0.11	-0.05	-0.10[NS]	0.11	-0.02
CNAE-28	-0.36***	0.08	-0.11	-0.31***	0.07	-0.07
CNAE-29	0.54***	0.09	0.17	0.54***	0.08	0.16
CNAE-30	-	-	-	-	-	-
CNAE-31	-0.68***	0.12	-0.21	-0.61***	0.11	-0.11
CNAE-32	-0.80[NS]	0.58	-0.25	-0.14[NS]	0.42	-0.03
CNAE-33	-0.19[NS]	0.19	-0.06	-0.12[NS]	0.18	-0.03
CNAE-34	0.17**	0.09	0.05	0.06[NS]	0.08	0.01
CNAE-35	0.53***	0.15	0.16	0.52***	0.14	0.16
CNAE-36	-0.17[NS]	0.10	-0.05	-	-	-
Log likelihood		-3 753.30			342.77	
Wald statistic[b]		1 726.45 ***			1 924.95 ***	
Number of observations		1 256			1 286	
$R^2 = 0.82$	Probability of correct prediction: 74.9%					

Source: author, on the basis of the SAS programme.

[a] R&D = research and development. CNAE= Brazil's standard national classification of economic activities.

[b] Joint significance test of the explanatory variables (χ^2 distribution with 34 and 33 degrees of freedom respectively).

* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

the firms in both countries. Moreover, the significant stimulant effect of exports on Brazilian firms' product innovation appears to denote a measure of success in diversifying Brazil's export pattern, gearing it towards technologically more complex products that are more in line with Fransman's abovementioned four positive effects of exports on innovation (Fransman, 1985).

In Brazil, the purchase of R&D is by far the most important factor in boosting product innovation, which reveals the technological dependence of Brazilian industrial firms. The data in table 1 also show that expenditure on innovation is not substitutive but complementary. In terms of marginal probability, spending on machinery and equipment has the least impact on product innovation.

In short, the results highlight four characteristics of Brazil's industrial firms with respect to their capacity to introduce new products into the domestic market: (i) the importance of external acquisition of technology by means of purchasing R&D, licences, acquisition of know-how, patents, registered trademarks, consulting services and technology transfer agreements; (ii) their weak internal research and development capacity, given that third-party service provision in this area (measured in terms of marginal probability) is four times greater than firms' internal research and development effort; (iii) the relatively small contribution of machinery and equipment acquisition to product innovation, and (iv) the prominent role of exports as an innovation driver.

In Argentina, these four characteristics are also very pronounced, although there are a few differences (table 2). First and foremost, the order of importance of the two main types of innovation expenditure is not the same. In Argentina, expenditure on other external knowledge and on industrial projects contributes most to the likelihood of product innovation, whereas the purchase of R&D comes second. This may mean that the acquisition of more definitive forms of technological knowledge (such as licences, purchase of technical know-how, patents and registered trademarks) is more useful to Argentine firms than the purchase of inputs for innovation in the form of R&D, which appears to predominate in Brazilian firms. A second difference between the two countries is the contribution made by external trade-integration variables to product innovation by firms. Whereas exports are clearly the predominant factor in Brazil, in Argentina exports and imports make a similar contribution.

Just as in Brazil, machinery and equipment expenditure in Argentina is the least important type of expenditure for new product creation. The data also suggest that internal research and development capacity is poor in both economies and only serves to complement the external acquisition of knowledge for use in product innovation.

According to the information for both countries, structural and performance variables make a relatively small contribution to firms' propensity for product innovation. In other words, when the significant variables of innovative effort and external trade integration are not omitted but, on the contrary, are clearly explained or specified in the model, the importance of the traditional structure and performance factors diminishes. This means that, irrespective of firms' market power (concentration), size, origin and performance (productivity), the factors that determine the propensity of Argentine and Brazilian firms to engage in product innovation are all types of innovative effort and external trade integration, especially exports.

Even so, structural factors are still significant. Observations show that the larger a firm is, the greater its propensity to innovate. The approximate marginal probability of large firms in Argentina and Brazil is 9% and 6% respectively, whereas in medium-sized firms it is 4% and 1% respectively. These results confirm one of Schumpeter's two hypotheses (1961), according to which innovation would increase more than proportional to size of the firm. The other hypothesis is confirmed by the positive contribution of the concentration variable, whose effect on increasing the likelihood of innovation is positive and significant in both countries.

As the absolute size of firms is already considered in another variable, this result indicates that larger relative size (greater market power) favours innovation in both countries. In other words, company size is the determinant of innovation. If the sign were negative, it would indicate that emerging firms favour innovation. In this case, the incentive for innovation would be the determinant. The results for both countries' industrial firms are as expected, given that in intracompany innovation, the stock of knowledge (gained by imitation, incremental innovation and adaptation by purchasing technology) predominates over knowledge flow. It is possible for the sign to be negative in more industrialized economies, if the incentive for innovation (1934 theory of the young Schumpeter) predominates over innovative capacity (1942 theory of the mature Schumpeter).

The inverse causality relationship (the effect of innovation on concentration) is also consistent with the Schumpeterian vision, but only after a prolonged

period of time. A technological breakthrough would be the starting point for a firm to grow and would enable it to take a market lead.

Productivity, which is a traditional measure of firms' performance and indicates their production efficiency, directly affects profitability, which is the key performance variable. It was included to test the relationship between performance (measured by productivity) and innovative effort (the extent to which firm's efficiency induces and boosts innovative effort). However, evidence indicates that productivity has no significant effect on the likelihood of innovation , even though its coefficient is statistically significant.[11]

The aim of the dummy variable for the source of capital is to capture differences in innovative effort between multinational companies and domestic firms. It was introduced because in specialized literature there are divergent views concerning the effect of multinational companies on national innovative capacity (Mansfield, 1974). An important difference between the two countries analyzed is the impact of the source of capital on the likelihood to innovate.

In Brazil, the presence of multinational companies increases the likelihood of innovation by approximately 2%. The chosen category of reference and comparison is domestically-sourced capital. This is because foreign capital is believed to have a major influence on national innovative capacity. However, its importance needs to be evaluated by considering which types of effort multinational companies have made and whether their greater visibility in the area of innovation can be attributed to much more systematic activities in this area.

It is useful to make a comparison with Araújo's theory (2005), which reveals that the presence of multinational companies reduces the likelihood of domestic firms investing in research and development. Both results allow us to conclude that multinational companies make a limited contribution to national technological development because, even though they allow international technology transfer, they fail to develop the country's innovative capacity by creating local externalities (something that would be achieved if research and development activities were conducted locally).

As in the case of Brazil, multinational companies have no decisive impact on product innovation in Argentina either. On the contrary, their presence reduces the likelihood of innovation by around 8%. Mansfield's classic hypothesis (1974) that multinationals would contribute to national technological development as vehicles for disseminating international technological best practice, does not appear to be true for Argentine industry. This is consistent with Chudnovsky's finding (1999) that the subsidiaries of multinationals in Argentina created few technological externalities, owing to the small scale of their innovative activities and their limited technology links with local suppliers and research centres. Chudnovsky, López and Pupato (2006) also corroborate this result, having found no significant relationship between foreign capital ownership and the propensity of firms to engage in innovative activities or launch innovations onto the market.

Following Pavitt's line of argument (1984), firms' propensity to innovate differs according to the sector to which they belong, as some sectors have more technological opportunities than others. Technological opportunities include the set of possibilities for technological advance (Klevorick, Levin et al, 1995). The chosen reference category for this study was the dummy variable for the manufacture of food products and beverages, as this is a wide-ranging sector of great importance to both countries' economies. According to Scherer (1965), technological opportunity is the factor that most influences inter-industrial differences when innovation results are measured using patent data, for instance.

In Brazil, the dummy sectoral variables that most contribute to the propensity to innovate correspond to the following CNAE divisions: pulp and paper (CNAE-21), publishing and printing (CNAE-22), chemical products (CNAE-24), rubber and plastic products (CNAE-25), machinery and equipment (CNAE-29), electrical machinery and apparatus (CNAE-31), vehicle assembly (CNAE-34) and other transport equipment (CNAE-35). In the following sectors, there is a lower likelihood of innovation compared with the reference category: manufacture of wearing apparel and accessories (CNAE-18), leather and footwear (CNAE-19), wood products (CNAE-20) and coke and refined petroleum products (CNAE-23). The other seven dummy sectoral variables lack statistical significance in the regression and two were excluded from the programme as they were vectors comprising solely 0 or 1.

The sectors under study exhibit heterogeneous indicators of technology content and patterns of

[11] As with the concentration variable, the relationship between innovation and productivity may be characterized by dual causality. However, as mentioned in section two on methodology, the productivity variable relates to the year 1998. The objective is therefore to determine the influence of firms' past productivity on their current innovation performance.

technology effort, as well as diverging widely from Pavitt's taxonomy, which was originally formulated for developed countries. They include "supplier-dominated" sectors, which are not the sectors that tend to have the greatest technological opportunities in developed countries (CNAE 21 and 22) and sectors classified by the Organisation for Economic Co-operation and Development as low technology (CNAE 22), medium-low technology (CNAE 25) and medium-high technology (CNAE-34).

This sectoral heterogeneity in Brazil's innovative capacity reflects not only the source of capital but also an industrial structure biased in favour of natural resource-based sectors, which sustain the export model. Given that such sectors tend to be supplier-dominated or exploit economies of scale, they entail little private research and development for the purposes of product innovation, since technology effort is concentrated on acquiring machinery and equipment and improving production inputs and processes. Moreover, in national knowledge-based sectors, which rely on specialist suppliers and make intensive use of information, the research and development effort is limited because absorption is a passive process that is dependent on international technology-transfer mechanisms.

Sectoral heterogeneity also reflects the fragile industrialization process in Latin American economies, which is incomplete and has created gaps in their technology matrices. The result is that, even where input-product matrices are "complete", as in Brazil's industrial structure, some sectors are under-represented, especially in the capital goods segments, and this weakens national capacity to create new products and processes. The very concept of innovation means different things in different countries of the region, as our study's dependent variable is itself linked with innovations targeted at the domestic market rather than the international market, in stark contrast to those of technologically advanced countries.

These same observations are also true for Argentina's industry, although there are some sectoral differences compared with Brazil. The significant dummy sectoral variables in the regression in table 2 were as follows: textile products (CNAE-17), publishing and printing (CNAE-22), chemical products (CNAE-24), non-metallic mineral products (CNAE-26), machinery and equipment (CNAE-29) and other transport equipment (CNAE-35).

Another group of sectors exhibits a negative coefficient in the regression, meaning that it does not stand out from food products and beverages. Some such sectors are: leather and footwear (CNAE-19), wood products (CNAE-20), fabricated metal products (CNAE-28) and electrical machinery and apparatus (CNAE-31). A marked difference with respect to Brazil is the inclusion of CNAE-31 in this group, showing the weak innovative capacity of this sector in Argentina. The nine other dummy sectoral variables have no statistical significance in the regression and two were excluded from the programme as they were vectors comprising solely 0 or 1.

2. Process innovation

Below are the results of the regression to estimate the propensity of Brazilian and Argentine firms for process innovation, showing major differences compared with product innovation.

The instruments chosen to estimate the export coefficient are significant in the case of Brazil because they have major individual significance (*p*-value) and pass the Sargan test. The Hausman and Wald tests indicate that the exogeneity hypothesis cannot be supported (appendix C, table C.3). In the case of Argentina, perhaps because less prolific data was available for use as instruments, the Sargan test rejects the null hypothesis of orthogonal error significant to 5%, calling into question the validity of the instruments (appendix C, table C.4). However, one of the instruments chosen (a dummy variable) has individual statistical significance in the regression, while the same is not true of the GDP growth of export destination countries.

As regards the type of expenditure associated with Brazilian process innovation (table 3), the magnitude of marginal probability reveals that the chief determinant of innovation is the purchase of R&D, as it is in the case of product innovation. The order of importance of product innovation determinants differs only in terms of the role played by the 'internal research and development effort', which, in the case of process innovation, has the least impact on the likelihood of innovation. This was to be expected, given the heavy involvement of machinery suppliers and technology service providers in innovations that reduce production costs. In such a case, the complementary nature of this expenditure is likely to be even more marked than in product innovation. Amazingly the marginal probability of expenditure on machinery and equipment is fairly low.

Of all expenditure on innovation, only the internal research and development effort contributes less to the propensity to innovate. Even though these various

TABLE 3

Brazil: determinants of the likelihood of process innovation, 2000[a]

Explanatory variables	*Probit*			Instrumental-variables *probit*		
	Coefficient	Standard deviation	Marginal probability	Coefficient	Standard deviation	Marginal probability
Intercept	-2.69***	0.06	-	-2.71***	0.06	-
Export coefficient	0.41***	0.13	0.03	1.19***	0.22	0.04
Import coefficient	2.12***	0.23	0.15	2.03***	0.23	0.07
Productivity	0.00[NS]	0.00	0.00	0.00*	0.00	0.00
Concentration	0.25***	0.05	0.02	0.20***	0.05	0.01
Personnel assigned to R&D	0.03***	0.00	0.00	0.03***	0.00	0.00
R&D intensity	0.08***	0.01	0.01	0.08***	0.01	0.00
Internal R&D effort	0.69***	0.09	0.05	0.69***	0.08	0.02
Purchase of R&D	2.26***	0.48	0.16	2.34***	0.48	0.08
Expenditure on external knowledge	1.49***	0.33	0.11	1.32***	0.32	0.05
Expenditure on machinery	1.07***	0.05	0.08	1.04***	0.05	0.04
Expenditure on industrial projects	1.17***	0.16	0.08	1.15***	0.15	0.04
Dummy variable for source of capital	0.14**	0.07	0.01	0.10[NS]	0.07	0.00
Dummy variable for medium-sized firms	0.45***	0.04	0.03	0.41***	0.04	0.02
Dummy variable for large firms	1.02***	0.07	0.07	0.97***	0.07	0.09
CNAE-16	-1.50**	0.72	-0.11	-1.28*	0.69	-0.01
CNAE-17	-0.04[NS]	0.09	0.00	0.01[NS]	0.08	0.00
CNAE-18	-0.97***	0.15	-0.07	-0.91***	0.15	-0.02
CNAE-19	-0.17*	0.10	-0.01	-0.21**	0.10	-0.01
CNAE-20	-0.28**	0.13	-0.02	-0.35***	0.12	-0.01
CNAE-21	0.03[NS]	0.11	0.00	0.11[NS]	0.11	0.00
CNAE-22	0.24***	0.10	0.00	0.32***	0.09	0.02
CNAE-23	-1.07**	0.45	-0.08	-0.98**	0.45	-0.01
CNAE-24	0.07[NS]	0.08	0.01	0.15**	0.07	0.01
CNAE-25	-0.05[NS]	0.08	0.00	0.02[NS]	0.08	0.00
CNAE-26	0.13[NS]	0.09	0.01	0.17**	0.08	0.01
CNAE-27	-0.05[NS]	0.14	0.00	-0.04[NS]	0.14	0.00
CNAE-28	-0.04[NS]	0.08	0.00	0.03[NS]	0.08	0.00
CNAE-29	-0.19**	0.08	-0.01	-0.15**	0.07	0.00
CNAE-30	-1.42***	0.56	-0.11	-	-	-
CNAE-31	0.09[NS]	0.10	0.01	0.16*	0.10	0.01
CNAE-32	0.17[NS]	0.14	0.01	0.26*	0.13	0.01
CNAE-33	-0.66***	0.18	-0.05	-0.59***	0.18	-0.01
CNAE-34	-0.03[NS]	0.10	0.00	0.01[NS]	0.09	0.00
CNAE-35	-0.83***	0.34	-0.06	-0.72**	0.33	-0.01
CNAE-36	-0.14*	0.08	-0.01	-	-	-
Log likelihood		-2 862.52			4 791.04	
Wald statistic[b]		1 741.28 ***			1 828.50 ***	
Number of observations		6 626			6 710	
$R^2 = 0.33$	Probability of correct prediction: 86.9%					

Source: author, on the basis of the SAS programme.

[a] R&D=research and development. CNAE= Brazil's standard national classification of economic activities.

[b] Joint significance test of the explanatory variables (χ^2 distribution with 35 and 33 degrees of freedom respectively).

* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

types of expenditure form a fairly complementary whole, the role they play reveals the importance of each type of expenditure in the innovation process. In Brazil, the pattern of process innovation during the import substitution period relied chiefly on the purchase of machinery, especially imported machinery (Tavares, 2000).

Judging by data for the recent period subsequent to trade opening and monetary stabilization, the pattern of process innovation has shifted more towards the purchase of disembodied knowledge. This suggests progress compared with the previous period, when technological transfers were only based on embodied capital-goods purchases.

This new process innovation model also appears to be developing in Argentina, albeit with less intensity. Table 4 shows that expenditure on the purchase of R&D, industrial projects and machinery and equipment, in that order, are the main factors of process innovation, whereas internal research and development activities come second. The difference is that expenditure on other external knowledge has an adverse effect on process innovation. In spite of this unexpected negative result, which could be caused by errors in the primary research data, expenditure on other external knowledge in Brazil is still the second most important expenditure influencing the propensity for process innovation.

The other two variables that also measure firms' innovative effort are the proportion of their personnel assigned to research and development activities and the intensity of research and development activities (expenditure/turnover ratio). The variable for R&D personnel has a positive sign and is significant, although it is not very important in either of the two countries, just as in the case of product innovation. With respect to the intensity of research and development activities, the differences between Brazilian and Argentine firms that have introduced process innovations are much the same as for product innovation. In other words, the intensity of research and development activities increases the likelihood of innovation more in Argentine firms than in Brazilian firms. As they are generic indicators of innovative effort, these variables are less significant for the two countries than variables related with the type of expenditure.

As regards external trade integration, both exports and imports can be seen to heavily influence the propensity for process innovation in both countries. However, the increase in the likelihood of innovation arising from external trade integration is much greater in Argentina than in Brazil, and is much more akin to the product innovation pattern, even though Argentina's export coefficient is not statistically significant. Whereas in Argentina the impact of imports on the propensity for process innovation is much greater than the joint impact of expenditure on innovation activities, in Brazil these effects are as important as those of trade integration.

This could reflect differences in the degree of trade openness (measured by adding the export and import coefficients), which, in structural terms, is determined by the size of the two economies. The Argentine economy's greater trade openness is therefore expected to boost the positive effects of its trade integration in promoting innovation, especially in processes, which tend to be tangible and exist in the international technology market. Moreover, technological externalities are expected to be greater in the Brazilian economy, as its industrial scale increases the propensity of established firms to innovate by making the results of innovative effort more profitable and effective.

Finally, the structure and performance variables for process innovation tend to be less important than the variables for innovative effort, as was seen in the case of product innovation. With regard to concentration, the results confirm that in Brazil it contributes to process innovation (table 3), although firms' likelihood of process innovation is lower than that of product innovation (see table 1 above). Schumpeter's "mature" economic theory is not borne out in Argentina, at least with respect to this variable, as its coefficient is not significant for process innovation (table 4). Moreover, productivity has virtually no influence on the decision of firms to introduce process innovations, which is much the same result as for firms engaging in product innovation.

In Brazil, although the source of capital has a positive sign, it is not an important factor of process innovation. In Argentina, the source of capital dummy variable has a negative sign and is significant in process innovation, as it is in product innovation. This confirms the results obtained by Chudnovsky (1999) and Chudnovsky, López and Pupato (2006).

As in previous cases, the dummy variables for evaluating the relative importance of company size also show that the propensity to innovate is greater in large firms. The marginal probability is 9% in Brazil and 14% in Argentina, which are higher values than for product innovation in both countries. This means not only that company size is important for both types of innovation in the two countries, but that its importance

TABLE 4

***Probit* Regression of Process Innovation in Argentinean Industrial Firms, 2001[a]**

Explanatory variables	*Probit*			Instrumental-variables *probit*		
	Coefficient	Standard deviation	Marginal probability	Coefficient	Standard deviation	Marginal probability
Intercept	-1.92***	0.06	-	-2.05***	0.05	-
Export coefficient	-0.03^{NS}	0.12	0.00	2.09***	0.19	0.24
Import coefficient	1.98***	0.19	0.30	1.30***	0.20	0.15
Productivity	0.00***	0.00	0.00	0.00*	0.00	0.00
Concentration	0.03^{NS}	0.03	0.49	0.00^{NS}	0.03	0.00
Personnel assigned to R&D	0.05***	0.00	0.01	0.05***	0.00	0.01
Intensity of R&D activities	0.22***	0.03	0.03	0.20***	0.03	0.02
Internal R&D effort	0.17***	0.12	0.03	0.30*	0.11	0.03
Purchase of R&D	1.11**	0.49	0.17	1.11**	0.50	0.13
Expenditure on external knowledge	-0.34***	0.87	-0.05	-0.47***	0.82	-0.05
Expenditure on machinery	0.71***	0.05	0.11	0.67***	0.05	0.08
Expenditure on industrial projects	1.14***	0.19	0.17	0.95***	0.18	0.11
Dummy variable for source of capital	-0.07^{NS}	0.08	-0.01	-0.14*	0.08	-0.01
Dummy variable for medium-sized firms	0.23***	0.06	0.04	0.16**	0.05	0.02
Dummy variable for large firms	0.74***	0.16	0.11	0.74***	0.15	0.14
CNAE-16	-5.33^{NS}	3.62	-0.82	-	-	-
CNAE-17	0.24***	0.08	0.04	0.37***	0.08	0.05
CNAE-18	-1.76***	0.36	-0.27	-1.29***	0.33	-0.06
CNAE-19	-0.18^{NS}	0.11	-0.03	-0.41***	0.11	-0.03
CNAE-20	-0.05^{NS}	0.13	-0.01	0.22*	0.12	0.03
CNAE-21	0.25**	0.12	0.04	0.42***	0.11	0.06
CNAE-22	-0.02^{NS}	0.10	0.00	0.22**	0.10	0.03
CNAE-23	0.74^{NS}	0.58	0.11	0.43^{NS}	0.55	0.07
CNAE-24	-0.47***	0.09	-0.07	-0.31***	0.09	-0.03
CNAE-25	-0.02^{NS}	0.09	0.00	-0.10^{NS}	0.09	-0.01
CNAE-26	0.58***	0.11	0.09	0.77***	0.11	0.15
CNAE-27	-0.44***	0.15	-0.07	-0.25*	0.14	-0.02
CNAE-28	-0.09^{NS}	0.09	-0.01	0.07^{NS}	0.09	0.01
CNAE-29	0.32***	0.10	0.05	0.37***	0.09	0.05
CNAE-30	-	-	-	-	-	-
CNAE-31	-0.14^{NS}	0.13	-0.02	0.06^{NS}	0.12	0.01
CNAE-32	-0.21^{NS}	0.56	-0.03	0.15^{NS}	0.47	0.02
CNAE-33	0.26^{NS}	0.19	0.04	0.47***	0.18	0.08
CNAE-34	0.29***	0.10	0.05	0.22**	0.10	0.03
CNAE-35	-0.23^{NS}	0.24	-0.04	-0.07^{NS}	0.23	-0.01
CNAE-36	-0.63***	0.17	-0.10	-	-	-
Log likelihood		-2 206.45			1 920.81	
Wald statistic[b]		925.09***			1 100.10***	
Number of observations		1 256			1 282	
$R^2 = 0.59$	Probability of correct prediction: 75.3%					

Source: author, on the basis of the SAS programme.

a R&D= research and development. CNAE = Brazil's standard national classification of economic activities.
b Joint significance test of the explanatory variables (χ^2 distribution with 34 and 32 degrees of freedom respectively).
* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

is greater in the case of process innovations, most of which are capital-intensive.

In Brazil, the dummy sectoral variables are significant and have a positive effect on promoting innovations in the following sectors: publishing and printing (CNAE-22), chemical products (CNAE-24), non-metallic mineral products (CNAE-26), electrical machinery and apparatus (CNAE-31) and electronic and communication equipment and apparatus (CNAE-32). In contrast, the following sectors do not stand out from the food products and beverages sector: tobacco products (CNAE-16), wearing apparel and accessories (CNAE-18), leather and footwear (CNAE-19), wood products (CNAE-20), coke and refined petroleum products (CNAE-23), machinery and equipment (CNAE-29), medical, precision and optical instruments (CNAE-33) and other transport equipment (CNAE-35).

In Argentina, the sectors with the highest likelihood of process innovation are: textile products (CNAE-17), wood products (CNAE-20), pulp and paper (CNAE-21), publishing and printing (CNAE-22), non-metallic mineral products (CNAE-26), machinery and equipment (CNAE-29), medical, precision and optical instruments (CNAE-33) and vehicle assembly (CNAE-34). Moreover, the sectors of wearing apparel and accessories (CNAE-18), leather and footwear (CNAE-19), chemical products (CNAE-24) and manufacture of basic metals (CNAE-27) present negative coefficients that are significant in the regression.

These results show that no clear sectoral hierarchy in process innovation exists in Brazilian and Argentine firms and point to innovative behaviour by firms themselves, rather than a propensity to innovate arising from their structural-sectoral integration. Furthermore, many firms from sectors that proved to be more innovative than the food products and beverages sector in terms of product innovations, did not excel in terms of process innovation.

IV
Conclusions

This article analysed the relative importance of the factors that have determined innovation in Brazilian and Argentine industrial firms, taking into account the two countries' distinctive characteristics in terms of technological change, including the high proportion of the innovative expenditures they spend on acquiring external knowledge and absorbing technology embodied into machinery and equipment, compared with their spending on internal research and development activities. Among the determinants of innovation, the article also considered a number of structural and performance characteristics of firms, such external trade integration, productivity, degree of market concentration, sectoral propensities to innovate, influence of the size of firm and source of capital.

The results of the regressions reveal firms' limited in-house capacity to conduct research and development activities which enable them to innovate. The acquisition of external knowledge by purchasing third-party technology services (measured in terms of marginal probability) quadruples internal research and development activities in Brazil and more than doubles them in Argentina. The introduction of product and process innovations is therefore heavily dependent on the purchase of R&D; licensing; know-how acquisition, patents and registered trademarks; consulting services, and technology transfer agreements.

As regards the differences in importance between product innovation determinants and process innovation determinants, the coefficients of these variables of innovative effort can be seen to reflect the rewards deriving from each effort because the variables are a proportion of the overall effort. In the case of product innovation, the acquisition of disembodied knowledge by means of the various types of expenditure is more significant than in the case of processes. Although the general indicators of internal research and development effort (intensity and assigned personnel) are statistically significant, as expected, they have little influence on the introduction of innovations by Brazilian and Argentine firms.

In addition to the variables directly related to expenditure on external and internal acquisition of technological knowledge, firms' external trade integration is highly important for innovation in both countries, albeit much more so for Argentine firms. The effect of exports is significant in both types of innovation in Argentina and Brazil, even though its relative importance

differs in the two countries: whereas in Brazil exports are very important for firms' product innovation, in Argentina they are more important in process innovation. It was established that imports tend to have a positive and significant effect on innovation in both countries, which is consistent with an industrialization process in Latin American countries that was based on import substitution and the large-scale purchase of foreign capital goods and equipment. A point of note is that, in Brazil, imports are more significant for firms that introduce process innovations.

As regards structural and performance variables, market concentration, while significant, does little to explain innovation in Brazilian and Argentine firms, whereas company size has a much greater influence on both product and process innovation in the two countries. While productivity presents positive and significant coefficients, it scarcely influences Brazilian and Argentine firms.

Source of capital is an important factor in the innovative behaviour of Brazilian firms, especially in the case of products. Based on the study results and on information from specialized literature, the finding is that multinational companies located in Brazil have more propensity to innovate than domestic firms, even though this is not reflected in the decision to invest in research and development. This means that multinational companies make a limited contribution to national technological development because, even though they allow international technology transfer, they fail to promote the country's innovative capacity by creating local externalities (something that would be achieved if research and development activities were conducted locally).

In Argentina, however, foreign-sourced capital reduces the likelihood that firms will innovate. This finding is consistent with other studies that reveal that the subsidiaries of multinationals have created few technological externalities, owing to the small scale of their innovative activities and their limited technology links with local suppliers and research centres.

In sectoral terms, the results confirm a heterogeneous mix of technology intensity indicators and patterns of technology effort that is characteristic of Latin American countries. Although a few differences exist between the sectors that are more likely to innovate in both Argentina and Brazil, the study revealed the presence of a few sectors that do not tend to have greater technological opportunities in developed countries or are classified by the Organisation for Economic Co-operation and Development as low or medium technology intensity. This stems from both the technology dynamic of developing countries (dictated by traditional sectors and by large-scale production sectors based on low value-added exports) and the very concept of innovation: for the most part, products and processes are new only in the domestic market because they are copies (with or without adaptation) of products and processes already introduced into technologically advanced countries.

In general, a comparison of the results in recent years with those of the import substitution period reveals some modest advances in the patterns of innovation of Argentine and Brazilian firms. The first advance is in their means for acquiring knowledge for innovation: there has been a move away from the simple purchase of (mostly imported) machinery and equipment to the acquisition of more intangible disembodied knowledge in the form of R&D and of other more definitive forms of technological knowledge, such as patents, licences and know-how. Expenditure on research and development activities and on industrial projects is prominent in firms' internal effort. It does not replace but rather complements their expenditure on external acquisition of knowledge. Progress in firms' pattern of innovation appears to be greater in Brazil than in Argentina, especially in the case of product innovation.

The second advance is in the role played by exports in promoting innovation: exports are more important than imports for Brazilian firms introducing product innovations. This is a powerful indication that the traditional function of exports (to generate import capacity) is changing to one of feeding back dynamic increasing returns. Owing to the positive effects of competitive pressure, exports promote better product quality, lower costs, access to opportunities for international intercompany learning and an expanded market for domestic firms, allowing them to exploit economies of scale and increase the division of labour.

(Original: Portuguese)

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APPENDIX A

TABLE A.1

Brazil: correlation matrix for the sample of firms, 2000[a]
(Sample: 6 710 firms)

	Import coefficient	Productivity	Concentration	R&D personnel	R&D intensity	R&D	External R&D	Other	Machinery	Industrial projects	Export coefficient
Import coefficient	1										
Productivity	0.42	1									
Concentration	0.24	0.34	1								
R&D personnel	0.12	0.12	0.12	1							
R&D intensity	0.09	0.03	0.07	0.55	1						
R&D	0.12	0.11	0.12	0.49	0.53	1					
External R&D	0.07	0.06	0.17	0.20	0.15	0.12	1				
Other	0.10	0.10	0.13	0.12	0.10	0.10	0.12	1			
Machinery	0.08	0.06	0.08	0.07	0.01	-0.11	0.03	0.05	1		
Industrial projects	0.10	0.11	0.07	0.18	0.15	0.09	0.09	0.14	0.17	1	
Export coefficient	0.05	0.05	0.12	0.00	0.13	0.01	0.04	0.05	0.05	0.04	1

Source: author.

TABLE A.2

Argentina: correlation matrix for the sample of firms, 2001[a]
(Sample= 1 286 firms)

	Import coefficient	Productivity	Concentration	R&D personnel	R&D intensity	R&D	External R&D	Other	Machinery	Industrial projects	Export coefficient
Import coefficient	1										
Productivity	0.31	1									
Concentration	0.26	0.26	1								
R&D personnel	0.11	0.15	0.03	1							
R&D intensity	0.10	0.01	0.10	0.22	1						
R&D	0.09	0.05	0.09	0.24	0.56	1					
External R&D	-0.03	0.05	0.07	0.17	0.09	0.09	1				
Other	0.11	0.11	0.12	0.12	0.13	0.08	0.08	1			
Machinery	0.14	0.16	0.09	0.09	-0.02	-0.12	0.02	0.01	1		
Industrial projects	0.08	0.07	0.13	0.12	0.09	0.09	0.09	0.03	-0.03	1	
Export coefficient	0.09	0.08	0.08	0.06	0.04	-0.01	0.03	0.05	0.09	0.03	1

Source: author.

[a] R&D = research and development.

APPENDIX B

Brazil's standard national classification of economic activities (CNAE) devised by the Brazilian Geographical and Statistical Institute (IBGE)

Division	Description
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textile products
18	Manufacture of wearing apparel and accessories
19	Tanning and dressing of leather and manufacture of leather articles, luggage and footwear
20	Manufacture of wood products
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke and refined petroleum products and nuclear fuel and alcohol production
24	Manufacture of chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products – except machinery and equipment
29	Manufacture of machinery and equipment
30	Manufacture of office machinery and computers
31	Manufacture of electrical machinery, apparatus and supplies
32	Manufacture of electronic and communication equipment and apparatus
33	Manufacture of medical and hospital equipment, precision and optical instruments, industrial automation equipment, watches and clocks
34	Manufacture and assembly of motor vehicles, trailers and bodywork
35	Manufacture of other transport equipment
36	Manufacture of furniture and miscellaneous manufacturing

APPENDIX C

TABLE C.1

Brazil (product innovation): results of phase one of the *probit* regression for the export coefficient, 2000[a]

Explanatory variables	Coefficient	Standard deviation
Import coefficient	-0.15***	0.02
Productivity	0.00***	0.00
Concentration	-0.49[NS]	0.44
Personnel assigned to R&D	-0.00[NS]	0.00
R&D intensity	-0.00[NS]	0.00
Internal R&D effort	-0.03***	0.01
Purchase of R&D	-0.05[NS]	0.06
Expenditure on external knowledge	0.02[NS]	0.03
Expenditure on machinery	0.01***	0.00
Expenditure on industrial projects	-0.03*	0.01
Dummy variable for source of capital	0.04***	0.01
Dummy variable for medium-sized firms	-0.02***	0.00
Dummy variable for large firms	-0.02***	0.01
CNAE-16	0.08***	0.03
CNAE-17	-0.03***	0.01
CNAE-18	-0.01[NS]	0.00
CNAE-19	0.05***	0.01
CNAE-20	0.09***	0.01
CNAE-21	-0.04***	0.01
CNAE-22	-0.03***	0.01
CNAE-23	-0.03*	0.02
CNAE-24	-0.05***	0.01
CNAE-25	-0.05***	0.01
CNAE-26	-0.01***	0.00
CNAE-27	-0.02***	0.01
CNAE-28	-0.04***	0.01
CNAE-29	-0.04***	0.01
CNAE-31	-0.05***	0.01
CNAE-32	-0.05***	0.01
CNAE-33	-0.01[NS]	0.01
CNAE-34	-0.03***	0.01
CNAE-35	-0.02[NS]	0.02
Dummy variable for exports in 1997	0.06***	0.00
GDP growth	0.14***	0.00
Constant	0.01***	0.00
Wald statistic[b]	137.84***	
Sargan statistic[c]	0.88[NS]	
Hausman statistic[d]	115.68***	
Partial R^2 (Shea)	0.13	

Source: author, on the basis of the SAS programme.

[a] R&D = research and development. CNAE= Brazil's standard national classification of economic activities.
[b] Wald test for exogeneity of the export coefficient.
[c] Sargan test for validity of the instruments.
[d] Hausman test for exogeneity of the export coefficient variable.
* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

TABLE C.2

Argentina (product innovation): results of phase one of the *probit* regression for the export coefficient, 2001[a]

Explanatory variables	Coefficient	Standard deviation
Import coefficient	0.03[NS]	0.02
Productivity	0.00*	0.00
Concentration	-0.39[NS]	0.28
Personnel assigned to R&D)	0.00***	0.00
R&D intensity	0.00[NS]	0.00
Internal R&D effort	-0.07***	0.01
Purchase of R&D	-0.17***	0.05
Expenditure on external knowledge	-0.05[NS]	0.09
Expenditure on machinery	-0.03***	0.00
Expenditure on industrial projects	-0.07***	0.02
Dummy variable for source of capital	0.03***	0.01
Dummy variable for medium-sized firms	0.01***	0.01
Dummy variable for large firms	-0.01[NS]	0.02
CNAE-16	0.45***	0.08
CNAE-17	0.00[NS]	0.01
CNAE-18	-0.01[NS]	0.01
CNAE-19	0.12***	0.01
CNAE-20	-0.01[NS]	0.01
CNAE-21	-0.06***	0.01
CNAE-22	-0.03***	0.01
CNAE-23	0.10[NS]	0.07
CNAE-24	-0.08***	0.01
CNAE-25	0.03*	0.01
CNAE-26	-0.03***	0.01
CNAE-27	0.02**	0.01
CNAE-28	-0.02*	0.01
CNAE-29	-0.01[NS]	0.02
CNAE-31	-0.03*	0.02
CNAE-32	-0.03[NS]	0.05
CNAE-33	-0.03[NS]	0.05
CNAE-34	0.05**	0.03
CNAE-35	0.03[NS]	0.03
Dummy variable for exports in 1997	0.21***	0.00
GDP growth	0.12[NS]	1.20
Constant	-0.12[NS]	1.31
Wald statistic[b]	100.06***	
Sargan statistic[c]	0.33[NS]	
Hausman statistic[d]	74.58***	
Partial R^2 (Shea)	0.23	

Source: author, on the basis of the SAS programme.

[a] R&D = research and development. CNAE= Brazil's standard national classification of economic activities.
[b] Wald test for exogeneity of the export coefficient.
[c] Sargan test for validity of the instruments.
[d] Hausman test for exogeneity of the export coefficient variable.
* Significant to 10%; ** Significant to 5%. *** Significant to 1%. NS= not significant.

TABLE C.3

Brazil (process innovation): results of phase one of the *probit* regression for the export coefficient, 2000[a]

Explanatory variables	Coefficient	Standard deviation
Import coefficient	-0.15***	0.02
Productivity	0.00***	0.00
Concentration	-0.50[NS]	0.44
Personnel assigned to R&D	-0.00[NS]	0.00
R&D intensity	-0.00[NS]	0.00
Internal R&D effort	-0.03***	0.01
Purchase of R&D	-0.05[NS]	0.06
Expenditure on external knowledge	0.03[NS]	0.03
Expenditure on machinery	0.01***	0.00
Expenditure on industrial projects	-0.03*	0.01
Dummy variable for source of capital	0.04***	0.01
Dummy variable for medium-sized firms	-0.02***	0.00
Dummy variable for large firms	-0.02***	0.01
CNAE-16	0.08***	0.03
CNAE-17	-0.03***	0.01
CNAE-18	-0.01[NS]	0.00
CNAE-19	0.05***	0.01
CNAE-20	0.09***	0.01
CNAE-21	-0.04***	0.01
CNAE-22	-0.03***	0.01
CNAE-23	-0.03*	0.02
CNAE-24	-0.05***	0.01
CNAE-25	-0.05***	0.01
CNAE-26	-0.01***	0.00
CNAE-27	-0.02***	0.01
CNAE-28	-0.04***	0.01
CNAE-29	-0.04***	0.01
CNAE-31	-0.04***	0.01
CNAE-32	-0.05***	0.01
CNAE-33	-0.01[NS]	0.01
CNAE-34	-0.03***	0.01
CNAE-35	-0.02[NS]	0.02
Dummy variable for exports in 1997	0.06***	0.00
GDP growth	0.14***	0.00
Constant	0.01***	0.00
Wald statistic[b]	19.10***	
Sargan statistic[c]	2.09[NS]	
Hausman statistic[d]	12.13***	
Partial R^2 (Shea)	0.13	

Source: author, on the basis of the SAS programme.

[a] R&D = research and development. CNAE= Brazil's standard national classification of economic activities.
[b] Wald test for exogeneity of the export coefficient.
[c] Sargan test for validity of the instruments.
[d] Hausman test for exogeneity of the export coefficient variable.
* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

TABLE C.4

Argentina (process innovation): results of phase one of the *probit* regression for the export coefficient, 2001[a]

Explanatory variables	Coefficient	Standard deviation
Import coefficient	0.03[NS]	0.02
Productivity	0.00*	0.00
Concentration	-0.39[NS]	0.28
Personnel assigned to R&D	0.00***	0.00
R&D intensity	0.00[NS]	0.00
Internal R&D effort	-0.07***	0.01
Purchase of R&D	-0.17***	0.05
Expenditure on external knowledge	-0.05[NS]	0.09
Expenditure on machinery	-0.03***	0.00
Expenditure on industrial projects	-0.07***	0.02
Dummy variable for source of capital	0.03***	0.01
Dummy variable for medium-sized firms	0.01***	0.01
Dummy variable for large firms	-0.01[NS]	0.02
CNAE-16	0.45***	0.08
CNAE-17	0.00[NS]	0.01
CNAE-18	-0.01[NS]	0.01
CNAE-19	0.12***	0.01
CNAE-20	-0.01[NS]	0.01
CNAE-21	-0.06***	0.01
CNAE-22	-0.03***	0.01
CNAE-23	0.10[NS]	0.07
CNAE-24	-0.08***	0.01
CNAE-25	0.03*	0.01
CNAE-26	-0.03***	0.01
CNAE-27	0.02**	0.01
CNAE-28	-0.02*	0.01
CNAE-29	-0.01[NS]	0.02
CNAE-31	-0.03*	0.02
CNAE-32	-0.03[NS]	0.05
CNAE-33	-0.03[NS]	0.05
CNAE-34	0.05**	0.03
CNAE-35	0.03[NS]	0.03
Dummy variable for exports in 1997	0.21***	0.00
GDP growth	0.12[NS]	1.20
Constant	-0.12[NS]	1.31
Wald statistic[b]	112.89***	
Sargan statistic[c]	4.12**	
Hausman statistic[d]	104.56***	
Partial R^2 (Shea)	0.23	

Source: author, on the basis of the SAS programme.

[a] R&D = research and development. CNAE = Brazil's standard national classification of economic activities.
[b] Wald test for exogeneity of the export coefficient.
[c] Sargan test for validity of the instruments.
[d] Hausman test for exogeneity of the export coefficient variable.
* Significant to 10%. ** Significant to 5%. *** Significant to 1%. NS= not significant.

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Trade-growth relationship in Cuba: estimation using the Kalman filter

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In this article, time-varying coefficients are used to estimate the balance of payments constrained growth (BPCG) model for Cuba. Exports are considered to have been a decisive factor in Cuba's recovery following the crisis. Also, there was an estimated increase in income elasticity of demand for imports in the early 1990s and between 2003 and 2005, indicating a decrease in import substitution. The conclusion is that, given the rapid rise in the export of services, there are now better growth prospects for the Cuban economy. However, prospects could be better and would benefit a larger share of the economy if import substitution were also made more efficient and other export sectors with a greater multiplier effect were expanded.

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I
Introduction

In this article, time-varying coefficients are used to estimate the balance of payments constrained growth model for Cuba. The extended form of the BPCG model is used to explain economic growth based on exports, external financing and terms of trade.

The subject has already been addressed in studies by Moreno-Brid (2000), Mendoza and Robert (2002), Mañalich and Quiñones (2004), Alonso and Sánchez-Egozcue (2005) and Cribeiro and Triana (2005). All these studies estimate the trade-growth relationship in Cuba. The contribution this article makes is to use the Kalman filter (KF) estimation method and state-space representation to estimate equations with time-varying coefficients. The aim is to ascertain the trajectory of the elasticities associated with the explanatory variables of the BPCG model, as well as their contribution during different periods. The article also analyses the evolution of import substitution, using the estimated trajectory of income elasticity of demand for imports.

The basic hypothesis is that, in the period 1950-2005, the Cuban economy underwent a number of phases that may have modified the relationship between economic growth and the balance of payments. Between 1950 and 1959, Cuba was a market economy; after 1960 it began to function as a centrally-planned economy; in 1973 it entered the Council for Mutual Economic Assistance (CMEA) with the then-socialist countries; as from 1990 it was affected by the disintegration of the Soviet Union and the collapse of the European socialist block, and now it has stepped up its pace of growth by concluding new agreements with Venezuela and China.

The article is structured as follows. Section II explains the balance of payments constrained growth (BPCG) model. Section III discusses the data. Section IV presents the cointegration tests and the recursive and sequential estimations of the coefficients. The results obtained in section IV are used to estimate the time-varying parameter model; taking a Bayesian approach, they can be interpreted as prior information. Section V presents the model in the state-space form and the statistical results of the Kalman filter. Section VI describes the trajectory of the elasticities and discusses the contribution of the model's explanatory variables. Finally, the conclusions assess the principal results.

II
Balance of payments constrained growth model

The BPCG model, initially put forward by Thirlwall (1979), follows the Keynesian approach of stressing the importance of aggregate demand in the economic growth process, as opposed to the neoclassical approach, which considers the supply of factors of production and technical progress to be fundamental elements of growth. Of the components of aggregate demand, the BPCG model emphasizes the role of exports, as these are the only component of demand that can be expanded without destabilizing the balance of payments situation. The model also reflects the fact that GDP is determined by income elasticity of demand for imports; an increase in such elasticity reduces the export multiplier effect. Thus, given its rate of export growth and income elasticity of imports, each country has a GDP growth rate consistent with the current account balance. Thirlwall and Hussain (1982) extend the model to include net external financing; this makes it possible to reflect the experience of countries that accumulate current account deficits for prolonged periods.[1]

The BPCG model can reflect the situation of countries like Cuba, which rely on imported intermediate

[1] For a fuller description of the BPCG model, see McCombie and Thirlwall (1994).

inputs for the day-to-day running of the economy and on imported capital goods to increase growth in productive forces. Thus, economic growth is constrained by the availability of foreign exchange to finance imports.

Exports affect growth in gross domestic product (GDP) in two ways: first, via the foreign trade multiplier and, second, by relaxing the balance of payments constraint on growth, as exports automatically generate foreign exchange receipts to pay for imports. That is why, even if the value of exports is small compared with the total value of GDP, export growth is a decisive factor in total growth. Added to the effect of exports, there is also the relaxing effect that external financing and terms of trade can have on balance of payments constraints.

Below is the formulation of the extended form of the BPCG model developed by Thirlwall and Hussain (1982).

$$(1) \qquad X*Px + FE* E = M*Pm*E$$

Equation (1) expresses the balance of payments identity, where X represents real exports, Px is the price of exports in national currency, FE is net external financing or the current account deficit in foreign currency units, M is real imports, Pm is the price of imports in foreign currency and E is the nominal exchange rate expressed in national currency units per foreign currency unit.

$$(2) \qquad \theta = \frac{Px * X}{\left(Px * X + FE * E\right)}$$

Equation (2) is an identity introduced to simplify the algebraic notation, in which θ expresses export earnings as a share of total imports at current prices and $(1-\theta)$ expresses the proportion of current imports financed with the net capital inflow. The dynamic formulation of equation (1) is:

$$(3) \qquad \theta\left(x + px\right) + \left(1-\theta\right)\left(fe + e\right) = m + pm + e$$

where the lower-case letters represent the growth rates of the variables.

Expression (4) below symbolizes a conventional dynamic equation of import demand, and equation (5) expresses exports as exogenous to the other variables in the model:

$$(4) \qquad m = \phi\ (pm - px + e) + \xi y \text{ with } \phi < 0 \text{ y } \xi > 0$$

$$(5) \qquad x = x_0$$

where θ is the import price elasticity, y is the growth rate of real national income and ξ is the income elasticity of imports.

By substituting equations (4) and (5) into expression (3) and taking a fixed exchange rate ($e = 0$), we obtain the economic growth rate compatible with the balance of payments equilibrium:

$$(6) \qquad y = \frac{\theta x + \left(1-\theta\right)\left(fe - px\right) + \left(\phi + 1\right)\left(px - pm\right)}{\xi}$$

Equation (6) expresses the growth rate in real national income as determined by the rates of: export growth (x), net external capital flows in real terms ($fe - px$) and the terms of trade ($px - pm$). The expectation is a positive relationship with exports and external financing;[2] in the case of the terms of trade, the sign depends on the value of ϕ. Equation (6) also reflects the fact that economic growth is determined by income elasticity of demand for imports ξ. A decrease in ξ is associated with a process of import substitution; equation (6) indicates that such a process has a positive impact on economic growth. A stochastic representation of equation (6) is estimated using Cuban data.[3]

1. Latest revisions of the model

Although in this article we estimate only model (6), which in the case of Cuba has never before been estimated to include external financing, below is a summary of two more recent revisions of the BPCG model.

Moreno-Brid (1998-1999) developed a new version to guarantee that the balance of payments-constrained growth rate is accompanied by a sustainable increase

[2] This assumes that the country is a net importer of capital and therefore θ is less than one unit. On the assumption that there ought not to be a long-term current account deficit (θ=1) and that the terms of trade do not change, this gives the simplest form of the BPCG model: long-term growth is determined by the export growth rate and income elasticity of imports. In literature, this expression is known as the dynamic Harrod foreign trade multiplier, or Thirlwall's Law: $y = \frac{x}{\xi}$

[3] See Atesoglu (1993-1994) and Hussain (1999) for estimations of the BPCG model extended to include external financing.

in external debt. He redefines the notion of long-run balance of payments equilibrium by introducing a constant quotient B for the current account deficit in relation to domestic income, with both variables measured in nominal terms:

$$(7) \qquad B = \frac{\left(Pm^{*}M - Px^{*}X\right)}{\left(P^{*}Y\right)}$$

By differentiating this expression and equalling it to zero, and adding in the functions of import demand (4) and exogenous exports (5), we arrive at a new expression for balance of payments constrained growth:

$$(8) \qquad y = \frac{\theta x + \left(\phi + 1\right)\left(px - pm\right)}{\xi - 1 + \theta}$$

Although this still depends on exports and the terms of trade, the value of the long-run multipliers is altered by a factor equal to $\frac{\xi}{\xi - 1 + \theta}$.

The second revision was developed by Moreno-Brid (2003), by explicitly taking into account the influence of interest payments in the rate of economic growth compatible with the balance of payments equilibrium. This proves to be an important amendment for analysing the long-term growth pattern of developing economies where net interest payments are a major component of their current deficit.

To arrive at the final expression of the model, the following equations are added to the functions of imports (4), exports (5) and the constraint (7):

$$(9) \qquad pm + m = \theta_1\left(px + x\right) - \theta_2\left(r + px\right) + \left(1 - \theta_1 + \theta_2\right)\left(f + px\right)$$

$$(10) \qquad \theta_1 = \frac{Px^{*}X}{Pm^{*}M}$$

$$(11) \qquad \theta_2 = \frac{Px^{*}R}{Pm^{*}M}$$

where equation (9) corresponds to the dynamic expression of the balance of payments identity and includes r as net interest payments abroad and f as external capital flows, both measured in growth rates and in real terms. By solving the system of equations, we arrive at the following expression for the balance of payments-constrained growth rate:

$$(12) \qquad y = \frac{\theta_1 x - \theta_2 r + \left(1 + \phi\right)\left(px - pm\right)}{\xi - \left(1 - \theta_1 + \theta_2\right)}$$

The sign of the multiplier associated with the growth in net interest payments indicates the negative impact of interest payments on income growth; it imposes an additional constraint, in the sense that a portion of the current income that could be used to pay for imports must instead be used to step up interest payments. Hence the importance of maintaining prudent levels of debt, given that the effect of increasing the amount of external financing is to also increase net interest payments abroad.[4]

Moreno-Brid and Ricoy (2005) set out the successive versions of the BPCG model and empirically prove the predictive power of each version with reference to the Mexican economy during the period 1967-1999.

[4] Moreno-Brid (1998-1999) and Moreno-Brid (2003) develop the theoretical formulation of the model, using a conventional function of real export demand rather than exogenous export demand.

III
Data

The data used are annual series from 1950 to 2005 for GDP based on 1997 values, real exports of goods and services (X), net actual external financing (FE), as well as the terms of trade (TOT) calculated by the quotient between the export price index for goods and services and the import price index for goods and services. The data are drawn from the yearbooks of Cuba's National Statistical Office (ONE) and its National Institute of Economic Research (INIE).

The data on actual external financing are obtained by dividing the current account deficit by an average between the export price index and the import price index. Twice the minimum value is added to the entire series to avoid having negative data in the years where there was a current account surplus; thus the logarithmic transformation can be applied to obtain the elasticity (see appendix A).

Figure 1 presents the evolution of the series. All the series follow a non-stationary trajectory with an order of integration of one, or I(1). Table 1 shows the result of the augmented Dickey-Fuller test (ADF).[5]

The graph on real GDP in Figure 1 shows a sharp fall in the early 1990s, totalling a 35% decrease in the first four years of the decade and marking an economic crisis known as Cuba's 'Special Period'. There was also a drop in the remaining series in the early 1990s. It is therefore not necessary to include in the model qualitative intervention variables to capture the fall in GDP during these years, since it is explained within the BPCG model itself. As from 1995, GDP resumed its upward trend. The latest available observations reveal growth of 5.4% in 2004 and 11.8% in 2005.

In the series of real exports of goods and services, there was a recovery following the fall in the early 1990s. In 2004, real exports of goods and services grew by 19% and, in 2005, by 46% (the largest increase of the period under analysis). There was also a qualitative change in exports. Up until the late 1980s, exports were dominated by primary goods (first sugar, followed by nickel, tobacco and fisheries), which together accounted for more than 70% of total exports. In the 1990s, a process of tertiarization of exports began, initially triggered by the expanding tourism sector and, after 2003, driven by the export of professional services, especially the sale of medical services to Venezuela. In 2005, services accounted for more than 70% of total exports.

The net external financing series highlights the growth in the 1980s. Just as in other countries in the region, Cuba received petrodollar loans from private financial institutions and governments in the rest of the world. Credits also arrived from the block of socialist countries, entailing advantageous credit-term and interest-rate conditions. External debt spiralled so high that, in 1986, Cuba declared a moratorium on the repayment of foreign-currency debt. In the early 1990s, there was a compulsory current account adjustment. Net external financing fell again in 2004 and 2005, this time because the balance-of-payments current account recorded a surplus after being constantly in deficit since 1961.

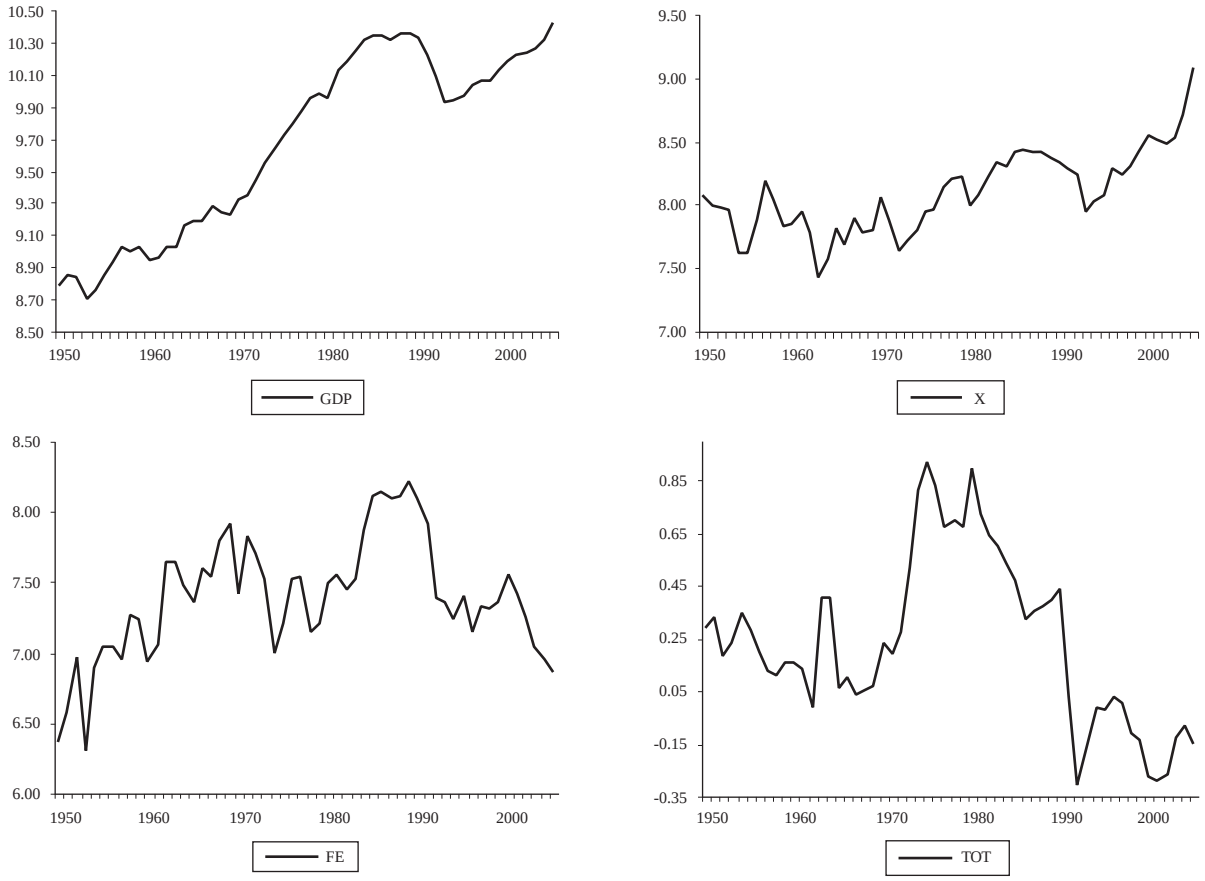
The history of the terms of trade has also been marked by the same events. With Cuba's entry into the CMEA and its conclusion of agreements that guaranteed a secure market for exports and preferential prices for sugar exports and oil imports, the terms of trade improved by more than 90% between 1973 and 1975. By the 1980s, they had already begun to show a negative trend, which worsened in the early 1990s owing to the collapse of the European socialist block, with which Cuba conducted around 85% of its trade.

Imports and external financing as a proportion of GDP have been on a declining trend (table 2). The export share of GDP also diminished in the 1960s, 1970s and 1980s, but increased in the 1990s and, in the twenty-first century, is averaging 19.8%, which is the highest share since the 1970s.

[5] The results of the unit root test could be influenced by the presence of structural changes in the series. The sheer variety of possible structural-break dates precluded use of the Perron test (1989). Subsequently, the recursive and sequential estimations of the model revealed no single break point in the estimation period.

FIGURE 1

Cuba: evolution of the series, 1950-2005
(Logarithm of data)



Source: Author, on the basis of data from Cuba's National Statistical Office (ONE) and its National Institute of Economic Research (INIE).

[a] GDP: gross domestic product. X: exports. FE: external financing. TOT: terms of trade

TABLE 1

Cuba: test for stationarity of the series, period 1950-2005[a]
(Statistical results with the logarithm of data)

Series	ADF[b]	Constant and trend	Lags
GDP	1.98	No	1
X	-2.52	Yes	0
FE	-2.08	Constant	4
TOT	-1.41	No	0
First difference			
D(GDP)	-4.91*	Constant	0
D(X)	-6.21*	No	0
D(FE)	-3.03*	No	3
D(TOT)	-6.43*	No	0

Source: Author.

[a] Stationary at 5%.
[b] Augmented Dickey-Fuller test.

TABLE 2

Cuba: real value of exports, imports and external financing as a proportion of real GDP
(Annual averages in percentage terms)

Years	X/GDP	M/GDP	FE/GDP
1950-1959	39.0	47.1	-1.5
1960-1969	25.9	38.5	8.2
1970-1979	18.5	38.4	8.2
1980-1989	14.2	30.6	5.4
1990-1999	15.6	18.5	2.8
2000-2005	19.8	17.2	1.0

Source: Author, on the basis of data from Cuba's National Statistical Office (ONE) and its National Institute of Economic Research (INIE).

IV

Cointegration and recursive and sequential estimations

On the basis of equation (6) in the BPCG theoretical model, based on the same order of integration for all the series, a test is conducted to determine whether there is a long-run relationship between the variables GDP, X, FE and TOT (table 3). Using the Engle-Granger methodology (1987), the augmented Dickey-Fuller test is carried out on the estimation residues using the ordinary least squares method (OLS) of equation (13).[6]

$$\log PIB_t = \beta_0 + \beta_1 * \log X_t + \beta_2 * \log FE_t + \beta_3 * \log TOT_t + \beta_4 * Trend + e_t \quad (13)$$

The value of the ADF statistic is compared with the critical values reported in Engle and Yoo (1987). The Johansen methodology (1991 and 1995) is also applied, and the value of the trace statistic is compared with the critical values reported by Johansen and Juselius (1990). At the 10% significance level, both tests find cointegration to be present.

Table 4 shows the cointegration vector estimation by Engle and Granger and by Johansen. In both cases, the inclusion of trend in the cointegration vector caused the adjusted R^2 to rise and the Akaike information criterion (AIC test) to fall; in fact, if the trend is excluded, no long-run relationship between the variables is found. The trend is always significant.[7] Also, the variables for exports, external financing and terms of trade are significant in the different estimations and their sign tallies with economic theory.

The studies of Mendoza and Robert (2002) and Cribeiro and Triana (2005), based on the Chow test and the cumulative sum (CUSUM) test for structural change, find parameter instability in the BPCG model estimations for Cuba. Even though the other studies mentioned do not test this assumption statistically, they make estimations for different periods and obtain values that differ from the elasticities.

TABLE 3

Cuba: cointegration test, period 1950-2005, GDP, X, FE and TOT series[a] [b]

(Statistical results with the logarithm of data)

Engle-Granger test Augmented Dickey-Fuller test	Johansen test Trace test
-4.21[c]	60.34[c]

Source: Author.

[a] Constant and trend were included.
[b] The Johansen test was conducted with two lags.
[c] There is cointegration at 10%.

TABLE 4

Cuba: cointegration vector[a]

(Statistical results with the logarithm of data)

	Engle-Granger test[b]	Johansen test (with two lags)
GDP	1.00	1.00
X	0.48 (0.05)	0.46 (0.06)
FE	0.24 (0.03)	0.24 (0.03)
TOT	0.49 (0.04)	0.59 (0.04)
Trend	0.026 (0.001)	0.026 (0.001)
Constant	3.14 (0.49)	3.22
Akaike information criterion	-2.17	-5.30
Adjusted R^2	0.98	

Source: Author.

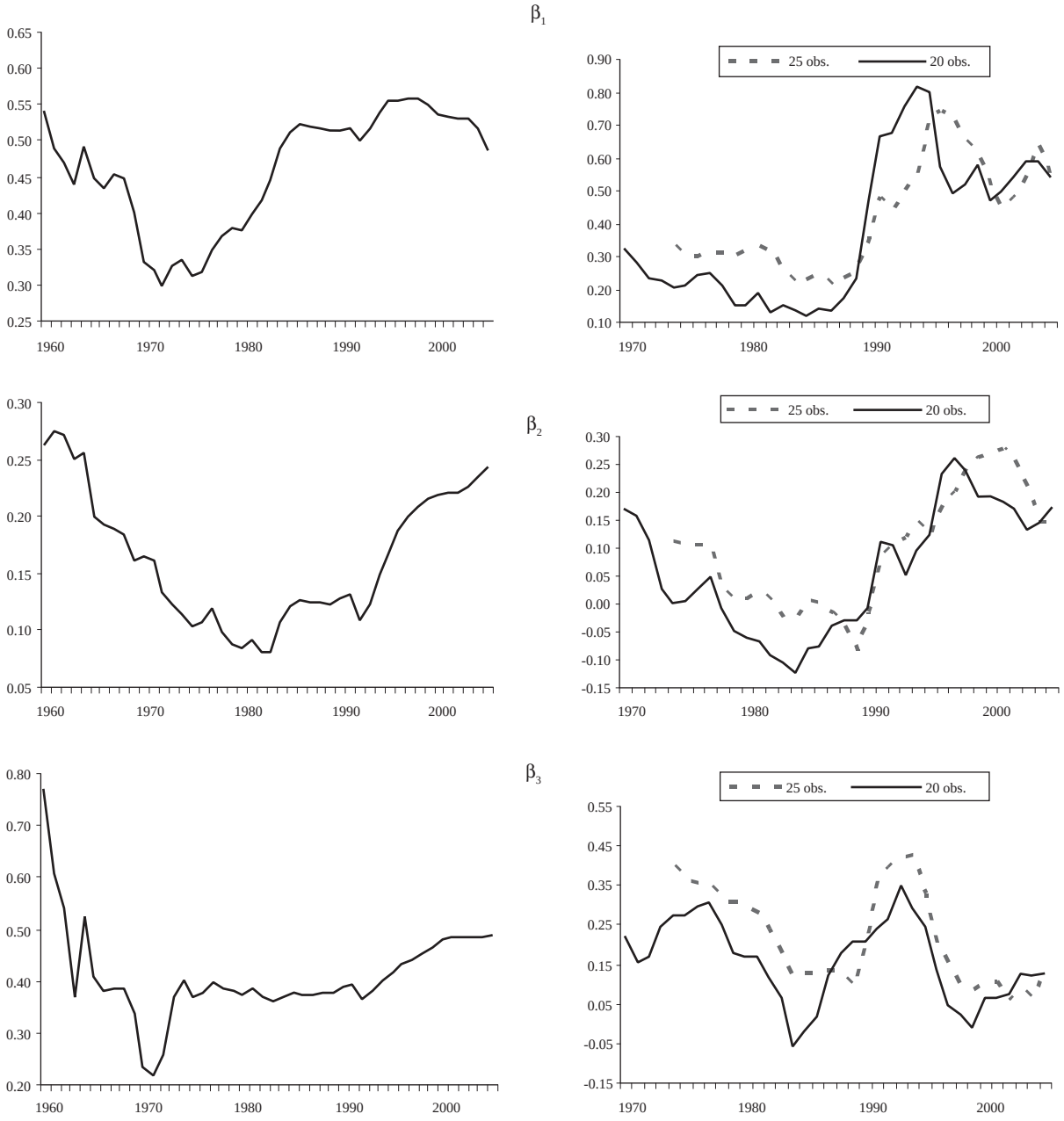
[a] In the vector the coefficients do not take the opposite sign. The figures in brackets correspond to standard error.
[b] Results in the first step of the Engle-Granger methodology.

[6] Even when the theoretical model is expressed in growth rates, a growing number of empirical studies make the estimations using the logarithm levels of the series, so as to avoid losing the long-term information with the differentiation. See for example Bairam (1993), Atesoglu (1997) and Moreno-Brid (1999).

[7] Blecker's interpretation (1992, pp. 338-339) includes a trend in the BPCG model. According to Blecker, the trend does not have to change the direction of the BPCG model's growth equation and can continue to represent the growth rate compatible with the balance of payments equilibrium; the trend would seem to stem from the existence of structural trends in export and/or import demand that define the long-term evolution of the country's relative competitiveness. McCombie (1997) also uses trend in his estimations.

FIGURE 2

Cuba: recursive estimations (1960-2005) and sequential estimations (1970-2005) with sampling windows of 20 and 25 observations[a b]
(Statistical results with the logarithm of data)



Source: Author.

[a] In the recursive estimations, the model was estimated repeatedly, each time adding a new observation. Sequential estimations, unlike recursive estimations, keep a constant sample size. These are successive estimations of size n for which two sampling windows are used: n=20 y n=25. In the figures, the estimation of the coefficient of a window was assigned to the last year of the corresponding period.

[b] Model: $\log PIB_t = \beta_0 + \beta_1 * \log X_t + \beta_2 * \log FE_t + \beta_3 * \log TOT_t + \beta_4 * Trend + e_t$

This would seem a logical concern, in view of the fact that, during the 55-year period used for the estimations, the Cuban economy underwent a number of phases that may have altered the relationship between economic growth and the balance of payments. In addition, parameter instability is also expressed in the BPCG theoretical model itself, the extended form of which includes external financing. Equation (6) shows that the coefficients for exports and external financing depend on θ (the quotient between current exports and current imports), which is not generally constant over time. In the case of Cuba, it has ranged around an average value of 0.87, with a standard deviation of 0.13.[8] In the latest formulations (equations 8 and 12) the multipliers also depend on θ.

To evaluate the parameter stability statistically, this article used the recursive residues and the CUSUM test of squares of equation (13) estimated using ordinary least squares; both suggested instability in the model (lack of space prevents the results from being described in this article). In addition, recursive and sequential estimations of β_1, β_2 y β_3 in equation (13) were computed, clearly showing instability (figure 2). As the figure shows, there appears to be no single break point in the coefficients in either the recursive or sequential estimations. This makes it difficult to pinpoint the date of the structural changes. Not only do the coefficients change much of the time, they do not have the same trajectory and the date of the maximums and minimums does not coincide. The parameter instability does not appear to be of the sort that can be resolved by including qualitative intervention variables in the model, or by working with estimations in different periods.

There are a number of drawbacks with using recursive and sequential estimations to analyse the trajectory of the coefficients. Some of the recursive estimations are done using too small a sample size, compounding the inaccuracy. There is a wide standard deviation in both the recursive and sequential estimations. In the sequential estimations, a larger sampling window could have been used to increase accuracy, but this would have meant losing much of the information on the trajectory of the coefficients. Furthermore, the recursive or sequential estimation for each year excludes information contained in part of the 1950-2005 sampling period.

Section V makes a dynamic representation of equation (6) in state-space form and an estimation of the coefficients using the Kalman filter. A stochastic trajectory of the coefficients is estimated instead of a deterministic trajectory, with a smaller standard deviation and using all the information from 1950 to 2005.

V

Model with time-varying coefficients

1. State-space notation

State-space models are a convenient notation for a wide range of time-series models. Some of their specific uses include: (i) modelling of non-observable components; (ii) representation of autoregressive integrated moving average (ARIMA) models, and (iii) estimation of time-varying parameter (TVP) models, which is the application that we shall be using here.

Some of the authors who have applied time-varying parameter models include Nelson and Kim (1988), who studied variations in the reaction function of the United States Federal Reserve System; Haldane and Hall (1991), who investigated the pound sterling's changing relationship with the Deutschmark and the United States dollar, and Revenga (1993) and Álvarez, Dorta and Guerra (2000), who made a stochastic estimation of inflationary persistence in the European Monetary System and in Venezuela, respectively. No published work was found that estimates the BPCG model using time-varying coefficients.

A state-space model is written in terms of a measurement equation (or observation) and a state equation (or transition). The measurement equation describes the relationship between observed variables

[8] To estimate the bpcg model with external financing, Hussain (1999) first estimates export demand, from which he obtains the income and price elasticities, which he substitutes into equation 6 (according to the numbering in this article), together with the average observed value of θ. Atesoglu (1993-1994) estimates equation (6) directly, assuming that the parameters are constant.

(data) and latent (non-observable) state variables. The state equation describes the dynamics of state variables and usually takes the form of a random walk or a first-order autoregressive process (AR(1)). A representation of a state-space model can be written as:

Measurement equation

$$(14) \quad y_t = x_t \beta_t + e_t$$

State equation

$$(15) \quad \beta_t = \tilde{\mu} + F\beta_{t-1} + v_t$$

$e_t \sim$ i.i.d.N (0, R),
$v_t \sim$ i.i.d.N (0, Q),
E ($e_t v_s$) = 0

where y_t is 1x1 and represents the dependent variable observed at the time t; β_t is a vector k x 1 of latent state variables; x_t is a vector 1 x k of observed exogenous or predetermined variables that relate the observable vector y_t with the latent vector β_t; $\tilde{\mu}$ is a vector k x 1 of constant coefficients to be estimated and F is a matrix of constant parameters of order k x k. The e_t of order 1x1 and the vector v_t of order k x 1 represent the errors in the measurement and state equations.

The state vector β_t must contain the most important information in the system at each point in time. In general, the state vector elements are non-observable. Equation (15) indicates that the new state vector is modelled as a linear combination of the former state vector and of a process of error. Equation (14) describes how the measurements or observations depend on the state vector.

In our case, the long-run relationship that had been estimated between real GDP, real exports, external financing and the terms of trade can be rewritten by adding a subindex t to the coefficients to indicate that they change over time:

$$(16) \quad \begin{aligned} \log PIB_t &= \beta_{0t} + \beta_{1t} * \log X_t + \\ &\beta_{2t} * \log FE_t + \beta_{3t} * \log TOT_t + e_t \end{aligned}$$

where β_{it} for i = 0,1,2,3 are the time-varying coefficients or state variables in this model. Despite the fact that the series are non-stationary, they have been kept at their respective levels because the tests show that they are cointegrated (at the 10% significance level). The independent term, which could also change over time, will be used to represent the deterministic trend, which was found to be necessary to the long-run relationship.

The state-space representation compatible with equation (16) is as follows:

Measurement equation

$$\log PIB_t = \begin{bmatrix} 1 & \log X_t & \log FE_t & \log TOT_t \end{bmatrix} \begin{bmatrix} \beta_{0t} \\ \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \end{bmatrix} + e_t$$

State equation

$$\begin{bmatrix} \beta_{0t} \\ \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \end{bmatrix} = \begin{bmatrix} \alpha \\ 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \beta_{0,t-1} \\ \beta_{1,t-1} \\ \beta_{2,t-1} \\ \beta_{3,t-1} \end{bmatrix} + \begin{bmatrix} 0 \\ \upsilon_t \\ \omega_t \\ \eta_t \end{bmatrix}$$

The coefficients β_{1t}, β_{2t} y β_{3t} are specified as random walks, allowing the disturbances affecting them to have a permanent effect. The augmented Dickey-Fuller test on the sequential coefficients estimated by means of ordinary least squares supports this specification: all the sequential coefficients are I(1) except β_{2t}, estimated using a sampling window of 20 observations (lack of space prevents the results from being described in this article). The variances of the disturbances estimated for each state equation $\sigma^2_{\upsilon_t}, \sigma^2_{\omega_t}, \sigma^2_{\eta_t}$, known as hyperparameters, indicate whether the coefficient has a stochastic or deterministic trajectory. If the variance is not significantly different from zero, then the coefficient is fixed and does not change over time. As already mentioned, β_{0t} represents the deterministic trend with a constant slope α.

2. Estimation using the Kalman filter

The state-space system is estimated using the Kalman filter (see appendix B). There is a full description of the Kalman filter in Hamilton (1994) and Kim and Nelson (1999).

Table 5 below shows the result of the estimation, using the Kalman filter, of the coefficients of equation (16) at the end of the period (2005), together with the standard deviation of the disturbances in each state equation.

TABLE 5

Cuba: estimation using the Kalman filter, period 1950-2005[a]

(Statistical results with the logarithm of data)

	Estimation at the end of the period (2005)[b]	Standard deviation of the disturbances	
$\beta_{0,2005}$	6.134[c] (0.41)		
$\beta_{1,2005}$	0.373[c] (0.03)	σ_{υ_t}	0.0062[c]
$\beta_{2,2005}$	0.139[c] (0.02)	σ_{ω_t}	0.0000
$\beta_{3,2005}$	0.169 (0.11)	σ_{η_t}	0.0236
α	0.026[c] (0.006)		
Akaike information criterion	-2.70		

Source: Author.

[a] Model:
$\log PIB_t = \beta_{0t} + \beta_{1t} * \log X_t + \beta_{2t} * \log E_t + \beta_{3t} * \log TOT_t + e_t$

[b] Standard error in brackets.

[c] Significant to 5%.

The table shows that the coefficients for exports and external financing are significant, but this is not so for the coefficient of terms of trade $\beta_{3,2005}$. The slope α of the trend is also significant, with a value of 2.6%, which is the same as the estimation obtained using the ordinary least squares method. The standard deviation of the disturbance associated with the external financing coefficient σ_{ω_t} is not significantly different from zero, which indicates that the coefficient has not varied over time. However, the hyperparameters σ_{υ_t} and σ_{η_t} are indeed significant, showing that the coefficients for exports and terms of trade have varied over time, the latter more than the former.

Figure 3 shows the GDP data and the one-period-ahead forecast of the Kalman-smoothed estimate. The BPCG model, with time-varying coefficients, can be seen to successfully capture the long-term trajectory of Cuba's GDP. It can even explain the years where GDP

FIGURE 3

Cuba: forecast using the Kalman filter one period ahead of the period 1951-2005[a]

(Logarithm of GDP)

Source: Author.

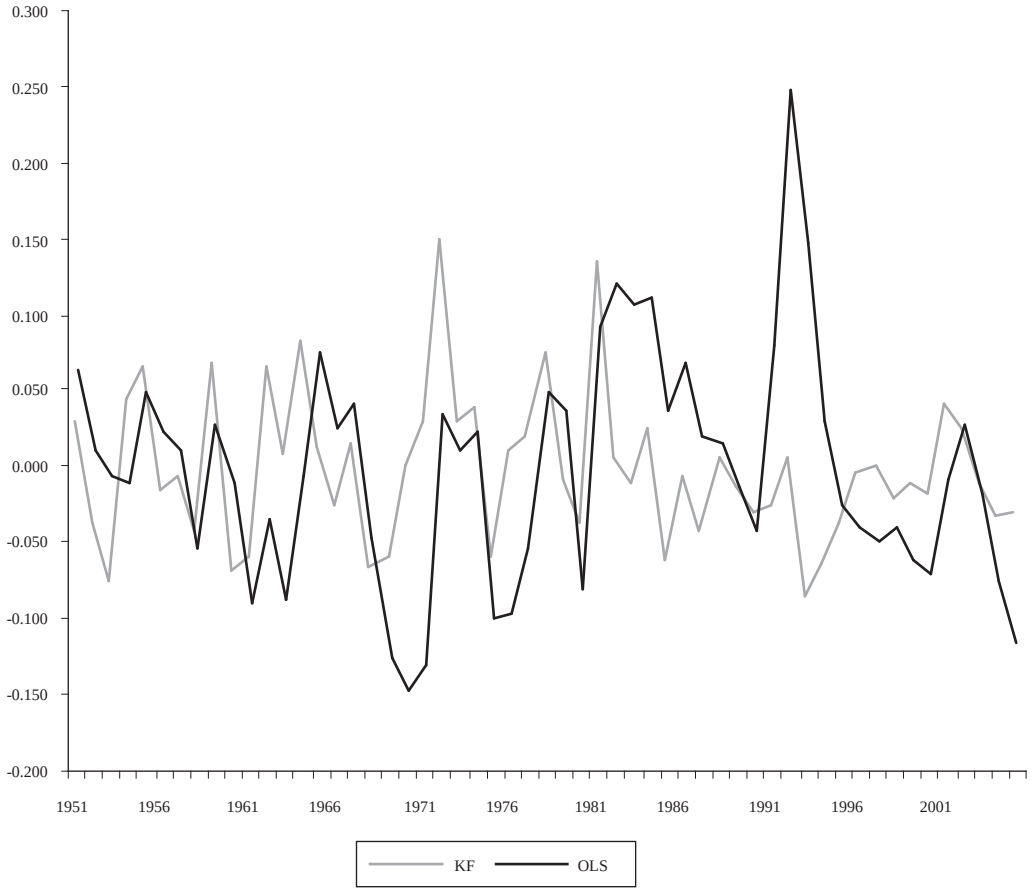
[a] Kalman-smoothed estimate.

fell the most sharply (1990-1993), as well as the rapid growth in GDP in 2004 and 2005.[9]

Figure 4 presents the one-period-ahead forecast errors of the Kalman-smoothed estimate and the residues of the estimated fixed-coefficient model by the ordinary least squares method in the first step of the Engle-Granger estimation. The standard deviation of the former is 0.049 and of the latter, 0.075. The estimation of the BPCG model with time-varying coefficients is shown to be a better predictor than the fixed-coefficient model, especially after 1980.

FIGURE 4

Cuba: one-period-ahead forecast error of the Kalman filter estimate and residues of the ordinary least squares estimate, period 1951-2005[a]
(Statistical results with the logarithm of data)



Source: Author.

[a] Kalman-smoothed estimate and estimation in the first step of the Engle-Granger methodology.

[9] By including external financing and terms of trade, the BPCG model can explain shorter-term GDP movements than Thirlwall's Law can. However, even in its extended form, balance of payments constrained growth continues to be a long-term concept.

VI

Dynamic trade-growth relationship

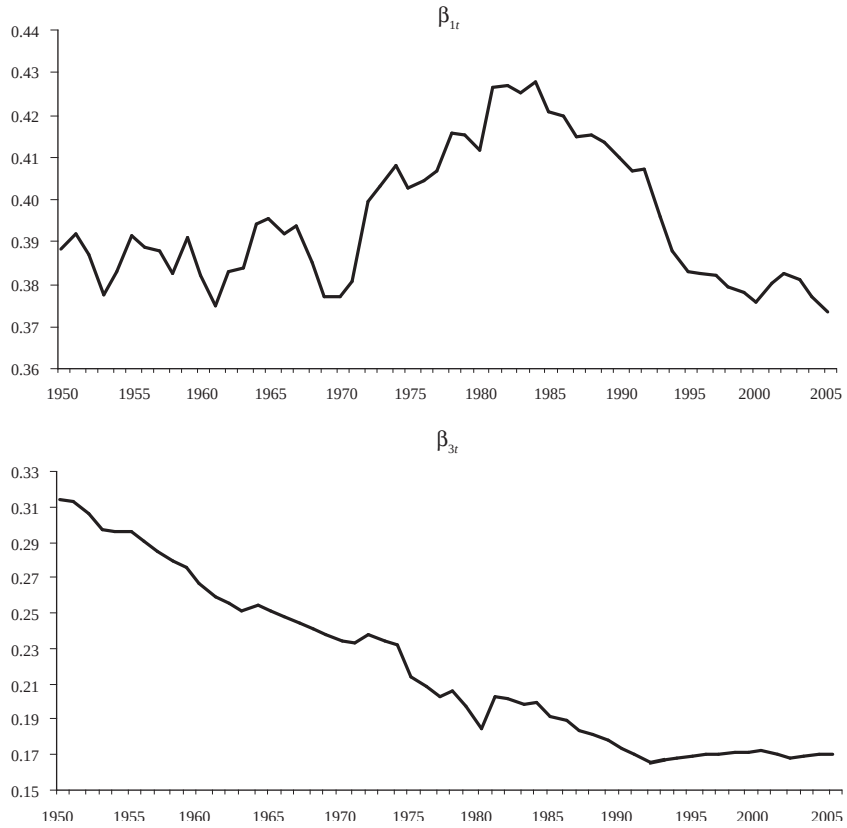
1. Elasticity of GDP to exports and to the terms of trade

Figure 5 below shows the estimated trajectory, using the Kalman filter, of the time-varying coefficients: the elasticity of GDP to real exports and to the terms of trade. They are smoothed estimates, that is to say, they take into account information for the entire sampling period.

The figure shows that the elasticity of GDP to exports has been more stable than its elasticity to the terms of trade: the former has ranged from a maximum of 0.427 to a minimum of 0.373, while the latter has ranged from a maximum of 0.313 to a minimum of 0.164. After averaging around 0.385 from 1950 to 1971, the elasticity of GDP to exports began to increase in 1972, peaking in 1984; in 1985 it started to fall, bottoming out in 2005. Throughout the period, the elasticity of GDP to exports

FIGURE 5

Estimation of the coefficients using the Kalman filter, trajectory from 1950 to 2005[a]
(Statistical results with the logarithm of data)



Source: Author.

[a] Smoothed estimate. Model: $\log GDP_t = \beta_{0t} + \beta_{1t} * \log X_t + \beta_{2t} * \log E_t + \beta_{3t} * \log TOT_t + e_t$

was greater than its elasticity to external financing and to the terms of trade.

The elasticity of GDP to the terms of trade followed a markedly negative trend virtually throughout the period (figure 5).[10] In 1993, it stopped falling and started to rise slightly. The negative trend in the 1970s and 1980s can be explained by Cuba's agreements with socialist countries and the economy's increased external financing facilities. The inflection point in 1993 coincides with Cuba's reorientation of its foreign trade towards markets where it is more vulnerable to international price variations and is subject to greater financing constraints.

The reduction in the elasticities shows that, in percentage terms, Cuba's GDP derives less benefit (is adversely affected) for every 1% increase (decrease) in real exports and terms of trade. However, it must be borne in mind that diminished elasticity can be offset by greater variations in exports and in the terms of trade. To gain a better approximation of the effect that the balance of payments has had on Cuba's economic growth, the next section estimates the contribution of each variable to observed GDP growth.

2. Contribution to growth

Based on the elasticities of GDP to real exports and to the terms of trade, as well as the fixed elasticity to external financing and the estimated trend growth of 2.6%, a calculation is made of the contribution of each of these variables to GDP growth. To do this, the elasticity (Kalman-smoothed estimate) is multiplied by the observed variation in the explanatory variable in each year. As the relationship is long-run and does not have to occur every year, table 6 shows the results as annual averages for five-year periods and for the entire period. The predicted balance of payments constrained GDP growth is also computed. The contribution of 'other causes' affecting GDP growth but not captured in the model is the difference between observed and predicted GDP growth.[11]

The trend makes a fixed contribution of 2.6%, and approximates the contribution of factors that benefit GDP growth and show a trend evolution. The interpretation according to Blecker (1992) would be that the positive trend represents a long-run structural trend and that it increases the relative competitiveness of Cuban goods and services. From a neoclassical standpoint, the trend could be a simplified way of incorporating the long-term impact on GDP of population growth, capital accumulation and technical progress.[12]

Table 6 shows that real exports, external financing and terms of trade explain a large share of the deviations of GDP growth from trend growth. Nevertheless, 'other causes' are also shown to have had a major influence in several five-year periods. The 'other causes' column can approximate the net effect on GDP of factors internal to the economy other than the balance of payments, such as institutional factors and various economic policies.[13] The existence of negative values in 'other causes' indicates that growth in the Cuban economy is lower than that imposed by external constraints, which means that internal factors are affecting economic growth. The existence of positive values in 'other causes' indicates that the economy has boosted internal factors to overcome the external constraints.

It is worth highlighting a number of results in table 6. In the period 1971-1975, the economy recorded annual average growth above that of trend growth. In this five-year period, with Cuba's entry into the CMEA, terms of trade made a more positive contribution (3.16%). Together with 'other causes', they were a key factor in higher growth during the five-year periods under analysis. Since that time, the economy has had to struggle with average negative contributions in the terms of trade, which also made a positive contribution of 0.41% only in the latest period.

[10] This even culminated in the non-significance of the coefficient at the end of the period, as mentioned in respect of table 5.

[11] To be more precise, the contribution of exports in each year is calculated as $\beta_{1t\text{-}1/T} * d\log X_t$ and the contribution of the terms of trade, as $\beta_{3t\text{-}1/T} * d\log TOT_t$. As the coefficient does not change over time, the contribution of external financing is calculated as $0.139 * d\log TOT_t$. The contribution of the trend is fixed and equal to 2.6%. To obtain 'other causes', once the annual averages have been calculated, we take the difference between observed and predicted GDP growth (total contributions).

[12] Even using a neoclassical interpretation of the trend, this would not contravene the basic principles of the BPCG model put forward by Thirlwall (1997). We would not be assuming that the factors of production are a sufficient condition for growth and that demand does not matter. On the contrary, we would be assuming that the use of the factors of production depends on there being external demand for the goods produced by Cuba, as well as on the country having foreign exchange receipts to finance imports. The variables of the BPCG model determine whether growth is higher or lower than trend growth.

[13] As the model considers not only exports but also the terms of trade and external financing, we are closer to approximating the effect of factors internal to the economy by studying the differences between observed growth and growth predicted by the BPCG model.

TABLE 6

Cuba: contribution of the explanatory variables, 1951 to 2005
(Annual averages in percentage terms)

Years	GDP (predicted)	GDP (observed)	Contribution of the explanatory variables				Other causes[a]
			Trend	X	FE	TOT	
1951-55	0.64	1.25	2.60	-3.57	1.73	-0.12	0.61
1956-60	2.97	1.80	2.60	1.43	-0.32	-0.73	-1.17
1961-65	2.43	5.18	2.60	-0.54	1.07	-0.70	2.75
1966-70	5.20	2.63	2.60	1.67	0.13	0.81	-2.58
1971-75	4.18	8.38	2.60	-0.86	-0.72	3.16	4.20
1976-80	3.30	4.66	2.60	0.15	0.73	-0.18	1.35
1981-85	6.12	8.04	2.60	3.50	1.69	-1.68	1.92
1986-90	1.69	-0.0	2.60	-0.71	-0.04	-0.16	-1.89
1991-95	-3.28	-7.06	2.60	-2.25	-1.96	-1.67	-3.78
1996-00	5.66	4.59	2.60	3.58	0.36	-0.87	-1.07
2001-05	4.98	4.88	2.60	3.87	-1.90	0.41	-0.10
1951-2005	3.04	3.02	2.60	0.54	0.06	-0.16	-0.02

Source: Author.

[a] Difference between observed and predicted growth in the gross domestic product.

The benefits of Cuba's trade and financial agreements with the CMEA started to become apparent in real exports and external financing in the five-year periods 1976-1980 and 1981-1985. Both variables made a positive contribution, which offset the drop in the terms of trade. In the five-year period 1981-1985, external financing made the second largest positive contribution of the period under analysis (1.69%).

In the five-year periods 1986-1990 and 1991-1995, the economy declined as a result of internal and external factors. During those years, the average contribution of all the variables in the BPCG model was negative: the most important external cause during the economic crisis period is considered to be the fall in real exports (-2.25%), followed closely by the reduction in external financing (-1.96%), and third, by worsening terms of trade (-1.67%). Together this led to an average annual drop in GDP of 5.88% between 1991 and 1995. In both five-year periods, 'other causes' unrelated to the balance of payments constraints help to explain the fall in GDP, which ties in with the idea that the troubles in the Cuban economy in those years stemmed also from internal factors, which had already been manifesting themselves as problems in the Cuban economic model since the 1980s.

In the five-year periods 1996-2000 and 2001-2005, the Cuban economy resumed annual average growth in excess of trend growth. Real exports were the decisive factor in the economy's recovery following the crisis.

The last row of table 6 shows that, during the 55-year period, observed GDP growth converges with the predicted balance of payments constrained growth. Exports maintain a positive contribution (0.54%), the terms of trade make a negative contribution (-0.16%) and, as expected, the contribution of external financing tends towards zero, as a current account deficit cannot be maintained indefinitely.[14]

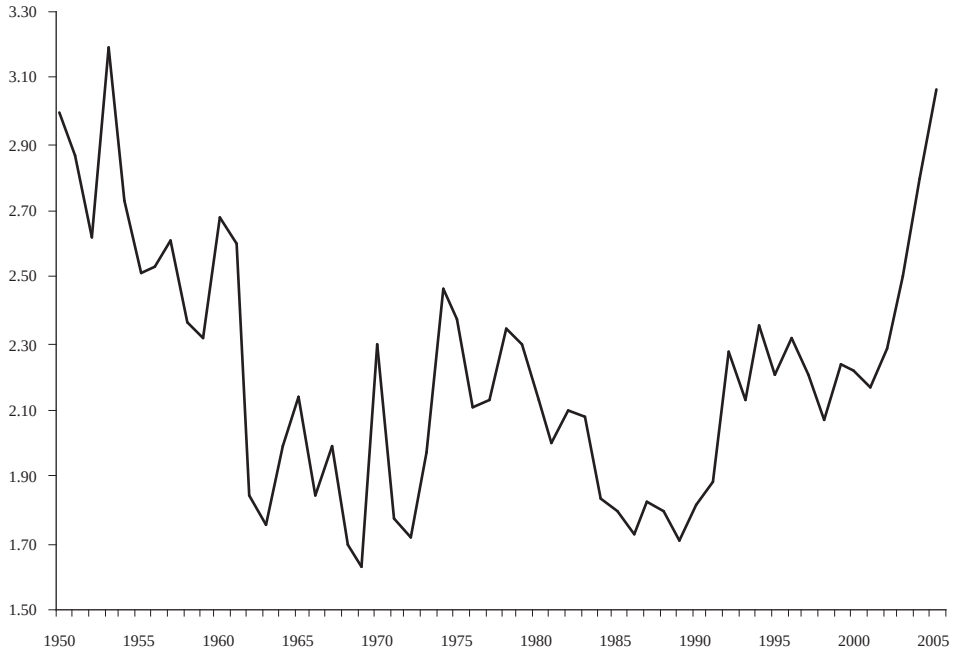
3. Income elasticity of imports

In equation (6) of the BPCG theoretical model, the coefficient associated with real exports is given by the expression θ/ξ. Thus, the trajectory of income elasticity of demand for imports (ξ_t) can be obtained based on the trajectory of β_{1t} estimated using the Kalman filter and the observed values of θ_t. Figure 6 presents this elasticity calculated by the quotient: $\xi_t = \theta_t / \beta_{1t}$.

[14] Moreno-Brid and Pérez (2000) showed that the most influential variable in GDP growth in Central American countries during the period 1950-1996 was real exports, rather than the terms of trade (the model does not include external financing).

FIGURE 6

Cuba: trajectory of income elasticity of imports, 1950 to 2005
(Statistical results with the logarithm of data)



Source: Author.

The figure shows that, in the 1950s and 1960s, income elasticity of imports continued on a downward trend, indicating a process of import substitution. In 1953, it peaked at 3.18 and in 1969 it reached a minimum of 1.62. By around 1974, income elasticity of imports had once again increased to 2.54. It showed a negative trend between 1974 and 1989, the year when it fell to 1.69, again revealing an increase in import substitution. With the economic crisis, there was a new increase in income elasticity of imports between 1990 and 1992. Between 1992 and 2002, it remained at an average of around 2.21. Finally, income elasticity of imports increased significantly between 2003 and 2005, with estimated values of 2.50, 2.79 and 3.06 in the three years, respectively. The elasticity in 2005 is the second highest value in all the 55 years analysed.[15]

The estimated trajectory of income elasticity of demand for imports contains most of the estimations made in the aforementioned studies, except Moreno-Brid's estimation (2000) of 4.11 for the period 1985-1998. Mañalich and Quiñones (2004) and Alonso and Sánchez-Egozcue (2005) estimated an income elasticity of imports of 2.88 for the period 1975-2000 and 2.42 for the period 1960-2000, respectively, based on import demand. Mendoza and Robert (2002) and Cribeiro and Triana (2005) estimated elasticities of 1.62 for the period 1976-2000 and 1.72 for the period 1960-2004 respectively, based on the economic growth equation of the BPCG model.

[15] Most of the variance of ξ_t is given by θ_t, since it has a standard deviation 8.4 times greater than β_{1t}. The increases and decreases in θ_t have been reflected less in the elasticity of GDP to exports β_{1t} and substantially more in income elasticity of imports ξ_t.

VII
Conclusions

The finding was that the BPCG model with time-varying coefficients can explain much of Cuba's economic growth, even though it was estimated that, in addition to external constraints, internal factors have also had a heavy influence. In accordance with the estimated evolution of elasticities, of all the BPCG model's explanatory variables, real exports have always been the one with the greatest relative impact on GDP. Despite the fact that the elasticity of GDP to exports has been falling since 1985, the surge in exports in the last decade has offset the diminished elasticity. In fact, Cuba's economic growth following the crisis could be said to have been based on rising exports.

The results concur with those of other studies that have applied the BPCG model to Cuba, insofar as they have found economic growth to be highly dependent on imports. Owing to the insufficient domestic supply of intermediate and capital goods, growth in economic activity entails a significant penetration of foreign goods, which exerts pressure on the external equilibrium. The estimated trajectory of income elasticity of demand for imports shows an increase in the early 1990s and between 2003 and 2005, which indicates that import substitution in the Cuban economy has declined.

Despite the high income elasticity of imports, rapid growth in GDP in 2004 and 2005 did not undermine the external equilibrium. The rise in service exports outstripped that of imports, even producing a current account surplus. The combination of higher exports and lower import substitution demonstrates that the export sector has few linkages with the domestic production sector. To some extent this is an expected result: exports of services do not have as much of a multiplier effect as they could do; for example, exports based on industrial sector development. An additional two factors must be determining this result: (i) the slowdown in tourism (the service sector with the largest potential multiplier effect on construction and other domestic production activities), and (ii) falling share of total exports of the sugar sector (a sector that has tends to have more linkages with other national production sectors). As part of the process for restructuring the Cuban sugar agroindustry, almost half of the country's industrial sugar mills were shut down in 2002, and 2005 saw the smallest sugarcane harvest for the past 100 years.

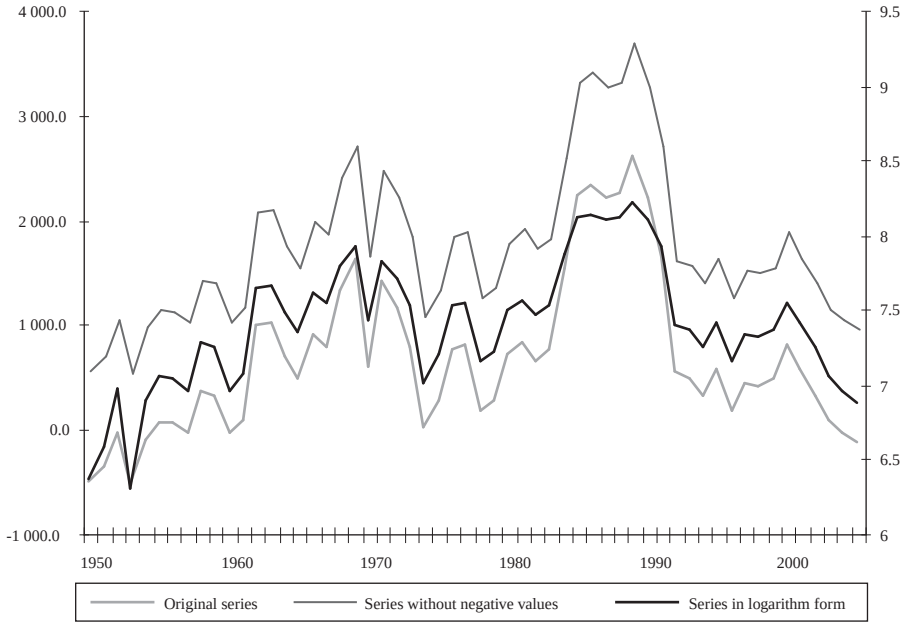
The estimation of the BPCG model suggests that the future growth of the Cuban economy will depend chiefly on the ability to maintain export growth and to reduce income elasticity of demand for imports. Given the new economic agreements with Venezuela and China and the rapid increase in professional services, exports are expected to continue growing in the coming years. However, prospects could be better and bring benefits to a larger proportion of the economy if import substitution were made more efficient and if other export sectors with a greater multiplier effect were expanded.

APPENDIX A

Transformation of external financing

FIGURE A.1

Evolution of the actual external financing series, 1950-2005[a]



Source: Author, on the basis of data from Cuba's National Statistical Office (ONE) and its National Institute of Economic Research (INIE).

[a] Left vertical axis: original series and series without negative values. Right vertical axis: series in logarithm form.

APPENDIX B

Kalman filter algorithm

The Kalman filter was developed by Rudolf E. Kalman (1960). It is the main algorithm for estimating dynamic systems represented in state-space form. It works using a recursive procedure that allows the optimum estimator of the state vector to be obtained at each moment in time *t* based on the information available up to that time. The estimator is optimum in the sense that it minimizes the average quadratic error. Depending on how much information is used, there is either the basic or the smoothed Kalman filter. The basic filter is an estimation of the state vector using the information available up to time *t*. The smoothed filter is an estimation of the state vector based on the information available throughout the sampling period *T*.

1. The basic filter

The basic filter is based on a prediction and correction algorithm of vector β_t, which is repeated for each observation from the beginning to the end of the sample.

a) Prediction

On the basis of the information available up to the moment in time t-1 referring to $\beta_{t/t-1}$, a prediction is made of $y_t : y_{t/t-1}$.

b) Correction

Once y_t is known, it is possible to calculate the

prediction error: $\eta_{t/t-1} = y_t - y_{t/t-1}$. This prediction error contains new information on β_t not contained in $\beta_{t/t-1}$. Thus, after observing y_t, a more precise inference is made of β_t. Vector $\beta_{t/t}$, an inference of β_t based on information up to time t, is obtained as follows: $\beta_{t/t} = \beta_{t/t-1} + K_t \eta_{t/t-1}$, where K_t is the weight assigned to the new information on β_t contained in the prediction error, which is known as the 'Kalman gain'.

c) Equations

(i) Prediction equations

Prediction of state: $\beta_{t/t-1} = \mu + F_t \beta_{t-1/t-1}$

Covariance prediction of β_t:

$P_{t/t-1} = FP_{t-1/t-1}F' + Q$

Prediction error:

$\eta_{t/t-1} = y_t - y_{t/t-1} = y_t - x_t\beta_{t/t-1}$

Prediction error variance:

$f_{t/t-1} = x_t P_{t/t-1}x' + R_t$

where Q is the covariance of the effects of the disturbances on β_t and R is the variance of the error e_t of the measurement equation.

(ii) Correction equations

State correction: $\beta_{t/t} = \beta_{t/t-1} + K_t\eta_{t/t-1}$

Covariance correction:

$P_{t/t} = P_{t/t-1} - K_t x_t P_{t/t-1}$

where $K_t = P_{t/t-1} x_t' f^{-1}_{t/t-1}$ is the Kalman gain.

Given the initial values of $\beta_{0/0}$ and its variance $P_{0/0}$, the equations of the basic filter are iterated by t =1, 2,…., T. This article takes as initial values the fixed coefficients and the variances in equation (13) estimated by the ordinary least squares method with the first 35 observations in the first step of the Engle-Granger methodology.

2. Smoothed filter

The smoothed filter $\beta_{t/T}$ provides a more precise estimation of β_t since it uses more information than the basic filter. It is based on the same prediction and correction procedure, which uses the basic filter but ahead of the time, for $t = T$-1, T-2,…,1, taking as initial values the values obtained from the last iteration of the basic filter.

Smoothing procedure equations

$$\beta_{t/T} = \beta_{t/t} + P_{t/t}F'P^{-1}_{t+1/t}\left(\beta_{t+1/T} - F\beta_{t/t} - \tilde{\mu}\right)$$

$$P_{t/T} = P_{t/t} + P_{t/t}F'P^{-1}_{t+1/t}\left(P_{t+1/T} - P_{t+1/t}\right)P^{-1}{}'_{t+1/t}FP'_{t/t}$$

(Original: Spanish)

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KEYWORDS

Female-headed households
Unmarried mothers
Income
Labour market
Household composition
Poverty
Costa Rica

Female-headed single-parent households and poverty in Costa Rica

T.H. Gindling and Luis Oviedo

Average real family incomes rose in Costa Rica in the late 1990s and at the start of the new decade, but poverty rates did not fall. Here it is argued that economic growth in the country did not translate into reduced poverty during this period because of changes that took place in household structure and in the labour market, and that these changes had an important gender dimension Specifically, a rising proportion of female-headed single-parent households led to an increase in the number of women with children entering the labour force, many of them for the first time. Many of these mothers were unable to find or unwilling to accept full-time work in the higher-paying formal sector and ended up unemployed or working part-time as self-employed workers. These labour market phenomena contributed to low incomes for vulnerable households, especially single-parent households headed by women.

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I
Introduction

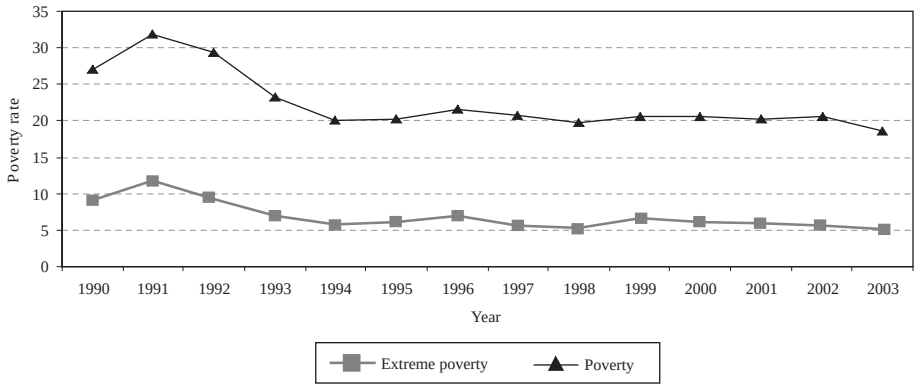
From the 1970s to the early 1990s poverty in Costa Rica was counter-cyclical, falling during expansionary periods and rising during recessions. From 1996 to 2003, however, despite increasing average real household incomes, the poverty rate stagnated (figures 1 and 2). This paper argues that faster economic growth in Costa Rica did not translate into reduced poverty because of changes that took place in household structure and in the labour market, and that these changes had an important gender dimension. It is further argued that the changes in family structure and those in the labour market were related. Specifically, a rising proportion of female-headed single-parent households[1] in Costa Rica was associated with an increase in the number of women with young children entering the labour force. Many of these mothers, new entrants to the labour force, were unable to find or unwilling to accept full-time work in the higher-paying formal sector and ended up unemployed or working part-time as self-employed workers. These labour market conditions helped to worsen inequality and unemployment and hold down the incomes of vulnerable households, especially single-parent households headed by women.

ECLAC (2004) notes that: "The most significant trend [in household structure in Latin America] has been the increase in single-parent households headed by women". This paper contributes to the understanding of how this change in household structure has contributed to poverty and to changes in the labour market in one Latin American country.

The structure of the rest of this paper is as follows. Section II describes the changes in the labour market that led to stagnating poverty rates in the 1996-2003 period in Costa Rica. Section III examines changes in household structure in this period and argues that these were important causes of many of the labour market changes that led to increasing inequality and flat poverty rates. Section IV draws some conclusions and suggests some possible policy measures.

FIGURE 1

Costa Rica: poverty and extreme poverty rates, 1990-2003



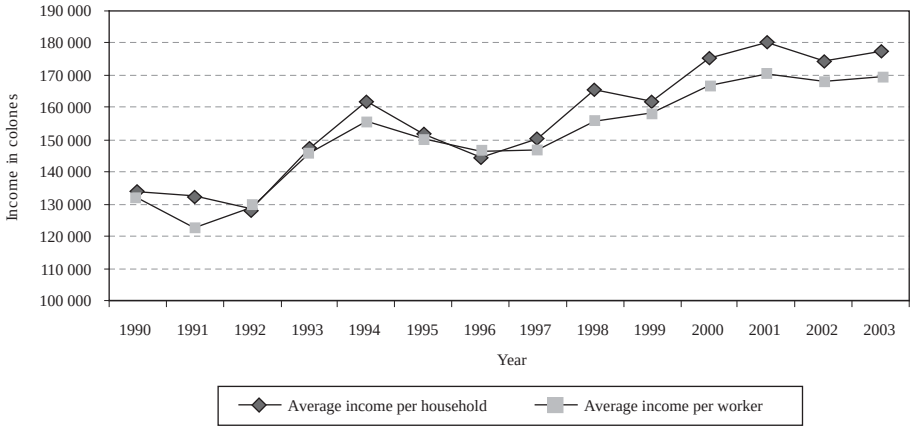
Source: Estado de la Nación, Costa Rica, 2006, available at www.estadonacion.or.cr.

☐ The authors are grateful for comments and suggestions provided by Andrew Mason, Jaime Saavedra, Carlos Sobrado and Juan Diego Trejos. An earlier version of this paper was written as part of the labour market study prepared under the supervision of Andrew Mason and Carlos Sobrado for the 2006 World Bank poverty assessment of Costa Rica.

[1] A single-parent household is defined as one in which, according to the Multi-purpose Household Survey, neither a spouse nor partner is present.

FIGURE 2

Costa Rica: average real monthly household income and individual earnings, 1990-2003
(1999 colones)



Source: Estado de la Nación, Costa Rica, 2006, available at www.estadonacion.or.cr.

II
Changes in the labour market

Two labour market phenomena help explain why poverty rates in Costa Rica stagnated despite economic growth: (i) increased income and earnings inequality; and (ii) increased unemployment rates among members of poor households.

1. Increased inequality

After falling for at least three decades (in the 1960s, 1970s and 1980s), earnings and income inequality in Costa Rica began to increase in the mid-1990s (see Gindling and Trejos, 2005). Figure 3 shows that household income inequality fell from 1990 to 1995, then increased from 1995 to 2003 (as poverty rates stagnated).[2] The increase in earnings and income inequality was one of the reasons why rising incomes in the latter half of the 1990s did not translate into lower poverty rates in Costa Rica.

In a study of changes in earnings inequality in Costa Rica, Gindling and Trejos (2005) conclude that the most important cause of the worsening of this type of inequality in the 1990s was an increase in the proportion of workers with a non-standard working schedule (i.e., those working part-time and over-time), which was caused largely by a rising proportion of women working part-time as self-employed workers.[3] This worsened the inequality in hours worked among workers and thus increased disparities in monthly and yearly earnings. The increase in women working part-time and as self-employed workers is also correlated with stagnating poverty; from 1996 to 2003 the proportion of women working part-time increased substantially, from 42.7% to 49.5%, while the proportion of men working part-time remained stable.[4] This pattern differed from that of the early

[2] Figure 3 presents the log variance of income, which is a measure of inequality that is sensitive to changes in the incomes of the poor. Other inequality indicators, such as the Gini coefficient and the Theil index, show a similar pattern in Costa Rica.

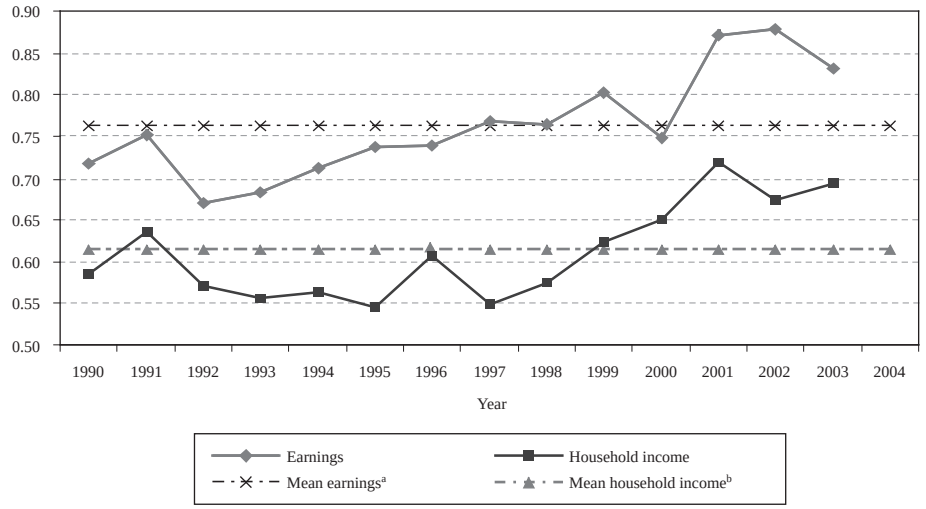
[3] Another cause of the sharpening disparity in hours worked was an increase in the proportion of men working over-time during this period.

[4] Based on the authors' calculations using the Multi-purpose Household Survey.

1990s, when the proportion of women working part-time held steady (at around 42.5%). Figure 4 shows that, although the proportions of self-employed men and women both rose from 1990 to 2003, the increase was much greater for women (from 16% to 25%) than for men (from 28% to 29%). Further, the proportion of self-employed women increased faster during the period in which poverty was stagnating (from 1996 to 2003) than in the period in which poverty rates were falling (from 1990 to 1996).

FIGURE 3

Costa Rica: log variance of earnings and income, 1990-2003

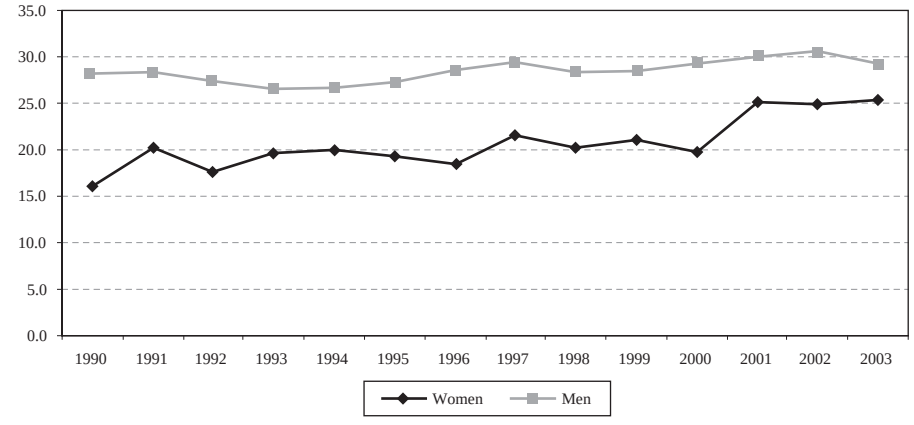


Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

[a] Average log variance of earnings.
[b] Average log variance of household income.

FIGURE 4

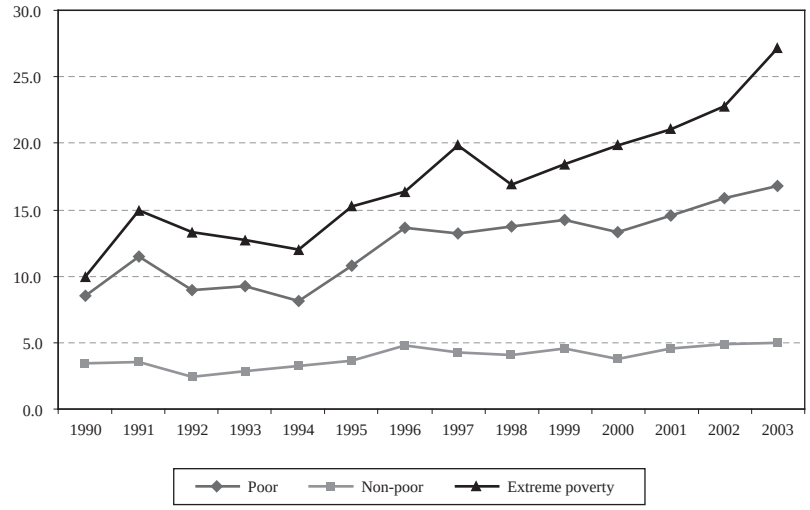
Costa Rica: self-employed workers, by gender, 1990-2003
(Percentages)



Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

FIGURE 5

Costa Rica: unemployment rates by poverty status, 1990-2003
(Percentages)



Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

The increase in the proportion of women working part-time occurred disproportionately among women living in poor households, further contributing to increased poverty. The proportion of women from poor households working part-time increased from 53% in 1990 to 68% in 2003; the proportion of non-poor women working part-time also increased, but at a slower rate (from 40% to 47%). At the same time, the proportion of men in both poor and non-poor households working part-time fell (while the proportion working over-time increased from 27% to 30% and 35% to 41%, respectively). From 1990 to 2003 the proportion of self-employed workers also increased fastest for women from poor households: almost doubling, from 22% to 42% (while the proportion of self-employed women from non-poor households increased from 40.8% to 47.4%).

In summary, the most important cause of the increase in earnings inequality from 1996 to 2003 was an increase in the proportion of women working part-time as self-employed workers.[5] Further, the increase in the proportion of women working part-time occurred disproportionately among women living in poor households, and thus contributing to increased poverty.

2. Increased unemployment

The enigma of rising real average earnings but stagnating poverty is also partly explained by rising unemployment rates, especially among those most vulnerable to poverty. National unemployment rates behaved counter-cyclically up to 1996, falling with the expansion from 1990 to 1994 (from 4.6% to 3.5%) and then rising during the recession from 1994 to 1996 (to above 6% in 1996). But although per capita GDP and average real earnings and incomes rose after 1996, unemployment rates remained high (6% to 6.5%) until 2003.

The pattern of high and rising unemployment rates during the period when earnings grew but poverty stagnated is especially marked for those living in poor households. Figure 5 shows that, while unemployment rates for those living in non-poor households remained slightly less than 5% for the entire expansionary period (1996-2003), those rates increased steadily and dramatically for those living in poor households over this same period. Unemployment rates increased from below 13.6% to 16.7% among members of poor

[5] According to Gindling and Trejos (2005), other labour market phenomena that contributed to the increase in earnings inequality include: an increase in the male-female wage gap, increasing returns to education, and sharper inequality in education levels among workers.

households, and from 16.3% to 27.1% for those in extreme poverty.

Analysis of the data suggests that the higher unemployment rates had different causes for men and women. In the case of women, higher unemployment rates were driven by increases in labour force participation, while in the case of men they were related to changes in demand for labour. From 1990 to 2003, labour force participation rates increased for women and decreased for men (figure 6). Women's labour force participation rates changed very little from 1987 to 1996, but rose from 1996 to 2003 (coinciding with the period of rapid income growth but stagnating poverty). Increasing female labour force participation rates suggest that high and rising unemployment was, at least in part, supply-driven. Specifically, we hypothesize that even if demand for labour and employment were increasing, employment was not able to increase fast enough to keep up with women's increasing labour force participation.

To provide additional evidence regarding this hypothesis, we use a technique developed in Card and Riddell (1993) to decompose the increase in unemployment rates (which began in 1994) into three components: (i) changes in the non-employment rate (unemployment plus labour force non-participation as a proportion of the population over 12 years of age); (ii) changes in the probability of unemployment given non-employment (unemployment plus labour force non-participation); and (iii) changes in labour force participation rates. The last two components of this decomposition are related to increases in labour force participation rates, while the first is related to changes in the demand for labour.

Formally, let P(U|LF) represent the probability of unemployment given labour force participation (the unemployment rate), let P(N) represent the unconditional probability of non-employment and let P(LF) equal the probability of being in the labour force. Then,

$$P(U|LF) = \frac{P(N) * P(U|N)}{P(LF)} \quad (1)$$

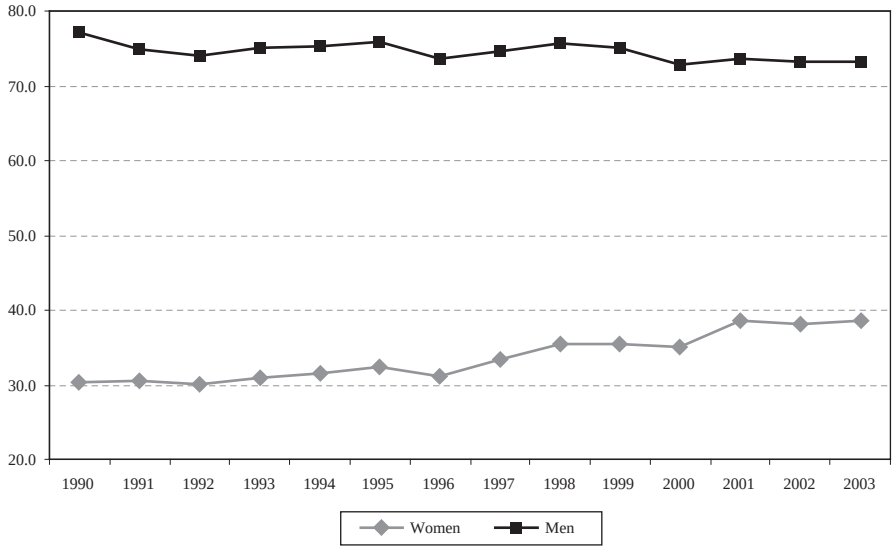
Taking logarithms,

$$\log P(U|LF) = \log P(N) + \log P(U|N) - \log P(LF) \quad (2)$$

Because labour force participation rates are increasing for women and falling for men, we calculate

FIGURE 6

Costa Rica: labour force participation rates by gender, 1990-2003
(Percentages)



Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

this decomposition separately for men and women. For women, our calculations indicate that the increase in the unemployment rate between 1994 and 2003 can be attributed entirely to higher labour force participation rates. Indeed, non-employment rates (the proportion of the working-age population either unemployed or not in the labour force) for women actually fell; indicating that if there had been no increase in labour force participation rates, unemployment rates among women would have decreased. For men, the calculations indicate that the increase in unemployment rates is explained by changes in labour demand and increases in the probability of unemployment given non-employment.[6] In summary, the increase in unemployment among members of poor households from 1996 to 2003 was caused, in part, by an increase in labour force participation rates for women.

III

Changes in household structure

In the last section, we identified the following explanations for stagnating poverty from 1996 to 2003 in Costa Rica despite economic growth: an increase both in the proportion of women from poor households working part-time as self-employed workers and in these same women's labour force participation rates which, in turn, caused unemployment rates among members of poor households to rise. In this section, we show that these labour market phenomena are related to changes in the structure of Costa Rican households. The most notable change in this respect is an increase in the proportion of female-headed households, from 18.0% of all households in 1990 to 25.5% in 2003, and the related decline in "traditional" two-parent male-headed households, from 61.6% of all households in 1990 to 49.6% in 2003 (see table 1). The most rapid increase in the proportion of female-headed households occurred during the period when poverty rates stood still despite economic growth (1996-2003): from 20.7% to 25.5% (as opposed to an increase of only 2.7 percentage points from 1990 to 1996). Further, in the 1990s it became increasingly likely that a poor household would be female-headed; the proportion of poor households headed by women rose from 20.4% in 1990 to 33.0% in 2003 (table 1) The proportion of female-headed households among the non-poor also increased in this period, although the jump was smaller (from 17.2% to 23.4%).

In an analysis of the relationship between household structure and poverty, it is important to distinguish female-headed households with children from those without. In the aggregate, female household heads are not necessarily poorer than male household heads. For example, ECLAC (2003) finds no systematic difference in poverty rates for male- and female-headed households in Latin America. Some female-headed households are less likely to be poor than the average household, such as those corresponding to the increasing number of economically independent young women in Latin America, which are reported as female-headed households (ECLAC 2004).[7] On the other hand, poverty rates for female-headed single-parent households are higher than for any other family type in almost all Latin American countries (ECLAC 2004). As we can see from table 1, this is also true in Costa Rica, where poverty rates are highest for this type of household.

The overwhelming majority of female-headed households in Costa Rica are also single-parent households (table 1). The typical female-headed household is a single-parent household (while the typical male-headed household is a two parent household). As

[6] For women, those employed as a percentage of the working-age female population increased from 29% in 1996 to 35% in 2003. The total change in the log of female unemployment rates between 1994 and 2003 was 0.35, of which the contribution of changes in non-employment rates was -0.08, while the contribution of changes related to changes in labour force participation was 0.43, i.e., the first and third of the components mentioned above. For men, the total change in the log of unemployment rates in the same period was 0.52, of which the contribution of changes in non-employment rates was 0.13, the contribution of changes in the probability of being unemployed given non-employment was 0.37, and the contribution of changes in labour force participation rates was 0.02.

[7] Slon and Zúniga (2006), using a panel data set of household heads constructed from the 2000-2002 Costa Rican Multi-purpose Household Survey, find that female-headed households have a lower probability of exiting poverty than male-headed households, and that female-headed non-poor households are more likely to become poor than male-headed ones (after controlling for other factors that affect transitions into and out of poverty).

TABLE 1

Costa Rica: household structure and poverty, 1990, 1996 and 2003
(Percentages)

	1990	1996	2003
Percentage of all households headed by			
Female household heads	*18.0*	*20.7*	*25.5*
Spouse not present and children up to age 18	11.0	11.5	13.5
Spouse not present and no children	6.2	7.8	9.2
Spouse present and children up to age 18	0.6	0.9	1.9
Spouse present and no children	0.2	0.4	0.9
Male household heads	*82.0*	*79.3*	*74.5*
Spouse not present and children up to age 18	1.7	1.7	1.7
Spouse not present and no children	5.1	5.7	6.8
Spouse present and children up to age 18	61.6	56.6	49.6
Spouse present and no children	13.6	15.3	16.3
Percentage of poor households headed by			
Female household heads	*20.4*	*26.5*	*33.0*
Spouse not present and children up to age 18	13.4	16.8	22.5
Spouse not present and no children	6.5	8.1	7.9
Spouse present and children up to age 18	0.3	1.3	1.7
Spouse present and no children	0.1	0.3	0.9
Male household heads	*79.6*	*73.7*	*67.1*
Spouse not present and children up to age 18	1.8	1.4	2.0
Spouse not present and no children	2.9	4.4	4.4
Spouse present and children up to age 18	65.2	57.0	50.7
Spouse present and no children	9.2	10.7	9.9
Percentage of poor (poverty rates) for the following households	***27.1***	***21.5***	***18.5***
Female household heads	*30.6*	*27.5*	*24.0*
Spouse not present and children up to age 18	32.9	31.5	30.9
Spouse not present and no children	28.3	22.1	16.0
Spouse present and children up to age 18	14.3	29.6	16.1
Spouse present and no children	15.0	14.2	17.1
Male household heads	*26.3*	*20.0*	*16.7*
Spouse not present and children up to age 18	28.0	17.9	22.6
Spouse not present and no children	15.6	16.5	11.9
Spouse present and children up to age 18	28.7	21.6	18.9
Spouse present and no children	18.5	15.0	11.2

Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

may also be seen in table 1, the proportion of poor households headed by women with children in Costa Rica increased from 13.4% in 1990 to 16.8% in 1996 and 22.5% in 2003. During the period when incomes were growing but poverty was stagnant (1996-2003) female-headed single-parent households were the only type to increase as a proportion of total poverty. The increase in the number of single-mother households in poverty was not due to an increase in poverty rates among such households, which remained steady (and even fell slightly), but rather to an increase in the proportion of such households in the population in general. The proportion of households headed by single mothers increased from 11.5% in 1996 to 13.5% in 2003 (after remaining relatively steady from 1990 to 1996).

The increase in the number of female-headed single-parent households contributed directly to keeping poverty rates stagnant during this period because such households are more likely to be poor than other types of households. This is partly because these female heads of household are more likely than others to earn low wages. Table 2 sets out the characteristics of poor and non-poor female-headed single-parent households. A comparison of female heads of single-parent

TABLE 2

Costa Rica: characteristics of female-headed household with children up to age 18 and spouse not present, by poverty status, 1990, 1996 and 2003
(Percentages)

	Poor households			Non-poor households		
	1990	1996	2003	1990	1996	2003
Age distribution (% of household heads)						
12-29 years old	10.3	8.0	11.2	8.5	8.3	10.1
30-39 years old	29.3	31.2	31.7	29.3	28.5	24.0
40-49 years old	23.7	26.5	30.6	26.8	33.3	39.2
50-64 years old	24.5	21.3	14.2	26.1	20.0	20.6
65 years or older	12.2	13.0	12.3	9.3	9.8	6.0
Percentage living in urban areas	*56.9*	*46.4*	*62.0*	*55.3*	*52.1*	*66.4*
For household heads						
Average years of education	4.3	5.0	5.3	6.7	7.6	8.5
Incomplete secondary school education	94.8	92.7	90.2	76.9	70.5	63.7
Labour force participation rate	41.8	41.8	52.8	57.4	68.3	72.4
Unemployment rate	9.0	12.5	17.0	2.5	3.9	2.9
Percentage unemployed	3.8	5.2	9.0	1.4	2.7	2.1
Percentage employed	38.1	36.6	43.9	56.0	65.6	70.3
Employed household heads working						
Part-time	71.1	58.1	66.9	34.6	36.8	45.7
Full-time (40-48 hours per week)	15.4	14.8	20.4	39.2	36.3	27.1
Over-time	13.6	27.0	12.7	26.1	26.8	27.2
Employed Household Heads Working in						
Self-employment	31.4	49.6	51.8	21.9	19.2	25.4
Wage employment	68.0	50.4	49.2	77.8	80.8	74.4

Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

TABLE 3

Costa Rica: characteristics of male household heads, with children up to age 18 and spouse present, by poverty status, 1990, 1996 and 2003
(Percentages)

	Poor households			Non-poor households		
	1990	1996	2003	1990	1996	2003
Age distribution (% of household heads)						
12-29 years old	19.1	11.5	13.2	19.4	18.4	14.0
30-39 years old	37.6	39.5	36.6	38.3	35.3	33.8
40-49 years old	21.4	25.5	27.1	23.6	26.7	32.0
50-64 years old	14.8	15.7	15.3	15.1	15.8	16.9
65 years or older	7.1	7.7	7.8	3.6	3.8	3.3
Percentage living in urban areas	*37.2*	*30.3*	*42.2*	*45.3*	*44.0*	*57.0*
For household heads						
Average years of education	4.9	5.2	5.4	7.7	7.9	8.4
Incomplete secondary school education	93.7	93.1	90.8	69.9	70.8	66.8
Labour force participation rate	89.6	89.4	89.8	94.5	94.7	95.8
Unemployment rate	1.5	3.7	5.6	0.5	1.3	0.6
Percentage unemployed	1.4	3.3	5.1	0.5	1.3	0.6
Percentage employed	88.3	86.2	84.7	94.1	93.4	95.2
Percentage of employed household heads working						
Part-time	36.8	38.2	35.8	20.0	21.3	18.6
Full-time (40-48 hours per week)	32.5	28.7	27.8	40.3	33.5	33.4
Over-time	30.7	33.1	36.4	39.7	45.2	48.0
Percentage employed household heads working in						
Self-employment	36.0	38.2	42.7	26.4	30.6	30.9
Waged employment	63.6	61.8	57.2	73.5	69.3	69.0

Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

households with male heads of "traditional" two-parent households (table 3) shows that female household heads are more likely to be unemployed, work part-time or be self-employed: labour market phenomena that we have identified as causes of the increase in inequality and standstill in poverty in the 1996-2003 period. Compared to non-poor female household heads, poor women heading households are more likely to participate in the labour force, have higher levels of unemployment, work part-time or be self-employed (table 2).

Further, between 1996 and 2003 (when poverty rates stagnated despite economic growth) labour force participation, unemployment, part-time work and self-employment become more prevalent in poor female-headed households. For example, table 4 shows that, among the poor, almost all new female labour force participants came from female-headed single-parent households; the proportion of poor female workers living in this type of household increased from 36.4% in 1990 to 48.3% in 2003 (while the proportion of poor female workers living in male-headed households and in female-headed households without children decreased). In addition, from 1996 to 2003 the proportion of poor single female household heads with children who worked part time increased from 58.1% to 66.9%, the proportion working as self-employed increased from 49.6% to 51.8%, those unemployed increased from 5.2% to 9.0%, and their labour force participation increased from 41.8% to 52.8% (table 2). Conversely, during the same period, among male-headed two-parent households labour force participation rates and the proportion working part-time fell. While rates of unemployment and self-employment rose among male household heads of two parent families, the increase was not as great as among female-headed single-parent households, as seen when comparing tables 2 and 3. The proportion of female heads of non-poor households working part-time also increased between 1996 and 2003 (from 36.8% to 45.7%), as did the proportion working as self-employed (from 19.2% to over 25.4%), while unemployment rates for this group decreased from 2.7% to 2.1% (table 2).[8]

In summary, the evidence suggests that the increase in the proportion of female-headed single-parent households can help explain the phenomena observed in the labour market (higher rates of labour force participation, higher unemployment rates and larger numbers of self-employed workers) which, in turn, contributed to stagnating poverty rates and higher earnings inequality in Costa Rica. Unfortunately, the Multi-purpose Household Surveys do not allow the researcher to identify the underlying sociological causes of the increase in female-headed single-parent households. For example, we cannot tell whether these are women who have never been married, were married but have been divorced or widowed, or who have lived in consensual unions but no longer have another adult living in the household. This is an important focus for future research.

[8] The proportion of female-headed households without children also increased from 1987 to 2004 (although at a slower rate than the increase in female-headed single-parent households). These women are usually older and less likely to be labour market participants than female household heads with children and male household heads of "traditional" two-parent families; more than 65% are aged 65 years or older, while less than 10% are labour force participants. This suggests that these are older women who do not have access to the pensions of a spouse. Unfortunately, the household surveys do not allow us to identify whether these are women who were never married, who have divorced, or whose husbands have died. From 1996 to 2003 there was also an increase in the proportion of married women in male-headed households who entered the labour force. In this same period an increasing percentage of married women from poor households with children also entered the labour force (the proportion increased from 11.5% to 13.5%). For married women from poor households, both employment rates and unemployment rates (as a percentage of the population) increased. Among employed married women from poor households, there was an increase in those working part-time or self-employed. The increase in the proportion of households with working married women can help explain the increase in part-time and self-employed workers, but not the stagnating poverty rate, because a household with two earners generally has a lower probability of being poor. Indeed, there is some evidence that the increase in the labour force participation rates of married women in two-parent households translated into a decrease in poverty, since the proportion of households with two working spouses in Costa Rica increased more among non-poor households than among poor ones (the proportion of poor male-headed households with an employed spouse increased from 6.7% in 1996 to 12.8% in 2003, while that of non-poor male-headed households with an employed spouse increased from 24.4% in 1996 to 32.2% in 2003).

TABLE 4

Costa Rica: household structure and labour force participation of women living in poor households, 1990, 1996 and 2003

(Percentage of the female labour force living in each type of household)

	Poor households		
	1990	1996	2003
Female household heads	*42.6*	*50.3*	*54.4*
Spouse not present and children up to age 18	36.4	40.8	48.3
Spouse not present and no children	5.3	5.1	2.9
Spouse present and children up to age 18	0.7	3.9	2.6
Spouse present and no children	0.2	0.5	0.6
Male household heads	*57.4*	*49.7*	*45.6*
Spouse not present and children up to age 18	1.7	1.1	1.5
Spouse not present and no children	0.1	0.0	0.4
Spouse present and children up to age 18	52.0	46.6	39.9
Spouse present and no children	3.6	2.1	3.9
Total	100.0	100.0	100.0

Source: Authors' calculations based on data from the Multi-purpose Household Survey, 1990-2003.

V

Conclusions and policy implications

The period when poverty rates stagnated in Costa Rica despite growing average real earnings and incomes coincided with a large increase in the proportion of households headed by women, and an even larger increase in the proportion of poor female-headed single-parent households. Because single-parent households headed by women are more likely to be poor than any other type, the increase in the proportion of that type of household alone was enough to push up poverty rates. The evidence also supports the supposition that these women, as new entrants to the labour force, were unable to find or unwilling to accept full-time work in the higher-paying formal sector, and ended up unemployed or working part-time as self-employed workers. These labour market phenomena, in turn, contributed to increased inequality, higher unemployment and low incomes for households vulnerable to poverty.

The findings here suggest that many poor mothers in Costa Rica have sole responsibility for childcare, which may make it difficult to work standard working hours in the formal sector. Policies that would help those women to obtain and keep full-time work in the higher-paying formal sector could contribute to reducing poverty rates in Costa Rica. Expanding access to childcare for poor families during normal working hours would make it easier for poor single mothers to obtain well-paid full-time work. Public policies to expand access to childcare might include: increasing subsidies to poor families for childcare, providing after- and before-school childcare programmes in schools, and subsidies to private firms for the provision of day care facilities at the workplace.

Trejos (2006) describes existing programmes in this area in Costa Rica, such as the Ministry of Health's *Centros Infantiles* ("Child Centres") scheme and the programme run by the Joint Institute for Social Aid (IMAS) known as *Oportunidades de Atención a la Niñez* ("Childcare opportunities"). He makes the point, however, that the existing programmes cover a very small proportion of the poor families who need childcare services and that the already small amount of spending on these programmes has actually been falling since 2000. Also, these programmes are only for preschool-aged children. For school-aged children, the Ministry of Education runs programmes that help families to keep children in school, such as free lunches and financial aid for transport, uniforms, supplies, and so on. However, there are no before- and after-school

childcare programmes for children above preschool age. This limits mothers' work options, because many public schools in Costa Rica have two sessions per day and a child may thus be in school only in the morning or only in the afternoon, and will require childcare for the other half of the working day.

Our results suggest that Costa Rica should reduce the legal barriers faced by women who would like to work non-standard work hours. For example, current Costa Rican legislation limits employers' ability to employ women at night, which may force women interested in part-time or night work into the lower paying informal sector.

Lastly, our findings suggest that the Costa Rican government should enact policies to provide single mothers with the training and other resources they need to find and keep well-paid employment. Poor female heads of single-parent households have very low levels of skills compared to other Costa Rican workers; thus, programmes designed to address that lack could help to reduce poverty in the country. One such set of policies would make it easier for women (particularly younger women with children) to complete more years of formal education. Another set of policies would provide training for adult single mothers. The Costa Rican government currently has non-targeted training programmes that include those run through the National Apprenticeship Institute (INA), the Agricultural Development Institute (IDA) and the National Production Council (CNP). In addition, the Joint Institute for Social Aid administers training programmes directed towards the poor (especially female heads of household). Our results suggest the government should expand this type of programme aimed at providing training for poor women.

(Original: English)

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KEYWORDS

Students
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Urban segregation and school backwardness in Rio de Janeiro

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This article analyses a dimension that is almost completely absent from studies on the socio-territorial mechanisms that reproduce inequalities in Brazil: differences in the risk of school backwardness among children and young people between 7 and 17 years of age, based on residential segregation in Rio de Janeiro. Data from the 2000 Population Census were used to construct two sets of multilevel logistic regression models to quantify the risk of school backwardness among primary school students in fourth and eighth grade, according to individual characteristics, family socio-educational conditions and the social setting of their place of residence. Apart from showing that residence in a ghetto (*favela*) is associated with a higher risk of school backwardness, the results show that the risk of backwardness and school dropout is higher among inhabitants of *favelas* located in wealthy neighbourhoods. Possible explanatory mechanisms for these findings are reviewed.

I
Introduction

The city of Rio de Janeiro contains large ghettos (known as *favelas*),[1] many of which are located close to the city's most "noble" areas. In the educational domain, although the city's grade level pass rates are higher than the national average, the failure rate is high compared to most countries in the world, and this results in high rates of school backwardness. The purpose of this paper is to analyse the relation between place of residence and the risk of school backwardness.

The so-called "neighbourhood effect" forms part of the general category of explanatory models that hypothesize a causal relation between certain events and the social context in which they occur. The aim is to explain a given social phenomenon in terms of the causal relation between the individual —his or her motivations, options, behaviour patterns and social situation— and social settings arising from the residential concentration of persons with certain shared or similar characteristics. In other words, the goal is to capture the effect that social relations developed in the residential setting have on events that occur in the neighbourhood (Sampson, Raudenbush and Earls, 1997). The neighbourhood effect should not be understood as a mere consequence of neighbourhood social composition, however. The challenge for the researcher is to capture this effect based on a variable that expresses social relations that have the potential to alter the phenomenon being investigated. The study by Sampson, Raudenbush and Earls (1997), for example, showed how collective effectiveness was associated with a reduction in criminality in various areas of Chicago. The concept of collective effectiveness was defined on the basis of a question that captured the level of agreement expressed by respondents with statements measuring the extent to which they considered they could rely on the intervention of neighbours to deal with local problems, such as youth congregating on the streets during school hours and graffiti on the walls. In this classic example of neighbourhood effect studies, both the phenomenon itself —criminality— and the social relations that affect it —collective effectiveness— occurred in the neighbourhood setting.

A review of work done on the neighbourhood effect in the United States following the publication of the book by Wilson (1987), particularly the bibliographic reviews made by Jencks and Mayer (1990) and Gould Ellen and Austin Turner (1997), revealed a lack of convergence in the specialized literature regarding the existence of any such causal relation, when the social phenomenon being studied is children's school performance. Several authors tend to downplay or deny the existence of the neighbourhood effect, adducing the major influence that the social setting closest to the child —particularly the family— exerts at this stage in an individual's life cycle. In Latin America, however, several recent papers confirm the hypothesis of the influence of the neighbourhood effect on educational achievements. Kaztman and Rematoso (2007), for example, have convincingly demonstrated the existence of causal relations between residential segregation and different learning outcomes among school-age children in Montevideo.

Studies on the determinants of education in Brazil are based on achievement or attainment tests, which are considered measures of success or failure during the years of schooling. In both cases, most authors have approached the topic through three types of factors: the characteristics of the students and their families,[2] the social setting of schools[3] and the characteristics that make certain schools relatively more effective than others.[4]

In recent years, another set of factors has drawn the attention of certain Brazilian researchers, including the relation between the school and the city's social organization. Under the influence of demographic and sociological studies performed in the 1980s and 1990s in the United States, the authors Torres, Ferreira and Gomes (2005) seek to establish a link between

[1] Favelas are settlements classified by the Brazilian Geography and Statistical Institute (IBGE) as a subnormal agglomerate: i.e. they are built on illegally occupied land beonging to third parties, they do not adhere to current standards, are not regulated by public bodies, and their essential services are precarious. For a more detailed description, see footnote 6.

[2] See Gomes-Neto and Hanusheck, 1994; Paes e Barros, Mendonça and others, 2001; Alves, Ortigão and others, 2007.

[3] See Albernaz, Ferreira and Franco, 2002; Soares and Andrade, 2006.

[4] See Machado Soares, 2005; Soares, 2004; Franco, Ortigão and others, 2006; Lee, Franco and Albernaz, 2007.

residential segregation in the city of São Paulo and inequalities in school performance among youngsters of 18 to 19 years of age. The article by Ribeiro (2005), based on the 2000 Population Census, reviews the relation between school backwardness among 7-15 year-olds, on the one hand, and variables relating to the school capital endowment of families, family assets, and the location of neighbourhoods of residency in the various social segments of the metropolises of Rio de Janeiro, São Paulo and Belo Horizonte.

This article returns to this subject, and attempts to answer the questions raised in those papers, using models that include various additional statistical controls apart from those used by the aforementioned authors. The aim is to study the relation between differences in the risk of school backwardness among children and young people from seven to 17 years of age, on the one hand, and the various social settings that arise from residential segregation processes in the city of Rio de Janeiro, on the other. For this purpose, indicators were constructed using data from the 2000 Population Census, and two sets of multilevel logistic regression models were estimated to quantify the risk of school backwardness among primary school fourth and eighth grade students, based on their individual characteristics, the socio-educational conditions of their families, and the social setting of their place of residence. The latter level of analysis calculated the risk of school backwardness according to the city's socio-territorial stratification, defined both by average income in 204 subdivisions of Rio de Janeiro, and in terms of being a *favela* or not, which is one of the distinctive features of that city's residential segregation model.

This paper seeks to answer the following: (i) whether the risk of school backwardness in fourth and eighth grade of primary school (*educação fundamental*)[5] is related to the socio-spatial organization of the city of Rio de Janeiro; and (ii) what hypotheses can be formulated to explain the mechanisms through which a neighbourhood's social setting interacts with school performance. The article also reflects on lessons learned by the case under study, with its specific features in the social, urban and school domains; and these are compared with the results —to some extent refuted— of other studies that review current knowledge on the subject.

This paper firstly discusses the meaning of *favelas* in the literature on the Rio de Janeiro segregation model, the main characteristics of which are territorial proximity and social distance. It then describes the methodology used, provides details of the models developed, and presents and analyses the results obtained. Next, it summarizes the results and reviews their compatibility with theoretical arguments on how poverty concentration can affect the life of individuals.

II

The *favela*, the city, and the Rio de Janeiro model of territorial stratification: physical proximity and social distance

The social space of Rio de Janeiro eloquently expresses the hybrid nature of the regime whereby classes established in Brazilian society by the well-known process of selective modernization (Soares, 2000) interact. Its main characteristic is the territorial proximity between actors who are socially distant from each other and interact according to a socio-cultural matrix that has historically combined holistic hierarchical values with individualistic egalitarian values inherent in a market society (Da Matta, 1981 and 1991; Soares, 1997).

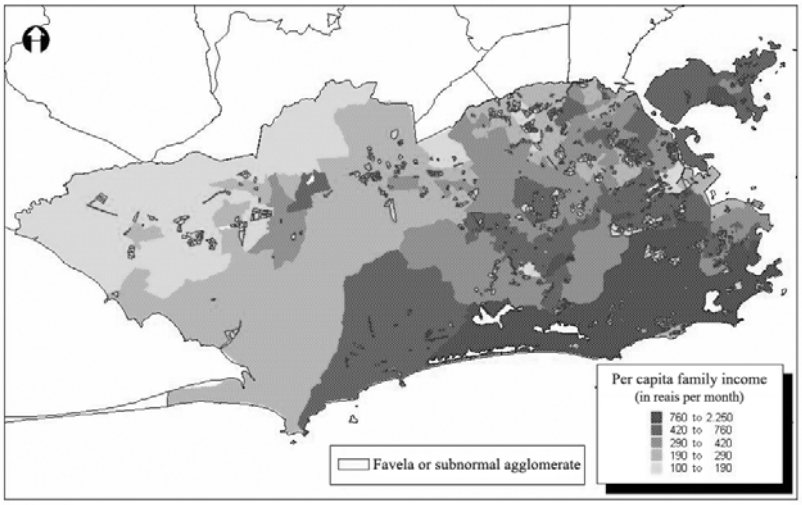
As Map 1 shows, the existence of ghettos scattered around the city, but especially in its noble sectors, is the most visible feature of the city's socio-territorial organization.

¿But what are *favelas*? Ever since their inception, they have been a hierarchical way of accommodating low-income population groups in the city, in the *civitas* and *polis* dimensions of the urban condition.

[5] In Brazil, primary education encompasses eight school grades.

MAP 1

Municipality of Rio de Janeiro: socio-territorial division and location of favelas in the Municipality of Rio de Janeiro



Source: Metropolis Observatory Urban and Regional Planning Research Institute/Federal University of Rio de Janeiro/Federation of Social Assistance and Educational Organizations (fase), 2006. The metrodata team, a unit belonging to the *Metropolis Observatory*, included Juciano Rodrigues, Paulo Renato Azevedo and Ricardo Sierpe.

In political terms they correspond territorially to what Santos (1979) has called "regulated citizenship", or what Carvalho (1987) referred to as super-citizenship or *"estadanía"*, or what Machado (2002) called a situation of "negotiated control".

Far from disappearing, this polarized form of urban organization has strengthened in recent years, for not only has the importance of *favelas* increased, but so also has their presence in the wealthier zones of the city (Ribeiro and Lago, 2000).[6] The relative and absolute weight of these settlements grew in the 1980s, as a result of their own development and because of a drop in the rate of population growth in the wealthiest residential zones. The reasons for this phenomenon are basically the following:

(i) the crisis of internal mobility in the metropolitan area of Rio de Janeiro, which forced less skilled workers to live close to (or at an accessible low-cost distance from) the city's wealthiest zones, where the highest-income segments are concentrated and hence great demand for personal domestic services;[7]

(ii) job opportunities in the informal labour market within *favelas* themselves, particularly the largest ones, which, under the momentum of social diversification, generate a market for services and trade aimed at meeting local demands;[8]

[6] This paper uses the statistical category of "subnormal agglomerate" defined by the Brazilian Geography and Statistical Institute (IBGE) as the variable representing *favelas*. This decision is based on the IBGE's own definition of this category as: a group consisting of at least 51 housing units (precarious homes, houses), which occupy or until recently have occupied land owned by third parties (public or private), generally haphazardly and densely arranged, and mostly lacking essential public utilities. The identification of subnormal agglomerates is based on the following criteria: (a) illegal occupation of the land, i.e. construction on land plots owned by third parties (public or private) at the time or recently (property title obtained no more than 10 years ago); (b) at least one of the following characteristics: (i) urbanisation that does not comply with current standards, reflected in narrow and irregular streets; and (ii) land plots of varying sizes and shapes, and constructions that are not regulated by public bodies; and (c) precarious essential public services. In Río de Janeiro the registered number of subnormal agglomerate does not agree with the municipality's cadastre of *favelas*. Nonetheless, several studies —to be mentioned below— support the use of the IBGE category as an efficient indicator to describe the sociodemographic characteristics of the population and its territorial organisation.

[7] See Gobierno del Estado de Rio de Janeiro (undated).

[8] For further details regarding clear signs of a territorial economy within *favelas*, see Fonseca (2005), which considers youth employment in the *mototaxi* service invented in the Rocinha *favela*. The authors of this article agree with Abramo (2003) on the need to analyse the growth of *favelas* as a result of structural constraints and the alternatives and preferences of families.

(iii) the desire to exploit externalities and urban attractions generated by a concentration of the wealthiest sectors in the coastal zone of the city; and

(iv) without any doubt, the change from a policy of total tolerance to a policy to officially recognize the *favela* as a zone of residence in the city, which has been favoured since the early 1980s by urbanization programs and also by the partial regularization of property ownership.

Rio de Janeiro is an exceptional case among the world's leading metropolises, because it has not experienced the classical territorial segregation of social groups and classes characteristic of large cities in the industrial era. There are many reasons explaining this specific feature, which cannot be discussed within the scope of this article. Nonetheless, for the purposes of this study, it is important to note that the history of *favelas* in the municipality of Rio de Janeiro relates directly to the turbulent and confused history of private land ownership in the city. This institutional framework largely favoured tolerance of illegal and irregular procedures as a means to incorporate low-income groups into the burgeoning urban society.[9]

A number of recent studies on *favelas* have fuelled a debate on the sociological relevance of distinguishing between *favela* and city for understanding the way space is socially organized in Rio de Janeiro. When analysing the evident improvements that have occurred in urban conditions of life in the *favelas* —particularly housing— some authors have highlighted the growing process of diversification of these spaces and their social approximation to popular neighbourhoods on the outskirts of the city (Preteceille and Valladares, 2000). Those studies explicitly or implicitly criticize the conception of *favelas* as spaces that concentrate segments of society that suffer the negative effects of residential segregation, including those relating to the reproduction of poverty. In fact, the aforementioned authors argue that the concept of *favela* is inadequate. Nonetheless, our studies in the Metropolis Observatory, and work done by other researchers, show that this distinction is relevant, because it relates to different patterns of social interaction between *favela* inhabitants and the institutions of society and even other social groups. For example, a number of labour market studies based on data from the 2000 Population Census, including Ribeiro and Lago (2000) and Pero, Cardoso and Elias (2005), highlight the relationship between socio-territorial segmentation and income differences among workers of similar demographic and social characteristics. A case study by Andrade (2004) had already shown the adverse effects on personal income caused by living in a *favela*, owing to uncertain property rights, guaranteed by informal and local mechanisms outside official institutional frameworks. In the domain of political relations, Burgos (2005) analysed the way in which the exercise of citizenship among *favela* inhabitants is weakened even today by the persistence of cronyism practices that are ever present in their relations with public organizations and institutions.

This paper assumes that neither the trend towards differentiation between *favela* and city, and between different types of *favela*, nor the greater access of *favelas* to certain urban services eliminates the *favela*-city dichotomy as a distinctive feature of urban organization in Rio de Janeiro, since a highly hierarchical social interaction regime persists between one and the other. This assumption directs the empirical research presented below, particularly with regard to the construction of variables that characterize both the distinction between *favela* and city and the differentiation between *favelas* situated in different socio-spatial arrangements. Nonetheless, we also hope that the empirical results of our research show that our assumptions as to relevance of distinguishing between *favela* and city are appropriate.

[9] Private land ownership in Brazil was instituted in 1850 through the Land Act (*Lei de Terras*). Until then a state paternalistic system had prevailed that regulated abandoned or uncultivated land areas. In the capital of the Kingdom and Empire, a large proportion of land plots fell into public ownership and were gradually incorporated into the market through illegal or fraudulent appropriation (a practice which in the vernacular is referred to as *grilagem*). As a forerunner of the emergence of *favelas* —whose chief characteristic is that the inhabitants only makes use of the land— there is an institutional framework of land ownership relations that lacks the effects of guarantee and protection of uncontestable private rights. In addition, a vast patrimony of public land has been acquired by social protection institutes founded since 1930, with the aim of creating reserves of assets for managing retirement and other pension funds. Public lands and vaguely defined private properties allowed for the fact that, in the midst of rapid urbanisation and the emergence of working classes as potential protagonists in the political system, there emerged in the city a public policy of total tolerance towards all forms of private appropriation of urban land by those who already had power or who aspired to a social and political status in the nascent modern urban society. The unregulated occupation of urban land was certainly one way of solving disputes —both among the dominant classes and between them and low-income sectors— arising from the city's expansion. See Pechman (1985) for a discussion of the history of land ownership in Río de Janeiro and how it relates to recent trends in the city's urban formation. See also Ribeiro and others (1985).

III
Methodology

1. Data

This study uses data from the 2000 Population Census. As in the other Population Censuses conducted since 1960, a sample of households was selected from each census sector, and detailed questions were asked on the characteristics of each household and its inhabitants. The sample questionnaire was applied to 10% of households (20% in small municipalities), and each census sector included a maximum of 350. For this reason, the Brazilian Geography and Statistical Institute (IBGE) only has micro-data on weighting areas that correspond to census sector conglomerates. In the case of certain large cities, including Rio de Janeiro, municipal planning agencies were consulted to jointly define the weighting areas, to ensure that they represented relatively homogeneous units. Moreover, definition of the weighting areas required a minimum number of questionnaires to be applied to the sample (least 400 occupied households) and for the set of grouped census sectors to be contiguous. The process of consulting municipal planning agencies helped to ensure that the weighting areas corresponded to subsets of the city to which the concept of neighbourhood is applicable. Secondly, the criterion of including a minimum number of households in the sample, together with the criterion of contiguousness, meant that small and medium-sized *favelas* were grouped together with non-*favela* census sectors for the purpose of defining weighting areas. This is particularly true of Rio de Janeiro, given the heterogeneous way in which the city's social space is organized. In this context, the *Metropolis Observatory* decided to define modified expansion areas representing more homogeneous units to facilitate the task of studying Population Census micro-data. For this purpose, the requirement that census sectors forming part of the modified expansion areas be contiguousness was relaxed. Census sectors considered subnormal (*favela* areas) were grouped together in 39 specific units, nonetheless representing the boundaries of neighbourhoods and administrative regions in the municipality. The geographic base created by the *Metropolis Observatory* was approved by the IBGE research department. In addition to the 39 areas mentioned, the database includes another 175 expansion areas, hereinafter referred to as "level-2 units".

As the Population Census data are cross-sectional, the results of this study should not be interpreted as unequivocal proof of causality relations. Nonetheless, there is ample evidence that the independent variables described below (income, mother's education, place of residence) already characterized the families before the occurrence of grade failure episodes, which are the main factors leading to school backwardness. In other words, despite the cross-sectional nature of the data, there are reasons to believe that the study has hardly been affected by problems stemming from the time sequence of the events considered in the models. Nonetheless, after examining school backwardness at the end of the primary school cycle (eighth grade) it was decided also to analyse fourth grade data. In this way, the cross-sectional nature of the data is less problematic, since there is less time between the social events in question and the time of measurement.

2. Variables

Data from the 2000 Population Census in Rio de Janeiro were firstly used to choose households with children and young people between seven and 17 years of age. The per-capita income of each of those households was then established and the per-capita income of level-2 units (i.e. each expansion area) was calculated. As the study aims to identify factors that raise the risk of school backwardness, target groups were subsequently chosen comprising students who were in fourth and eighth grade of primary school in the city of Rio de Janeiro in 2000. Two dependent variables were defined in each case, indicating school backwardness of one and two years, respectively. If the fourth grade student was 11 years of age or older on 31 July 2000, and the eighth grade student was 15 or older on the same date, the variable indicating one year of backwardness was coded as 1. Similarly, if the fourth grade student was 12 or more on 1 August 2000 and the eighth grade student was 16 or more on the same date, the variable indicating two years of backwardness was coded as 1.

The various educational networks operating in Brazil use different cut-off birth dates for a child to be able to enrol at the start of primary school. On 7 October 2005, the Minister of Education approved a

resolution of the National Education Council (CNE) requiring a child to the six years old before 1 March to be able to enter the nine-year primary school cycle (corresponding to the previous basic literacy class (*Classe de Alfabetização*)). For several years a similar regulation has been applied in the municipality of Rio de Janeiro, although until very recently it was very common for younger students to be registered through a ruling issued by the juvenile court. Even today, a variety of criteria are applied. In the municipal network of Belo Horizonte and in the State network of Minas Gerais, for example, the cut-off date used in 2006 was 30 June. In private schools, there are no predetermined rules, but 31 July is the usual date. In this study, we use two variables to capture school backwardness, recognizing that the one-year year variable overestimates backwardness, while the two-year variable underestimates it. Tables 1 and 2, respectively, contain a description and statistical data relating to the variables used in the constructed models.

TABLE 1

Municipality of Rio de Janeiro: variables used to capture school backwardness, 2000

Variables	Type	Description
Dependent variables		
Backwardness 1	Dichotomous	Indicates whether a student in eighth grade of primary school is behind by one or more years ((1= yes/ 0= c.c)
Backwardness 2	Dichotomous	Indicates whether a student in eighth grade of primary school is behind by two or more years ((1= yes/ 0= c.c)
Explanatory variables		
Level 1		
Male student	Dichotomous	Gender
Mulato student	Dichotomous	Mulato student (1= yes/ 0= otherwise)
Black student	Dichotomous	Black student (1= yes/ 0= otherwise)
Mother's education	Continuous	Years of schooling of the mother of the child living in the household.
Per capita family income	Continuous	Logarithm of per capita household income
Level 2		
Average family income in the zone	Continuous	Average of the logarithms of per capita household income
Favela	Dichotomous	Indicates whether the area is considered a *favela* (1= yes/ 0= otherwise)
Favela in wealthy zone	Dichotomous	Indicates whether the *favela* is in a wealthy zone (1= yes/ 0= otherwise)
Favela in low-income zone	Dichotomous	Indicates whether the *favela* is in a low income zone (1= yes/ 0= otherwise)

Source: Prepared by the authors on the basis of data from the 2000 Population Census.

TABLE 2

Municipality of Rio de Janeiro: descriptive statistics of the variables used, 2000

	Eighth grade		Fourth grade	
Variables	Mean	Standard deviation	Mean	Standard deviation
Backwardness 1	0.51	-	0.50	-
Backwardness 2	0.25	-	0.25	-
Male student	0.49	-	0.51	-
Mulato student	0.33	-	0.37	-
Black student	0.08	-	0.09	-
Mother's education	8.46	4.60	7.53	4.68
Per capita family income	2.37	0.64	2.18	0.74
Average family income in the zone	2.54	0.33	2.54	0.33
Favela	0.19	-	0.19	-
Favela in wealthy zone	0.06	-	0.06	-
Favela in low-income zone	0.12	-	0.12	-

Source: Demographic Census 2000.

3. Analytical focus

Given the hierarchical or pyramidal nature of the data (children and young people living in certain areas), the correct way to study the effects of place of residence on the risk of school backwardness entails constructing multi-level models. Specifically, the data analysis was undertaken through multilevel logistic regression models: children/young people and place of residence (Raudenbush and Bryk, 1992). Studies based on logistic regression models frequently present their results as a function of the coefficient of each of the regressors, where the value of the coefficient associated with a variable represents a probability ratio. When the event represented by the dependent variable is unusual, the probability ratio directly quantifies the risk associated with the category change in the explanatory variable. Unfortunately this is not the case of school backwardness in Brazil or in Rio de Janeiro. Table 2 shows that school backwardness affects 25% of fourth-year students and 51% of eighth grade students in the sample analysed. For this reason the results of this study are presented as a function of relative risk (RR), which measures the ratio between the probabilities of school backwardness in the response categories of the explanatory variable.

This research differs from usual studies on the neighbourhood effect, because the phenomenon being studied here —school backwardness— can occur in a school located outside the student's zone of residence, given the social relations that exist between actors living in different neighbourhoods. This can be seen by noting that almost 20% of school age young people were living in *favelas* in 2000, but only a few dozen of the 1,034 municipal schools were located inside those settlements. This shows that school backwardness —above all resulting from grade failure— occurs outside the zone of residence of the youngsters in question, i.e. outside the *favelas*, and, at least partly, as a function of the social relations that these students establish with other students and teachers who generally do not live in their neighbourhoods. We shall return to this topic later. Before presenting and analysing the results, we describe the sequence of the models constructed.

Continuing with a more descriptive than deductive approach, the first model constructed only included the variable indicating level-2 *favelas*. This model simply indicates the risk of school backwardness associated with that variable, without characterizing the differences between inhabitants of *favelas* and other areas of the city (model 1). Also with a descriptive focus, model 2 replaces the *favela* variable with two others, for the purpose of comparing the reference category (non-*favela*) with *favelas* located in wealthy social settings and those in low- income ones. This additional specification is justified by the type of phenomenon being studied, which involves social relations between inhabitants of different neighbourhoods. In this setting, one would expect the effects to be different in *favelas* located in different social settings —but this needs to be proven empirically. Next, models were estimated that included control variables relating to the student and his or her family (models 3 and 4); and lastly, the per-capita income of level-2 units was added to these variables (models 5 and 6).[10]

The results of the estimated models are described below. This sequence of six models was applied to eighth and fourth grade students, both in relation to the dependent variable indicating one or more years of school backwardness and in relation to the dependent variable indicating at least two years of backwardness. We again stress that the continuous variables are centred on their respective means and that the analysis made use of the sample size.

[10] An analysis of variation in the coefficients between level-2 units showed that only the intercept changed, so the coefficients on the other variables were fixed.

IV
The results and their analysis

Table 3 shows the relative risk in terms of the variables included in the six models constructed to measure school backwardness of one or more years. The lower part of the table shows the variance for each model, and this is compared with the variance of the unconditional model.

Model 1 only estimates the risk that a student living in a *favela* is behind by one or more years (i.e. he or she is 15 years or older by 31 July 2000 and in eighth grade) compared to the risk of a student that does not live in a *favela*. The relative result (RR= 1.51) shows that the risk for the former group is 51% higher than for the latter.

Model 2 is an alternative specification. Once again it compares the risk of backwardness among students living in *favelas* with the risk for students that do not live in *favelas*; but this time a distinction is made between *favelas* located in neighbourhoods occupied by high socioeconomic groups and those near to low-income neighbourhoods. The results show that the inhabitants of both types of *favela* run a greater risk of school backwardness than students living in other zones. The specific estimation of the risk for inhabitants of *favelas* in wealthy neighbourhoods (RR= 1.59) was higher than that for inhabitants of *favelas* bordering on low-income neighbourhoods (RR= 1.47). This means that the risk for young people from *favelas* that are next to wealthy zones and low-income neighbourhoods, respectively, is 59% and 47% greater than for young people living in other areas. The relevant tests show that the difference between the relative risks estimated is non-zero.

No statistical controls have been applied in the models presented thus far, so the estimated risks could merely be a consequence of individual differences between *favela* inhabitants and those of other city neighbourhoods. Accordingly, models were constructed that included variables controlling for the student and his or her family, to estimate the potential effect of social processes arising from the organization of the city's social space.

The results of model 3 show that the risk of backwardness for male students is 1.17. The results for mulato (i.e. a person of mixed African-European descent) and black students are RR = 1.14 and RR = 1.26, respectively, indicating a risk of backwardness that is 14% and 25% higher for mulato and black students than for white students. These risks are controlled for by the other variables included in the model, including place of residence, mother's education, and per capita

TABLE 3

Municipality of Rio de Janeiro: multi-level model measuring the risk of at least one year of school backwardness among eighth grade primary school students, 2000

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Level 1						
Male student			1.17***	1.17***	1.17***	1.17***
Black student			1.26***	1.26***	1.26***	1.26***
Mulato student			1.14***	1.14***	1.14***	1.14***
Mother's education			0.93***	0.94***	0.94***	0.94***
Per-capita income			0.90***	0.90***	0.90***	0.90***
Level 2						
Average family income				1.00		1.00
Favela	1.51***		1.21**	1.20**		
Favela in wealthy zone		1.59***			1.30***	1.30***
Favela in low-income zone		1.47***			1.16*	1.16*
Variance						
Unconditional model	0.231***	0.231***	0.231***	0.231***	0.231***	0.231***
Models 1 - 6	0.112***	0.111***	0.018*	0.018*	0.016*	0.016*

Source: Prepared by the authors using data from the 2000 Population Census.
* Significant at 5%; ** significant at 1%; *** significant at 0.1%.

family income. With respect to the two latter variables, the results (RR = 0.93 and RR = 0.90, respectively) show that when the mother's level of schooling increases by one year, the risk of school backwardness decreases by 7%; and when the logarithm of per-capita income rises by one unit, the risk declines by 10%. Model 3 also shows that if the social composition of eighth grade students in 2000 is held constant, the fact of living in a *favela* raises the risk of school backwardness by 21%. Model 4, in addition to considering the risk for individuals of a similar social profile, also implements an additional control for the mean per-capita income of the demographic expansion areas. The results in this case are not significantly different from the previous model.

Model 5 includes the level-1 controls, distinguishing between the situation of *favelas* close to wealthy zones and those bordering on low-income neighbourhoods. The result is similar to that of model 3 in terms of the risk relating to level-1 variables. The specific calculation of the risk for inhabitants of *favelas* located nearby high-status zones was greater than for inhabitants of *favelas* close to low-income areas (RR = 1.30 and RR = 1.16, respectively). These figures show that, when social origin variables are controlled for, the risk of school backwardness stemming from place of residence is 30% and 16% greater for inhabitants of *favelas* near wealthy neighbourhoods and low-income neighbourhoods, respectively. As in the other models estimated, the relative risks are different from the statistical standpoint.

Lastly, estimation of model 6 included a variable to control for the average per-capita income of the demographic expansion regions. The results were identical to those of model 5.

To summarize, the estimated models show that the risk of school backwardness is greater for youngsters living in *favelas* than for their peers who live in other neighbourhoods (model 1), and that the risk is partially reduced by including sociodemographic variables relating to the students and their families (model 3). The additional control on the average per-capita income of the zone of residence did not affect this result (model 4). It was also seen that the risk associated with living in a *favela* close to wealthy neighbourhoods is higher than that related to residence in a *favela* close to low-income neighbourhoods (model 2). This result is only partly diminished when sociodemographic control variables relating to students and their families are considered (model 5); and it remains unaltered when an additional control is included for the mean per-capita income of the zone of residence (model 6).

The lower part of table 3 shows the variance of the intercept in each model, which is compared with the variance of the intercept in the unconditional model. It can be seen that the variance decreases as stricter controls are applied. At the end of the process, the variables included in the model explain 93% of the variance.

Table 4 sets out the results of the models developed to study the risk of two or more years' school backwardness.

In general, the results obtained for the models whose dependent variable is two or more years' school backwardness are similar to those described previously; accordingly, they are merely summarized here, and only the main difference from the previous results is highlighted. Figure 1, which is based on model 6, shows the most important differences between the models estimated for the different dependent variables, and it facilitates the comparison.

The key difference is the lower risk associated with the variable "*Favela* in a wealthy zone", when the dependent variable is at least two years of school backwardness. As indicated in table 4, the risk associated with living in a *favela* is the same whether the *favela* is in a wealthy or low-income zone. A possible explanation for this result is school dropout, which could be more prevalent among young people living in *favelas* close to wealthy neighbourhoods. To investigate this hypothesis, an additional model was constructed, in which the dependent variable indicates school dropout among 14-17 year-old students who have not completed primary (i.e. eighth grade). The other specifications of this model are identical to those of model 6, as shown in table 4. The estimated result shows that the risk of dropout among students living in *favelas* bordering on wealthy and low-income neighbourhoods, respectively, is 74% and 57% higher than the risk of dropout among those who do not live in *favelas*. This result not only explains lower risks of school backwardness shown in table 4 and also in figure 2 below, but also highlights the greater risk for residents of *favelas*, particularly those bordering on wealthy neighbourhoods, as a result experiencing a situation of extreme school failure that leads them to drop out of school before completing primary.

Table 5 shows the risks estimated for the variables included in models relating to fourth grade students, with school backwardness of one or more years as the dependent variable.

As table 5 shows, under model 1 the risk that a fourth grade student living in a *favela* in 2000 is at least one year behind is 58% higher than in the case

TABLE 4

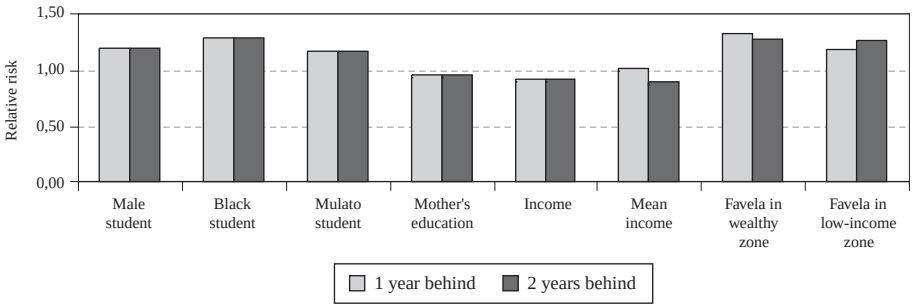
Municipality of Rio de Janeiro: multi-level model measuring the risk of at least two years of school backwardness among eighth grade primary school students

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Level 1						
Male student			1.20***	1.20***	1.20***	1.20***
Black student			1.21***	1.21***	1.21***	1.21***
Mulato student			1.15***	1.15***	1.15***	1.15***
Mother's education			0.94***	0.94***	0.94***	0.94***
Per-capita income			0.94***	0.94***	0.94***	0.94***
Level 2						
Average family income				0.92***		0.92***
Favela	1.41***		1.17**	1.15*		
Favela in wealthy zone		1.42***			1.17**	1.15*
Favela in low income zone		1.41***			1.17**	1.15*
Intercept	0.43***	0.43***	0.41***	0.43***	0.41***	0.43***
Variance						
Unconditional model	0.249***	0.249***	0.249***	0.249***	0.249*	0.249***
Models 1 - 6	0.140***	0.141***	0.060*	0.059*	0.062*	0.061*

Source: Prepared by the authors on the basis of data from the 2000 Population Census.
*Significant at 5%; ** significant at 1%; *** significant at 0.1%.

FIGURE 1

Municipality of Rio de Janeiro: risk factors for at least one or at least two years of school backwardness among eighth grade primary school students, 2000



Source: Prepared by the authors on the basis of data from the 2000 Population Census.

of a student not living in a *favela*. Model 2 shows that the risk of backwardness for a fourth year student living in a *favela* close to a wealthy neighbourhood or a *favela* in a low-income setting is, respectively, 71% and 52% higher than the risk for a student who does not live in a *favela*.

Model 3 considers control variables relating to the student and his or her family (level 1) and shows that the risk of backwardness is 18% greater for male than for female students. In the case of mulato and black students, the risk is respectively 23% and 32% higher than for white students. A one-year increase in the mother's level of schooling reduces the risk by 7%, and when the logarithm of per capita household income rises by one unit, the risk of backwardness declines by 15%. Moreover, when the social composition of fourth-grade students in 2000 was held constant, the risk of school backwardness for those living in a *favela* was 16% higher than for other students. Model 4 controls for an additional variable: the mean per-capita income

TABLE 5

Municipality of Rio de Janeiro: Multi-level model measuring the risk of at least one year of school backwardness among fourth-grade primary school students, 2000

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Level 1						
Male student			1.18***	1.18***	1.19***	1.19***
Black student			1.32***	1.32***	1.32***	1.32***
Mulato student			1.23***	1.22***	1.23***	1.23***
Mother's education			0.93***	0.93***	0.93***	0.93***
Per-capita income			0.85***	0.85***	0.84***	0.85***
Level 2						
Average family income				0.94		0.92
Favela	1.58***		1.16*	1.14*		
Favela in wealthy zone		1.71***			1.33**	1.30**
Favela in low-income zone		1.52***			1.07	1.04
Variance						
Unconditional model	0.381 ***	0.381 ***	0.381 ***	0.381 ***	0.381 ***	0.381 ***
Models 1 - 6	0.218***	0.214***	0.043**	0.042*	0.030*	0.029+

Source: Prepared by the authors on the basis of data from the 2000 Population Census.
+ Significant at 10%,* significant at 5%; ** significant at 1%; significant at 0.1%.

of level-2 units. The results in this case are similar to those obtained with the previous model, although the relation between residents in a *favela* and school backwardness is weakened somewhat. In the case of risks relating to level-1 variables, there is almost no difference between models 3 and 4.

Models 5 and 6 again distinguish between types of *favela*, according to their setting. These models show that living in a *favela* close to a wealthy neighbourhood is associated with a higher risk of school backwardness compared to students that do not live in *favelas*. In the case of students living in *favelas* close to low-income neighbourhoods, after controlling for their and their families' demographic characteristics, the additional risk associated with place of residence no longer persists. The hypothesis of a difference between the two types of *favela* was also tested, and the result showed a statistically significant difference. The lower part of table 5 shows the variance of the intercept of each model, and this is compared with the variance of the intercept of the unconditional model. When additional control variables are included, the variance gradually declines. The explanatory variables ultimately account for 92% of the variance. In model 6, the remaining variance is only marginally different from zero from the statistical standpoint ($p < 0.10$), which means that the variables included in the model explain the different probabilities of school backwardness in the different zones of the city.

Table 6 shows the results of the models estimated for the risk of two or more years of school backwardness.

An analysis of table 6 shows that the results obtained for the models used to estimate two or more years of school backwardness are similar to those shown previously in table 5. Figure 2, which is based on the relative risks for model 6, as shown in tables 5 and 6, makes it possible to compare the risk factors associated with each of the dependent variables. Two aspects should be noted. The first is the closer relation between an increase in the per-capita income of the zone of residence and a reduction in the risk of school backwardness when the dependent variable is two or more years of backwardness. Secondly, once again there is a relative reduction in the risk associated with the variable "Favela in a wealthy zone", when the dependent variable is "Two or more years of backwardness". Although dropout rate in the city of Rio de Janeiro was low for children between 10 and 14 years of age (2.5% of children in this age bracket left school without completing fourth grade), the risk of dropout among children living in *favelas* was nonetheless calculated. The result of this complementary analysis showed that the risk associated with living in *favelas* close to wealthy and low-income neighbourhoods, respectively, is 98% and 92% higher than the risk among students who do not live in a *favela*. The complementary analysis of the risk of school dropout used the same statistical

TABLE 6

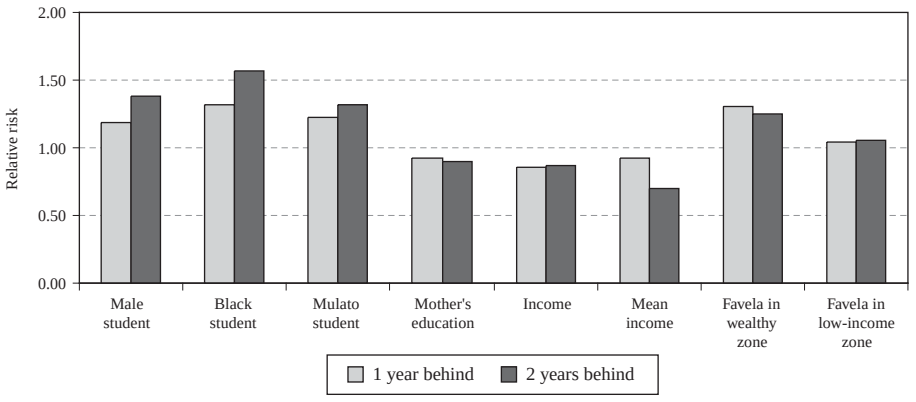
Municipality of Rio de Janeiro: multi-level model measuring the risk of at least two years of school backwardness among fourth grade primary school students

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Level 1						
Male student			1.37***	1.37***	1.38***	1.38***
Black student			1.57***	1.56***	1.59***	1.57***
Mulato student			1.33***	1.32***	1.34***	1.32***
Mother's education			0.87***	0.88***	0.88***	0.90***
Per-capita income			0.86***	0.86***	0.85***	0.87***
Level 2						
Average family income				0.71***		0.70***
Favela	1.90***		1.24*	1.13+		
Favela in wealthy zone		2.00***			1.38**	1.25+
Favela in low-income zone		1.86***			1.19+	1.05
Variance						
Unconditional model	0.341 ***	0.341 ***	0.341***	0.341 ***	0.341 ***	0.341 ***
Models 1 - 6	0.188***	0.190***	0.036*	0.033*	0.035*	0.032+

Source: Prepared by the authors on the basis of data from the 2000 Population Census.
+ Significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%.

FIGURE 2

Municipality of Rio de Janeiro: risk factors for at least one or at least two years of school backwardness among fourth grade primary school students, 2000



Source: Prepared by the authors on the basis of data from the 2000 Population Census

controls as model 6 for evaluating the risk of school backwardness. Considering the result obtained for the risk of backwardness using the dependent variable "Two or more years of backwardness", and examining this result in the light of the analysis of school dropout, it was found that the relatively lower risk of backwardness associated with residence in *favelas* near wealthy zones reflects the higher risk of school dropout among children living in those settlements.

V
Conclusions

Given the cross-sectional nature of the data used, one could reasonably argue that the available information does not ensure that the socially negative outcome (i.e. school backwardness) is caused by living in a *favela* or in a certain type of *favela*. It is possible to put forward hypotheses in which families with prior problems, including those relating to the educational history of their children, move into *favelas*. To study hypotheses of this type, school backwardness was firstly investigated among eighth grade primary school students, and afterwards among fourth graders. The aim of using dependent variables for different years was to reduce the time elapsing between events that could generate the socially negative outcome (i.e. grade failure experiences), and the collection of data on school backwardness and place of residence (2000). The consistency of the results strengthens the idea that, apart from documenting relations between place of residence and school backwardness, place of residence exerts an influence. Nonetheless, this subject will need to be studied using data that make it possible to reach more robust conclusions on the causality relation.

This paper demonstrates not the relation between living in a *favela* and the higher risk of school backwardness, and also the particularly higher risk of school backwardness and dropout among students from *favelas* located next to wealthy neighbourhoods. This result is important, because these *favelas* are considered to offer certain advantages, such as better access to jobs and various urban services.[11]

An exhaustive analysis of mechanisms explaining this result is beyond the scope of this study, which was based exclusively on data from the 2000 Population Census. Nonetheless, two potentially complementary lines of argument can be advanced. The first would stem from the social, and even residential, segregation, which might occur in the school, as children and young people from *favelas* near to wealthier zones could be more easily identified as students who do not conform to model that schools and teachers would desire for their student body; and, as such, they might perceive this and feel stigmatized. The education literature has argued that certain informal evaluation mechanisms in schools operate on a discriminatory basis, with serious consequences for grade failure (Freitas, 2002). This type of mechanism finds theoretical support in the notion of urban space as the materialization of the social space with its hierarchies, segmentations and social distinction practices, as described by Bourdieu (1993) and Wacquant (1997).

The second possible explanation relates to the effects of residential segregation on the social capital of poor population groups, which in turn affects the relevant results. Consistent with our findings, which identify a higher risk of school backwardness and dropout among inhabitants of *favelas* close to wealthy neighbourhoods, Small (2004, pp.175 and 176) stresses that urban sectors that concentrate poverty should not be viewed as homogeneous realities:

> *Can it be claimed that ghettos and housing complexes are socially isolated entities? Or that they lack social capital? [. . .] Questions such as these have often been answered in the affirmative [. . .] and ghettos have been assumed to be basically similar to each other[. . .]. Villa Victoria suggests that if we restrict our studies to approaches of this type, we will find it hard to understand several of the mechanisms through which neighbourhood poverty affects individuals. [. . .] The case of the Villa brought several of these conditioning factors to light. Some of them operate at the neighbourhood level, such as the availability of resources in the neighbourhood, the characteristics of the boundaries (well or less well defined) between the poor zone and the surroundings, the ethnic and class composition of the zone in which they live and of adjacent zones, and the characteristics of the resident cohort.*

Small thus puts forward two arguments that are important for our study. The first is that the neighbourhood effect not only depends on interactions between inhabitants of the zone, but also on the social

[11] Proximity to the city's wealthy neighbourhoods is aso apparently an advantage with respect to public safety. Zaluar (2000) shows that the likelihood of a young person who lives in the Cantagalo *favela*, located in Ipanema, dying for political reasons or rivalries in drug economy is less than among inhabitants of *favelas* in the northern zone of the city and the suburbs. The greater invisibility of *favelas* located in low-income neighbourhoods tends to exacerbate violence.

capital generated from social interactions made possible by the type of boundary and the degree of heterogeneity between the poor zone and adjacent neighbourhoods. The second argument, only hinted at in the foregoing quote, but developed throughout the study, is that clearly defined boundaries and great social distance between neighbouring zones are elements that contribute to the rarefaction of social capital. The empirical results of this study coincide with that view: the social distance between *favelas* close to less wealthy zones of the city and adjacent low-income neighbourhoods is less, and the boundaries and distinctive features of those *favelas* and adjacent zones are less well-defined than in the wealthier areas of the city. To appreciate the significance for educational results of the territorial arrangement of the complex formed by the *favela* and adjacent neighbourhoods, it is worth considering some of the data on the city of Rio de Janeiro and the relative importance of the public school system: 76% of primary school enrolment is concentrated in public schools, and 20% of primary school students live in *favelas*; most public school students therefore do not live in *favelas*. Although the percentage of students living in *favelas* varies from one school to another, only a few serve *favela* residents almost exclusively (of the 1,034 primary schools in existence, only 20 are located within such settlements). The mixing of *favela* and non-*favela* students at school is the rule rather than the exception in the public school network of Rio de Janeiro. Youngsters living in *favelas* located in the wealthier areas of the city end up studying in schools where there is a higher concentration of *favela* residents, than inhabitants of *favelas* close to low-income neighbourhoods, because family in the latter neighbourhoods have less chance to enrol their children in private schools than the inhabitants of wealthy neighbourhoods. This configuration and the social relations that it generates form the hypothesis that gives meaning and consistency to our result in terms of the higher risk of school backwardness among children and young people living in *favelas* generally and in *favelas* adjacent to wealthy neighbourhoods, in particular.

Lastly, the higher risk of school backwardness among children living in *favelas* in a wealthy neighbourhood disappeared when the dependent variable used was two or more years of school backwardness. In view of this result, the most positive scenario for those students would be a lower likelihood of multiple grade failures. Nonetheless, the empirical evidence shows that alleviation of the effect is explained by the higher risk of school dropout among students living in *favelas*, particularly those located in wealthy neighbourhoods. This could be due to the following: (i) a higher chance of multiple grade failure episodes; (ii) greater opportunities for paid work for these youngsters, which encourages them to drop out of school; (iii) the existence of a specific economy within the *favela* and its surroundings, which by nature — unskilled services in some cases serving the needs of the *favela* population — is based more on integration into local networks than on school achievement; (iv) the locational advantages stemming from greater income opportunities in wealthier areas translate into greater competition in the labour market in *favelas*, and thus in more precarious housing (especially high levels of overcrowding), which can also adversely affect the performance of children and young people.

(Original: Portuguese)

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KEYWORDS

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Public-debt management: the Brazilian experience

Helder Ferreira de Mendonça and Viviane Santos Vivian

This paper analyses public-debt management in Brazil, and considers the main recent theoretical models and the possible effect that the strategy adopted by the Treasury from 1999 onwards could have on the base interest rate. The findings show that the public-debt-management strategy adopted by Brazil was based on the recommendations of Calvo and Guidotti (1990). The average maturity of public debt, the proportion of shares linked to the Special System of Clearance and Custody (SELIC) and the public-debt-to-GDP ratio all play a significant role in determining the base interest rate. Government efforts to restructure public-debt maturities and reduce the negative effect on the interest rate are key in this regard.

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I
Introduction

In the 1980s, public debt in the United States soared, giving rise to a debate on fiscal sustainability. This did not affect the United States alone: in countries such as Belgium, Ireland, and Italy, for instance, the public-debt-to-GDP ratio reached 100% or more, with debt servicing representing a significant proportion of the public budget. Furthermore, the increase in real interest rates and the slowdown in economic growth looked likely to set the public-debt-to-GDP ratio on a dangerous course.

At the end of the 1980s, most countries had undertaken strict budgetary adjustment programmes. In 1989, for instance, Germany and the United States managed to stabilize the public-debt-to-GDP ratio. In the United Kingdom, a major programme was being rolled out on the basis of the privatization strategy. In some countries, however, the implementation of adjustment programs had been unsuccessful in promoting fiscal equilibrium.

According to Dornbusch and Draghi (1990), the macroeconomic environment in several countries during the 1980s raises several questions related to fiscal equilibrium:

(i) What is the microeconomic rationale behind a government having to choose between an increase in debt or fiscal equilibrium?

(ii) Are there macroeconomic implications (effects on economic activity, interest rate, etc.) stemming from the size of the public deficit, or the decision to finance the government through an increase in public debt?

(iii) How do countries deal with their deficits over time?

(iv) When public debt is high, is there a theoretical framework to offer guidance on appropriate maturities or indexation of public debt?

In terms of the final question, several theoretical models have been developed on the management of public debt. The five main models are: Calvo and Guidotti (1990); Giavazzi and Pagano (1990); Barro (2003); Missale, Giavazzi, and Benigno (2002); and Giavazzi and Missale (2004).

This debate currently deserves attention in developing countries. At the end of 1999, the Brazilian Treasury announced a strategy for extending the maturity of federal securities, based on models of public-debt management put forward by researchers such as Giavazzi and Pagano (1990) and Calvo and Guidotti (1990). Furthermore, in an attempt to improve the composition of government liabilities, efforts were made to increase the share of fixed-rate and price-indexed securities and to reduce the share of floating-rate and exchange rate-indexed debt. The main aim is to manage debt in a way that increases credibility.

Empirical analysis will be used to evaluate the public-debt-management strategy adopted by Brazil. The possible effect of the strategy on the base interest rate is also analysed. The article is organized into five sections. Following this introduction, section II details the main characteristics of contemporary models of public-debt management (based on relevant publications), section III describes Brazilian public-debt management during 2000-2005, section IV includes an empirical analysis, and section V presents the conclusions.

II
Contemporary models of public-debt management

The theoretical analysis of public-debt management received particular attention at the beginning of the 1990s, thanks to the analysis of Calvo and Guidotti (1990) and Giavazzi and Pagano (1990). Calvo and Guidotti (1990) analysed several frameworks for the indexation and maturity of public debt in order to

study their impact and optimal levels. The authors therefore analysed indexation in a framework of two periods (0 and 1), where period 0 sees the government fully commit the actions of the government in period 1 (full precommitment). The results indicate that the full indexation of public debt is desirable. However, full indexation may increase the tax burden as a source of public-sector financing. The optimal public-debt-management strategy therefore lies in longer debt maturities and a partial indexation of public debt.

Giavazzi and Pagano (1990) studied whether it is possible to reduce the risk of a crisis of confidence by correctly structuring public-debt maturities. The authors define a confidence crisis as an increased likelihood of change in the monetary regime, with the system in question taken to be a fixed exchange-rate regime. The researchers conclude that the central bank's capacity to resist a confidence crisis depends largely on how successful the Treasury is in refinancing public debt. The risk of monetary-regime change is therefore reduced (and the fixed exchange rate maintained) if the average public-debt maturity is increased or if interest or amortization payments are smoothed out.

Recently, the debate on the best framework for managing public debt was galvanized by the works of Missale, Giavazzi, and Benigno (2002), Barro (2003), and Giavazzi and Missale (2004). Missale, Giavazzi, and Benigno (2002) carried out an empirical analysis of how governments choose the maturity term when a fiscal stabilization programme is launched. In this context, it is assumed that the government aim is to achieve a fiscal surplus capable of stabilizing the public-debt-to-GDP ratio. For this purpose, 72 cases of fiscal stabilization are considered in countries of the Organisation for Economic Co-operation and Development (OECD) between 1975 and 1998. In each case, the governments' bond-issuance strategies two years after the launch of the stabilization plan were analysed. The analysis looked at two governments with different capacities for cutting expenditure. As a result, there are differing expectations as to what the interest rate will be at the end of the stabilization plan.

The analysis by Missale, Giavazzi, and Benigno (2002) suggests that governments are more likely to increase the maturity of public debt in the face of asymmetric information. This is a way of reducing the risk of refinancing and thus increasing the expectation that the fiscal effort will be successful. According to the authors, a government can issue bonds with mainly short-term payments in cases where investors are not aware of the government's for implementing the announced policies (presence of asymmetric information). The main idea is that this procedure must be adopted if the long-term cost is too high in terms of future interest-rate expectations.

Barro (2003) observed that the smoothing of the tax burden encourages the government to issue bonds whose payment is contingent on expenditure. When expenditure is equal in every period, public debt must be structured in consolidated annuities (consols). This isolates budget constraints from unexpected variations in the market prices of indexed bonds with different maturities.

The model put forward by Giavazzi and Missale (2004) assumes that the main objective of public-debt management in Brazil is to stabilize the public-debt-to-GDP ratio and thus reduce the probability of a crisis. In order to stabilize the public-debt-to-GDP ratio, the government must find sources of financing that offer low costs and limited variability of returns. Therefore, the choice of the public-debt instruments involves a trade-off between risk and the expected cost of debt servicing. From this point of view, the optimal framework of indexed public debt depends on a cost and risk assessment. Risk is minimized if an instrument offers protection against variations in the primary surplus and in the public-debt-to-GDP ratio, and if the variation in returns is relatively low.

It should be pointed out that the models of Missale, Giavazzi and Benigno (2002) and Giavazzi and Missale (2004) assume that the government's objective is to stabilize the public-debt-to-GDP ratio. Moreover, both models analyse the optimal framework for public debt, taking into consideration the trade-off between the cost of debt servicing and the risk of refinancing. Nevertheless, while the first model evaluates an optimal maturity framework for public debt, the second model analyses the optimal indexation framework for public debt. On the other hand, models such as those put forward by Giavazzi and Pagano (1990); Missale, Giavazzi and Benigno (2002); and Barro (2003) suggest that the optimal strategy is to increase the average maturity of public debt. In a different way, Calvo and Guidotti (1990) take both viewpoints into consideration.

In short, within the literature there are three main visions concerning the management of public debt. The first, represented by the models of Calvo and Guidotti (1990) and Giavazzi and Pagano (1990), emphasizes the dynamic inconsistency of fiscal policy. The second vision (Barro, 2003) considers the smoothing of the tax burden in a context of exogenous government expenditure, in order to identify the optimal framework for public debt. The third, as advocated by Giavazzi,

Missale and Benigno (2002) and Giavazzi and Missale (2004), focuses on the aim of stabilizing the public-debt-to-GDP ratio. Generally speaking, all these visions concur that an increased average maturity of public debt and a partial indexation of the debt both constitute optimal strategies.

III

Public-debt management in Brazil

This section presents a brief description of public-debt management in Brazil between the change of the exchange-rate regime in January 1999 and December 2005,[1] with special emphasis on three points: the public-debt-to-GDP ratio, the structure of public debt and the average maturity.

Between January 1999 and December 2005, the average public-debt-to-GDP ratio was 53.13%. However, between 1999 and 2000 this ratio fluctuated around 49.95% (see figure 1). Subsequently, debt increased substantially and reached 63.62% in September 2002. The acceleration of the rise in public debt during the second half of 2002 was due to "market fears" about a possible victory for Luis Inácio Lula da Silva in the presidential elections. A speech in which the candidate expressed unorthodox ideas increased the risk perceived by investors and triggered a process of rising interest rates and currency devaluation. However, the victory of this candidate and the establishment of the new government in 2003 did not change the course of economic policy. As a result, fiscal efforts were stepped up to reduce the public-debt-to-GDP ratio, which fell to almost 50% at the end of 2005.

The change to a floating exchange-rate system and the adoption of inflation targeting in 1999 are largely responsible for the trajectory of public debt indexed to the interest rate and to the exchange rate. Generally speaking, currency devaluation meant that it was no longer attractive to use the exchange rate as one of the main indexing factors. The use of the interest rate, on the other hand, remained a viable option. The principal reason is that, with inflation targeting, the main instrument available to the central bank is the base interest rate. Hence, the strategy adopted by the central bank to promote a disinflationary process increased the demand for bonds indexed to the interest rate.

In December 1999 the share of fixed-rate securities was 9%, which increased to 15% by the end of 2000. This was the result of the Treasury's strategy to gradually reduce the risk of short-term fluctuations in economic variables. However, due to the volatility in the domestic financial market in 2001, the proportion of fixed-rate securities in the public debt fell (to stand at 1.91% in April 2003). In that period, the Treasury needed to choose between increasing the level of fixed-rate securities at the cost of increasing the risk of refinancing, or accepting the reduction of such securities in the public-debt composition and extending debt maturities (i.e. lengthening the debt profile). The Treasury decided to reduce the volume of short-term fixed-rate securities.

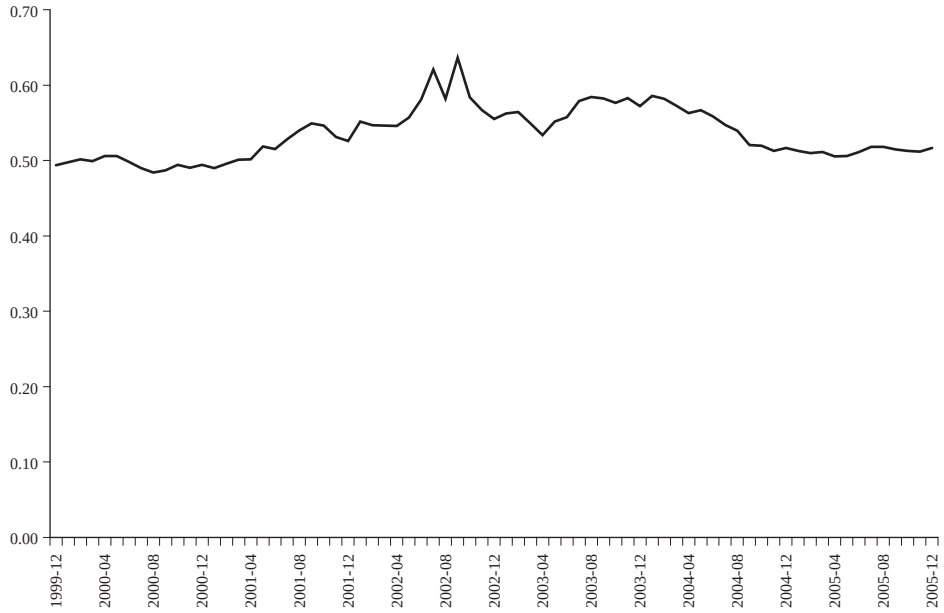
In 2002, with the aim of improving the debt composition, the Treasury adopted a strategy based on Assets and Liabilities Management (ALM) that emphasized the need to replace bonds indexed by the interest rate (over/SELIC) and the exchange rate with price-indexed papers. However, the proportion of interest-rate indexed bonds in the public debt composition increased to 60.8% in December 2002. On the other hand, the proportion of exchange-rate indexed bonds decreased and that of price-indexed bonds increased (see figure 2). The main reason for this pattern was currency devaluation and the fact that index-price performance exceeded the expectations of economic agents.

In 2003, 2004 and 2005 public-debt management was based on the strategy announced in 2002. In other words, the aim was to gradually reduce the proportion of exchange-rate indexed bonds and interest-rate indexed bonds, and to increase the share of public debt made up by fixed-rate and price-indexed bonds. The strategy was partially successful: it considerably increased the proportion of fixed-rate securities and price-indexed bonds, and reduced the share of exchange-rate indexed bonds to a negligible level. Nevertheless, the proportion of interest-rate indexed bonds stabilized at a high level

[1] This analysis is based on several reports of the Brazilian National Treasury. For an analysis concerning government debt management in the Euro Area, see Wolswijk and de Haan (2005).

FIGURE 1

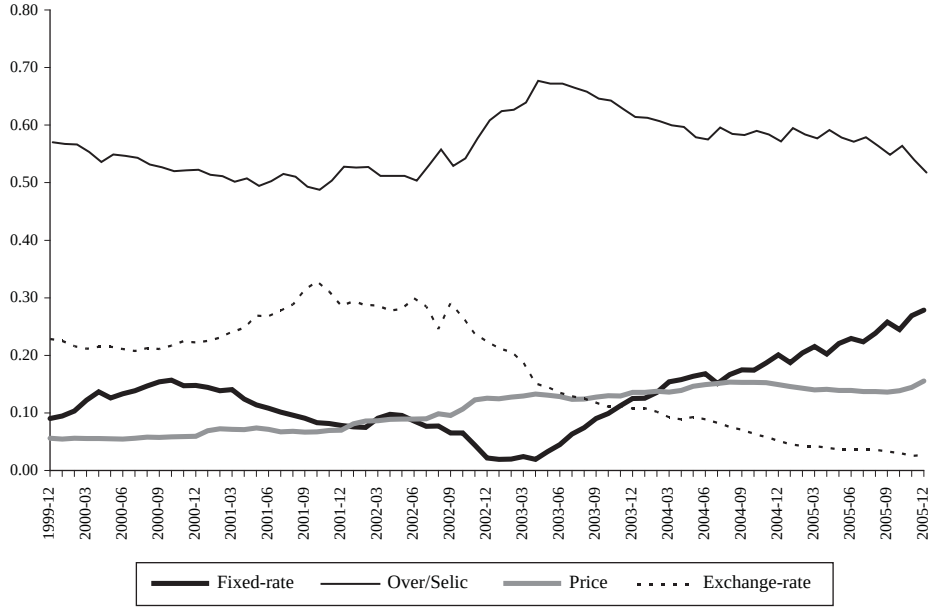
Public-debt-to-GDP ratio (%)



Source: The Treasury, Brazil.

FIGURE 2

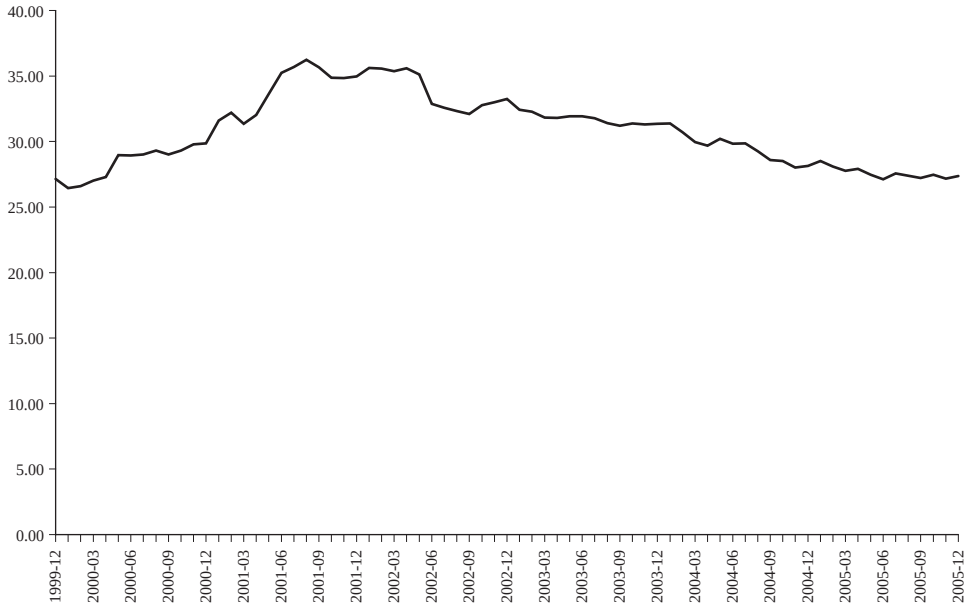
Public Debt – Composition by Indexing Factor



Source: The Treasury, Brazil.

FIGURE 3

Public Debt – Average Maturity



Source: The Treasury, Brazil.

(51.77% in December 2005), and remains the main form of indexation for public debt. This highlights the fact that the market has still not completely eliminated the risk of refinancing crises.

The Treasury did attempt to smooth the maturity structure of public debt. The average maturity of public debt increased from 27.13 months to 36.23 months between January 1999 and August 2001, and remained relatively stable until May 2002 (see figure 3). Subsequently, the average maturity trended downwards due to a lack of confidence on the domestic market. The maturity of the public debt in January 2006 (28.76 months) was lower than the average in 1999-2006 (30.78 months) and was close to the level observed in 1999. In short, the strategy adopted by the Treasury fell short of guaranteeing a sustainable increase in the average maturity of public debt.

Thus, the profile of Brazilian public debt gradually improved during the period under analysis. However, the public-debt-to-GDP ratio is still too high (51.65% in December 2005), which makes it difficult to control inflation and significantly reduce the base interest rate (over/SELIC).[2] The problem is particularly serious for the Brazilian economy because it has experienced a low economic growth rate in the period under analysis.

[2] The SELIC rate is the weighted average of the rates traded in overnight repurchase agreements (repos) backed by government bonds registered in the Special System of Clearance and Custody (SELIC). The terms SELIC, over/SELIC and base interest rate will be used interchangeably from hereon in.

IV
Empirical analysis

This section presents empirical evidence using the application of Ordinary Least Squares (OLS) and the vector autoregressive model (VAR) to analyse the relationship between the public-debt-to-GDP ratio and the main variables that explain the profile of Brazilian public debt. The main objective is to use the models described in section 2 to identify the theoretical basis for the strategy adopted in Brazil between December 1999 and December 2005.

The data used in this analysis are monthly and consist of the following variables:

(i) *Public-debt-to-GDP ratio (DEBGDP)*: variations in this variable are crucial for the analysis because they reflect any action taken to manage the public debt. As pointed out by Givazzi and Missale (2004), this is the most important variable for countries where fiscal vulnerability makes debt stabilization the main goal of debt management.

(ii) *Public-debt composition*: this variable is very important for public-debt management because any increase in the public-debt-to-GDP ratio is positively related to the indexing factor of public debt. In the case of Brazil, the main indexing factors are: the over/SELIC rate - which is the base interest rate of the economy (SELINDEX), the exchange rate (EXCINDEX) and the price index (PRICINDEX). Furthermore, based on the proportion of each indexing factor in the composition of public debt, a regressor entitled INDEX was created to represent the proportion of public debt associated with a given indexing factor. Fixed-rate securities (FRS) are also considered in the analysis.

(iii) *Average maturity of public debt* (AMPD):[3] this variable is expected to correlate strongly with public debt. For instance, according to Giavazzi and Pagano (1990), increasing public-debt maturity makes it possible to reduce the number of bonds that need to be refinanced during a crisis.

(iv) *Securities held by the public to mature in 12 months* (SHP): this variable is a proxy for the concentration of maturities of public debt. According to Giavazzi and Pagano (1990), the concentration of maturities is a major factor in the central bank's ability to resist a confidence crisis.

(v) *Primary surplus*: this variable represents the government effort to balance public finances. In this sense, increases in the primary surplus must reduce the level of public debt.

A first step in the empirical analysis is to examine the stochastic process in the series over time, i.e. to verify the integration order of the series. This procedure eliminates spurious results from the estimation of models. Therefore, unit-root tests were carried out (Augmented Dickey-Fuller –ADF– and Phillips-Perron –PP). The results, in both tests, show that the all the series under analysis are I(1) (see tables A1 and A2).[4]

The above-mentioned results suggest that it would be appropriate to use the first difference of series in the regression. However, this procedure can imply a loss of relation among series in the long run. It is therefore necessary to assess whether a linear combination among series is stationary, even if individually series are non-stationary. In other words, it is vital to check if series are cointegrated because, in that case, the regression of original series would imply reliable statistics.

1. Estimation of models

(a) *Model 1*

The first model captures the idea of Calvo and Guidotti's (1990) model of public-debt management. Their model suggests that lengthening the maturity terms, together with an adequate level of public-debt indexation, constitutes a good strategy for ensuring the credibility of economic policy and thus stabilizing the public-debt-to-GDP ratio. The theoretical model therefore considers a regressor related to public-debt indexation and another related to the average maturity of public debt. The model to be tested is expressed as:

$$DEBGDP = f(SELICINDEX, EXCINDEX, PRICINDEX, AMPD) \quad (1)$$

[3] The Treasury began this series in February 2000.

[4] All tables and figures marked A are included in the appendix.

While it is not possible to identify the expected signs for the relations with public debt indexation ex-ante, the expected sign for average maturity is $\partial f/\partial \text{AMPD}<0$.

The cointegration test proposed by Johansen (1991), based on the significance of estimated eigenvalues, indicates that the trace statistic rejects the no-cointegration hypothesis at a significance level of 5%, but does not reject the hypothesis that there is more than one cointegration relation (see table A3). Given that series are cointegrated and that there is therefore a relation of long-run equilibrium among them, the equation (1) can be estimated with the original series without the problem of spurious results.

The results of equation 2 indicate that financing public debt using bonds indexed by price, the interest rate or the exchange rate results in an increase in public debt. Contrary to theoretical expectations, lengthening the maturity terms also increases the public-debt-to-GDP ratio.[5]

DEBGDP = (2)

0.0251 + 0.2971SELINDEX(-6) + 0.1344PRICINDEX(-6) + 0.0747EXCINDEX(-6) + 0.0102AMPD(-6)
(0.5813) (5.1122) (0.9372) (0.0747) (6.9825)

$R^2 = 0.7740$ DW = 1.080979 n = 67

Serial Correlation Test

F-statistic	9.548393	Prob. F(2,60)	0.000251
Obs*R-squared	16.17619	Prob. Chi-Square(2)	0.000307

Heteroskedasticity Test

F-statistic	1.255561	Prob. F(14,52)	0.266603
Obs*R-squared	16.92660	Prob. Chi-Square(14)	0.260110

Note: t-statistics between parentheses.

Since the number of degrees of freedom is higher than 20 and the level of significance is 0.05, the null hypothesis must be rejected if the t-statistics are higher than 2 in modules. In this case, only SELINDEX and AMPD are statistically significant. The R^2 reveals that 77% of the variation of the public debt can be explained by the variables present in the model. Furthermore, the F-statistic indicates rejection of the null hypothesis that all slope coefficients are equal to zero at the 5% level. With a view to testing the serial correlation in the residuals, the Durbin-Watson statistic (1.08) was used to show the presence of positive autocorrelation. The presence of serial correlation was confirmed by the Breusch-Godfrey test. In order to check the heteroskedasticity of residuals, a White test was carried out and the presence of heteroskedasticity was detected.

Due to the presence of autocorrelation and heteroskedasticity in the regression, the model was re-estimated by applying the Newey-West matrix. The new regression (equation 3) shows that the coefficients of SELINDEX and AMPD are once again statistically significant at the 0.05 level. Therefore, it is observed that the empirical evidence does not concur with the theoretical analysis of Calvo and Guidotti (1990).

DEBGDP = (3)

0.0251 + 0.2971SELINDEX(-6) + 0.1344PRICINDEX(-6) + 0.0747EXCINDEX(-6) + 0.0102AMPD(-6)
(0.5806) (5.1589) (0.6905) (0.8189) (4.6120)

$R^2 = 0.7740$ DW = 1.080979 n = 67

[5] It should be pointed out that the number of lags in the equation was based on the Schwarz criterion.

(b) *Model 2*

The second model considers the analysis of Giavazzi and Pagano (1990). Therefore, the variables used in the regression are: AMDP, SHP and the primary surplus (PS). The justification for using the primary surplus variable its that it is capable of reducing the public-debt-to-GDP ratio. Since the Johansen test shows that the hypothesis of the non-cointegration of series is accepted at the 0.05 level of significance (see table A3), the empirical model is:

$$D(DEBGDP) = f(D(AMPD),D(SHP),D(PS)) \quad (4)$$

with the following expected signs for the relations expressed through partial derivatives: $\partial f/\partial D(AMPD)<0$, $\partial f/D(SHP)>0$, $\partial f/\partial D(PS)<0$.

The result indicates that lengthening the maturity terms of public debt, generating a primary surplus and increasing the concentration of public-debt maturities increases the public-debt-to-GDP ratio. However, even though the results reveal that any coefficient has statistical significance, the F-statistic is not significant, and the Durbin-Watson statistic (2.5735) indicates the presence of negative autocorrelation (equation 5). The Breusch-Godfrey test confirms the presence of autocorrelation at 0.05 level of confidence. Furthermore, the White test reveals the problem of heteroskedasticity in the regression.

$$\underset{}{D(DEBGDP) = \underset{(0.2685)}{0.0005} + \underset{(1.2018)}{0.1530}D(SHP) + \underset{(0.6063)}{0.0024}D(PS) + \underset{(0.7448)}{0.0080}D(AMPD)} \quad (5)$$

$R^2 = 0.0271$ DW = 2.5735 n = 72

Serial Correlation Test			
F-statistic	5.784035	Prob. F(2,66)	0.004846
Obs*R-squared	10.73768	Prob. Chi-Square(2)	0.004660
Heteroskedasticity Test			
F-statistic	1.753743	Prob. F(9,62)	0.095738
Obs*R-squared	14.61008	Prob. Chi-Square(9)	0.102219

Note: t-statistics between parentheses.

Based on the above-mentioned results related to model 2, it was again necessary to correct the estimation using Newey-West matrix. The result is:

$$\underset{}{D(DEBGDP) = \underset{(0.2685)}{0.0005} + \underset{(1.2018)}{0.1530}D(SHP) + \underset{(0.7448)}{0.0024}D(PS) + \underset{(0.6063)}{0.0080}D(AMPD)} \quad (6)$$

$R^2 = 0.0271$ DW = 2.5735 n = 72

The results do not have statistical significance. Therefore, they cannot be used to interpret the implications of this model for the management of Brazilian public debt.

(c) *Model 3*

This model incorporates the idea from models of Giavazzi, Missale and Benigno (2002) and Barro (2003). Although the motivations in these models are different, the result is the same, namely that lengthening the maturity terms of public debt is an effective strategy for public-debt management. In this context, the regression considers the public-debt-to-GDP ratio as a dependent variable and AMPD as a regressor. The Johansen test indicates that the series are not cointegrated (see table A3). Therefore, the first difference of the series was considered in the regression:

$$D(DEBGDP) = f(D(AMPD)),\ \partial f/\partial D(AMPD)< 0 \quad (7)$$

The expected result is a negative relation between the lengthening of maturity terms of the public debt

and the public-debt-to-GDP ratio. Although the result indicates the presence of the expected negative relation, neither the t-statistic nor the F-statistic is significant. Furthermore, the Durbin-Watson statistic, the Breusch-Godfrey test and the White test indicate the presence of heteroskedasticity and serial autocorrelation.

$$D(DEBGDP) = \underset{(0.2260)}{0.0004} - \underset{(-0.1907)}{0.0005}D(AMPD) \quad (8)$$

$R^2 = 0.0005$ DW = 2.6476 n = 72

Serial Correlation Test			
F-statistic	5.642419	Prob. F(2,68)	0.005406
Obs*R-squared	10.24797	Prob. Chi-Square(2)	0.005952
Heteroskedasticity Test			
F-statistic	0.017126	rob. F(2,69)	0.983024
Obs*R-squared	0.035724	Prob. Chi-Square(2)	0.982296

Note: t-statistics between parentheses.

In order to reduce the problem detected with heteroskedasticity and serial autocorrelation, the Newey-West matrix was applied to give the following result:

$$D(DEBGDP) = \underset{(0.2731)}{0.0004} - \underset{(-0.1634)}{0.0005}D(AMPD) \quad (9)$$

$R^2 = 0.0005$ DW = 2.6476 n = 72

The results indicate that lengthening maturity terms cannot be the only strategy considered when analysing public-debt management in Brazil.

(d) *Model 4*

This model is based on the theoretical analysis of Giavazzi and Missale (2004). In this approach, the composition of the public debt by indexing factor is essential to public-debt management. Therefore, the empirical model is:

$$DEBGDP = f(SELINDEX, EXCINDEX, PRICINDEX) \quad (10)$$

The Johansen test indicates rejection of the hypothesis of non-cointegration at the 0.05 level, which in turn implies that the estimation must be made without series differentiation. The result suggests that financing public debt using the indexing factors under consideration causes an increase in the public-debt-to-GDP ratio (equation 11). The t-statistics and the F-statistic are statistically significant at the 0.05 level.

$$DEBGDP = \underset{(6.1190)}{0.2281} + \underset{(3.0961)}{0.1976}(SELINDEX) + \underset{(8.8699)}{1.1189}(PRICINDEX) + \underset{(9.9757)}{0.4465}(EXCINDEX) \quad (11)$$

$R^2 = 0.6498$ DW = 0.6404 n = 73

Serial Correlation Test			
F-statistic	31.47047	Prob. F(2,67)	0.000000
Obs*R-squared	35.35982	Prob. Chi-Square(2)	0.000000
Heteroskedasticity Test			
F-statistic	2.226087	Prob. F(9,63)	0.031566
Obs*R-squared	17.61357	Prob. Chi-Square(9)	0.039931

Note: t-statistics between parentheses.

Nevertheless, both the Durbin-Watson statistic and the Breusch-Godfrey test reject the null hypothesis that there is no serial autocorrelation. The White test reveals no presence of heteroskedasticity in the residuals. Using the Newey-West matrix to correct the autocorrelation problem in the regression generates the following result:

$$\underset{}{DEBGDP} = \underset{(3.1203)}{0.2281} + \underset{(1.6719)}{0.1976}(SELINDEX) + \underset{(6.5161)}{1.1189}(PRICINDEX) + \underset{(5.8611)}{0.4465}(EXCINDEX) \quad (12)$$

$$R^2 = 0.6498 \qquad DW = 0.6404 \qquad n = 73$$

Based on the results of the above four models and considering R^2 as a criterion for selecting the adequate model, the best explanation for Brazilian public-debt management is found to be model 1.

2. Effect of public-debt management on the interest rate

The analysis included in the previous section shows that the model based on Calvo and Guidotti (1990) is the best match for the Brazilian case. It is therefore important to ascertain the effects of a strategy to manage public debt by extending the maturity of federal securities. Furthermore, it is also vital to consider the strategy announced at the end of 1999 to improve the composition of government liabilities by increasing the proportion of fixed-rate and price-indexed securities, and reducing the share of floating-rate and exchange-rate-indexed debt.

Besides the traditional argument of Sargent and Wallace (1981) that high debt and a large deficit could push up the interest rate, a concentration of redemptions is not appropriate due to the high cost it would entail in the event of a crisis of confidence. Even if there is sufficient demand for public bonds, the adverse environment may bring about an increase in the risk premium. Broadly speaking, an average maturity of public debt that is short (or long) may be associated with a high (or low) interest rate due to the high (low) default risk.

The base interest rate (over/SELIC) is fundamental to any analysis of Brazilian public debt. Between February 2000 and June 2005, an average 57% of federal public bonds were indexed by the over/SELIC rate. It is important to note that the Brazilian economy suffered several shocks in this period (stock-market instability and company losses in the United States, the crisis in Argentina and a speculative episode during the Brazilian presidential elections, etc.) that resulted in a failure to meet inflation targets in most cases (except in 2000 and 2004). As a result, the Treasury was forced to reduce the maturity of public debt and pay a risk premium in keeping with market demand. Therefore, the recent period has been marked by a certain rigidity in terms of reducing the short-term interest rate.

Although the literature on public-debt management suggests that it is appropriate to extend average debt maturity, this is known to come at the cost of a higher interest rate in economies lacking credibility. It is therefore necessary to establish whether the strategy adopted by the Brazilian government in November 1999 influenced patterns in the base interest rate. In order to assess the effects of the above-mentioned strategy, a vector autoregression (VAR) has been carried out using monthly data (February 2000-June 2005) on the average maturity of public debt (AMPD), base interest rate (SELIC), proportion of SELIC-indexed securities (DEBINDEX) and the net public-debt-to-GDP ratio (DEBGDP), as collected by the Treasury and the central bank.

Based on unit-root tests (Augmented Dickey-Fuller (ADF), Phillips-Perron (PP)) and the correlogram analysis of series, the series that were not stationary were differentiated as usual (see table A4 and figure A1). The VAR order was chosen on the basis of Schwarz and Hanna-Quinn criteria (see table A.5). The best model was found to be the one with two lags. According to the results of the Granger causality test (see table A6), the appropriate order of series in the VAR is given by DEBINDEX, DEBGDP, AMPD and SELIC.

As the data used are monthly, table 1 shows the variance decomposition during the first 12 months. The same period is used for impulse-response analysis (figure 4). According to table 1, the main variable that explains the variance of the DEBINDEX is the SELIC. Furthermore, the effect from DEBINDEX, DEBGDP and AMPD cannot be considered negligible. In relation to the impulse-response analysis, an increase in DEBGDP and

TABLE 1

Variance Decomposition

Months	DEBINDEX				DEBGDP			
	DEBINDEX	DEBGDP	AMDP	SELIC	DEBINDEX	DEBGDP	AMDP	SELIC
1	100.0000	0.000000	0.000000	0.000000	21.24768	78.75232	0.000000	0.000000
2	96.12370	0.548506	0.070362	3.257435	20.35500	77.37194	1.044210	1.228842
3	88.75164	1.938671	0.137191	9.172497	22.19732	74.39889	1.775024	1.628759
4	79.61383	3.934707	0.341600	16.109870	23.61782	71.97437	2.629931	1.777879
5	70.08112	6.494912	0.744171	22.679800	25.11833	69.89977	3.363887	1.618018
6	61.21069	9.376426	1.400784	28.012100	26.39971	68.09051	4.025889	1.483891
7	53.49525	12.405370	2.322360	31.777020	27.43824	66.29889	4.597992	1.664886
8	47.10612	15.407520	3.485837	34.000530	28.18081	64.38233	5.092001	2.344862
9	42.00308	18.246190	4.839272	34.911460	28.64143	62.30412	5.518081	3.536366
10	38.04516	20.817080	6.314428	34.823340	28.87721	60.13637	5.894771	5.091652
11	35.05080	23.053550	7.838196	34.057450	28.97471	58.00493	6.243172	6.777184
12	32.83436	24.925200	9.343047	32.897380	29.02146	56.03551	6.583174	8.359860
Months	AMPD				SELIC			
	DEBINDEX	DEBGDP	AMDP	SELIC	DEBINDEX	DEBGDP	AMDP	SELIC
1	0.045657	0.192932	99.76141	0.000000	3.801453	0.009787	0.790343	95.39842
2	0.778571	2.248934	96.67985	0.292648	2.178402	0.017220	0.469151	97.33523
3	2.060256	2.107929	95.28145	0.550367	1.268569	0.149315	0.241378	98.34074
4	2.682422	2.648740	93.80588	0.862955	0.769177	0.417978	0.157037	98.65581
5	3.267876	3.142126	92.55247	1.037530	0.567184	0.847052	0.259898	98.32587
6	3.628730	3.823221	91.44420	1.103845	0.641838	1.432912	0.583220	97.34203
7	3.855810	4.582652	90.47320	1.088343	0.991108	2.160451	1.146940	95.70150
8	3.965667	5.414534	89.57918	1.040623	1.603879	2.992243	1.948685	93.45519
9	3.996434	6.274359	88.73238	0.996830	2.443098	3.868523	2.952911	90.73547
10	3.975144	7.133281	87.91835	0.973226	3.436800	4.712257	4.086191	87.76475
11	3.924048	7.965808	87.14221	0.967930	4.483481	5.444579	5.245283	84.82666
12	3.858583	8.756080	86.41586	0.969480	5.472444	6.005445	6.319608	82.20250

Source: Authors' estimates.

SELIC contributes to a durable increase in DEBINDEX. On the other hand, an increase in AMDP is capable of reducing debt indexation. This result suggests that the extension of debt maturity is the result of credibility considerations, with reduced public demand for a high proportion of public debt to be indexed to the interest rate.

Public debt plays a fundamental role in the performance of DEBGDP. Besides this, indexation is relevant to variance decomposition and is capable of promoting a decrease in debt. This result needs to be clarified. As pointed out by Calvo and Guidotti (1990), indexation is a useful strategy for reducing public debt. However, using interest rate as the main index factor is not a good choice because, when there is a lack of credibility, an increase in indexation implies a reduction in debt maturity. Furthermore, the positive effects are only short term, as the cost of public debt service continues over time.

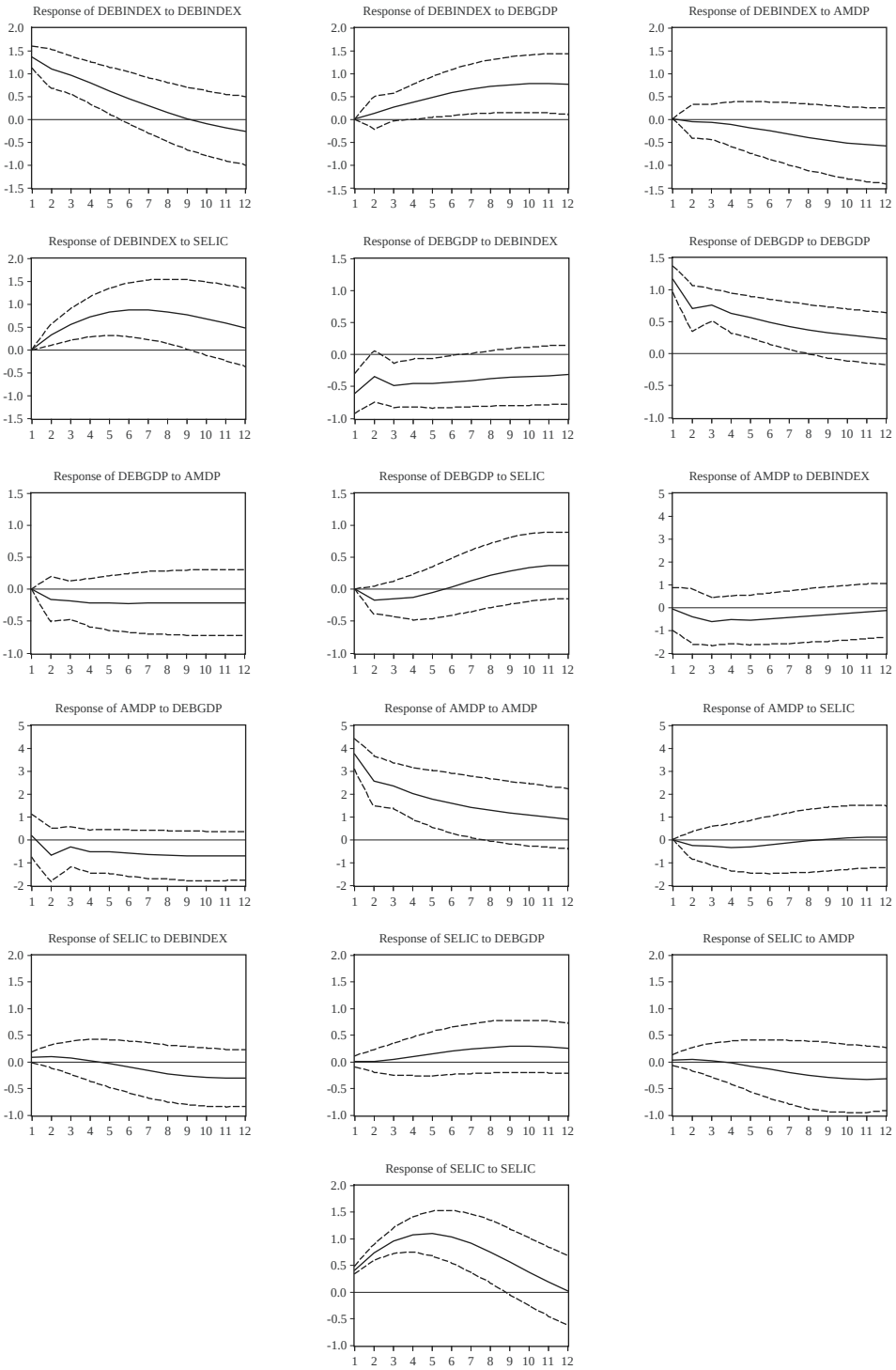
Although variance decomposition indicates that neither AMDP nor SELIC are relevant to debt variance, the data generated by impulse-response analysis should not be ignored. An increase in AMDP brings down public debt, while an increase in the interest rate raises debt after the sixth month. Therefore, the combined effect of a longer public debt maturity and lower interest rate may be to promote a fall in debt.

An analysis of AMDP reveals that average maturity is the main variable to explain variance and that an extension of debt maturity is not eliminated over time. Although DEBGDP has little significance in the variance of AMDP, as predicted by the theories, an increase in DEBGDP tends to reduce the maturity of public debt. The relative importance of DEBINDEX and SELIC in the

FIGURE 4

Impulse-response

Response to Cholesky One S.D. Innovations ± 2 S.E.



Source: Prepared by the authors.

variance of AMDP, as in the impulse-response analysis, shows that the external shocks to these variables do not have statistical significance.

In terms of SELIC variance, the main variable is the SELIC itself. The other variables together account for approximately 18%. The impulse-response analysis reveals that a shock transmitted by DEBINDEX brings down the interest rate after the fifth month. Similarly, a shock transmitted by AMDP, contributes to a permanent decrease in SELIC after the fourth month. These results indicate that public-debt management that seeks to decrease debt stock and extend average debt maturity helps to bring down the base interest rate. Shocks transmitted by SELIC to itself disappear after twelve months.

V
Concluding remarks

Empirical evidence suggests that Brazil adopted a public-debt-management strategy based on the recommendations of Calvo and Guidotti (1990). The average maturity and stock of public debt are relevant to the amount of SELIC-indexed securities. Furthermore, the results indicate that the average maturity of public debt, the proportion of SELIC-indexed securities and the net public-debt-to-GDP ratio play an important role in determining the Brazilian base interest rate.

Another relevant fact is that, although indexation reduces the debt-to-GDP ratio, this strategy is not appropriate for an economy with insufficient credibility, due to the high cost of public debt service. Therefore, the government should endeavour to extend the maturity of public debt and reduce any adverse effect on the interest rate. Furthermore, given the extremely high interest rate and the short maturity of public debt in Brazil, the strategy of generating primary surpluses has yet to yield positive results.

The strategy of extending the maturity of public debt announced by the Brazilian government at the end of 1999 is the right approach. However, according to Wolswijk and de Haan (2005, p. 19) "this new environment required an adaptation of strategies. Very practical considerations regarding cost and risks continue to dominate the objectives adopted, rather than tax or deficit stabilisation as suggested in the academic literature". As pointed out by Sargent and Wallace (1981), an economy that does not have sufficient credibility to neutralize shocks and that has a high debt-to-GDP ratio can generate a real interest rate that is higher than the economic growth rate. This concurs with Calvo and Guidotti (1990), who draw attention to the fact that a strategy of extending the maturity of public debt for economies with a debt-to-GDP ratio above 50% implies a high cost due to the increase in the interest rate.

It is important to stress that fixed-rate debt avoids large interest payments when the SELIC rate rises during a crisis or reacts to negative supply shocks (Giavazzi & Missale, 2004). However, in an economy such as Brazil's, where the maturity of fixed-rate bonds remains relatively short, the benefits of a fall in interest rates are negligible. This emphasizes the importance of reducing the proportion of public debt indexed to the interest rate and increasing inflation-indexed debt, for instance.

(Original: English)

APPENDIX

TABLE A1

Augmented Dickey-Fuller (ADF)

Series	Lag	Test	Critical values 1%	Critical values 5%
EXCINDEX	0	-1.5303	-2.5974	-1.9453
D(EXCINDEX)	0	-6.7300	-2.5979	-1.9454
SHP	1	-2.6615	-3.5256	-2.9029
D(SHP)	0	-5.2898	-2.5979	-1.9454
DEBGDP	1	0.1151	-2.5979	-1.9454
D(DEBGDP)	0	-11.8064	-2.5979	-1.9454
INDEX	3	-0.7176	-2.5989	-1.9455
D(INDEX)	2	-2.7292	-2.5989	-1.9455
PS	0	0.8879	-2.5974	-1.9453
D(PS)	0	-8.2902	-2.5979	-1.9454
AMPD	1	0.0480	-2.5979	-1.9454
D(AMPD)	0	-6.2564	-2.5979	-1.9454
PRICINDEX	0	1.9278	-2.5974	-1.9453
D(PRICINDEX)	0	-8.4058	-3.5256	-2.9029
SELINDEX	0	-0.4879	-2.5974	-1.9453
D(SELINDEX)	0	-7.6033	-2.5979	-1.9454
FRS	3	0.3476	-2.5989	-1.9455
D(FRS)	7	-4.0700	-4.1079	-3.4815

Source: Prepared by the authors.

Note: Augmented Dickey-Fuller test (ADF) – the final choice of lag was made based on the Schwarz criterion (SC). No-constant specification or time trend was used for series D(DEBGDP), DEBGDP, D(SHP), D(EXCINDEX), EXCINDEX, D(PS), PS, D(SELINDEX), SELINDEX, PRICINDEX, D(PRICINDEX), INDEX, D(INDEX), AMPD, D(AMPD) and FRS. Constant was used for the series SHP. Constant and time trend were used for the series D(FRS).

TABLE A2

Phillips-Perron (PP)

Series	Lag	Test	Critical values 1%	Critical values 5%
EXCINDEX	4	-1.3393	-2.5974	-1.9453
D(EXCINDEX)	3	-6.7357	-2.5979	-1.9454
SHP	4	-0.9566	-2.5974	-1.9453
D(SHP)	2	-5.2984	-2.5979	-1.9454
DEBGDP	1	-1.9423	-3.5242	-2.9023
D(DEBGDP)	0	-11.8064	-2.5979	-1.9454
INDEX	5	-1.3002	-2.5974	-1.9453
D(INDEX)	5	-8.5988	-2.5979	-1.9454
PS	2	0.9238	-2.5974	-1.9453
D(PS)	3	-8.2913	-2.5979	-1.9454
AMPD	0	-1.8567	-4.0906	-3.4734
D(AMPD)	3	-6.2913	-2.5979	-1.9454
FRS	6	1.2483	-2.5974	-1.9453
D(FRS)	6	-7.9343	-2.5979	-1.9454
PRICINDEX	2	2.0541	-2.5974	-1.9453
D(PRICINDEX)	2	-8.4084	-3.5256	-2.9029
SELINDEX	3	-0.4753	-2.5974	-1.9453
D(SELINDEX)	3	-7.5926	-2.5979	-1.9454

Source: Prepared by the authors.

Note: Phillips-Perron test – lag is the lag truncation chosen for the Bartlett kernel. No-constant specification or time trend was used for series D(DEBGDP), SHP, D(SHP), D(EXCINDEX), EXCINDEX, D(PS), PS, D(SELINDEX), SELINDEX, PRICINDEX, INDEX, D(INDEX), D(AMPD), FRS and D(FRS). Constant was used for the series DEBGDP and D(PRICINDEX). Constant and time trend were used for the series AMPD.

TABLE A3

Johansen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Prob.**
Model 1				
None *	0.431613	90.133850	69.818890	0.0005
At most 1 *	0.267025	49.457240	47.856130	0.0351
At most 2	0.215673	27.090880	29.797070	0.0994
At most 3	0.109833	9.600017	15.494710	0.3128
At most 4	0.016844	1.223073	3.841466	0.2688
Model 2				
None	0.289991	46.485160	47.856130	0.0669
At most 1	0.166373	21.826800	29.797070	0.3082
At most 2	0.111015	8.724999	15.494710	0.3914
At most 3	0.003500	0.252436	3.841466	0.6154
Model 3				
None	0.184701	16.462700	20.261840	0.1539
At most 1	0.024151	1.760242	9.164546	0.8248
Model 4				
None *	0.306547	56.785930	47.856130	0.0058
At most 1 *	0.231001	30.428710	29.797070	0.0422
At most 2	0.138665	11.516800	15.494710	0.1816
At most 3	0.010627	0.769249	3.841466	0.3804

Source: Estimates calculated by the authors using the Johansen cointegration test.

Note:
* denotes rejection of the hypothesis at the 0.05 level.
** MacKinnon-Haug-Michelis (1999) p-values.

TABLE A4

Unit root tests (ADF and PP) - VAR

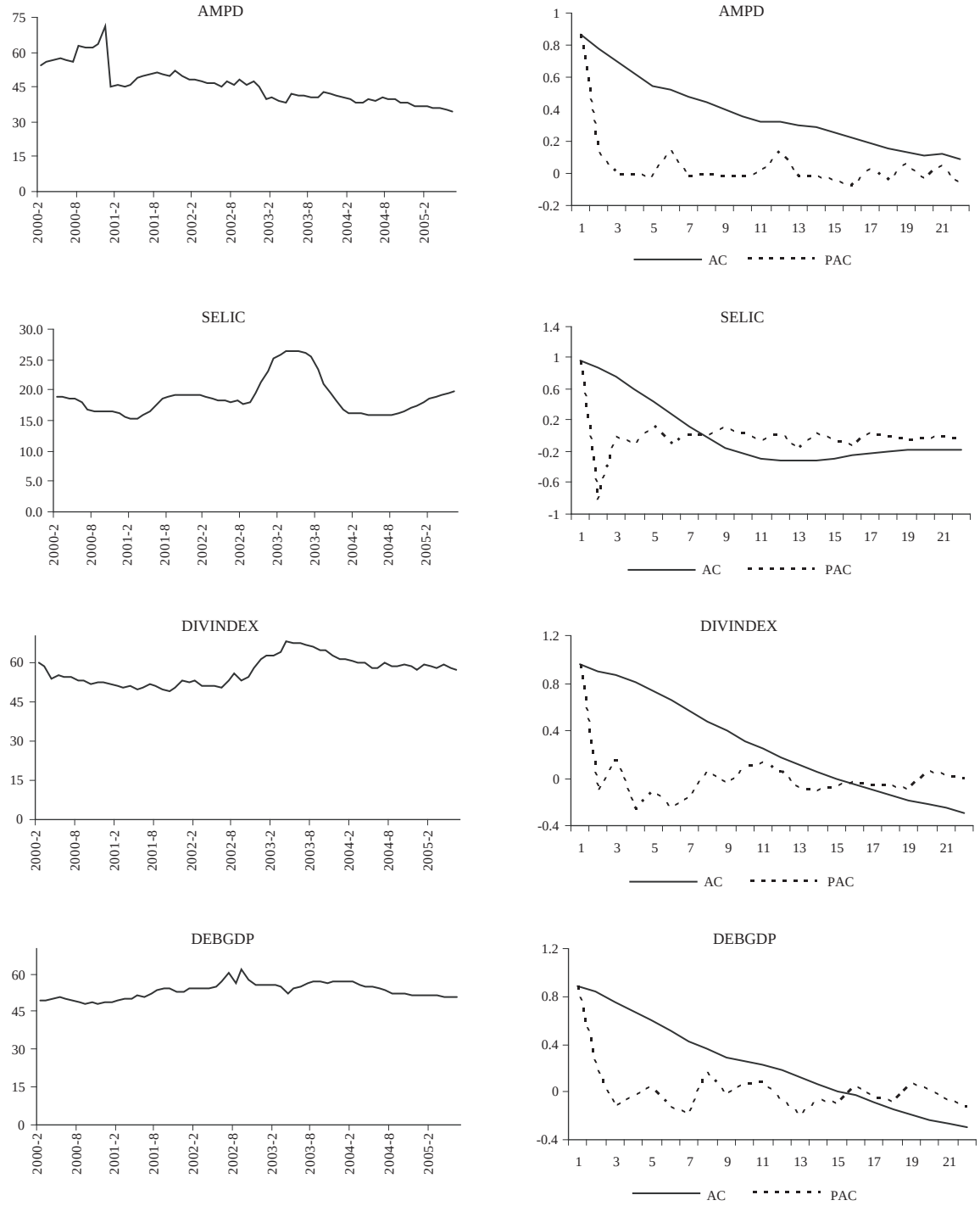
	ADF				PP			
Series	Lag	Test	Critical values 1%	Critical values 5%	Lag	Test	Critical values 1%	Critical values 5%
AMPD	0	-0.333129	-2.601596	-1.945987	1	-4.392240	-4.107947	-3.481595
D(AMPD)	0	-6.932854	-2.602185	-1.946072				
SELIC	1	-3.420096	-3.538362	-2.908420	5	-0.236942	-2.601596	-1.945987
D(SELIC)					3	-2.774981	-2.602185	-1.946072
DINVINDEX	0	-0.333129	-2.601596	-1.945987	3	-0.322813	-2.601596	-1.945987
D(DIVINDEX)	0	-6.932854	-2.602185	-1.946072	3	-6.904872	-2.602185	-1.946072
DEBGDP	1	0.075217	-2.602185	-1.946072	1	0.040130	-2.601596	-1.945987
D(DEBGDP)	0	-10.72096	-2.602185	-1.946072	2	-10.55005	-2.602185	-1.946072

Source: Prepared by the authors.

Note: Augmented Dickey-Fuller test (ADF) – the final choice of lag was made based on the Schwarz criterion (SC). No-constant specification or time trend was used for all series except SELIC whose constant was used. Phillips-Perron test – lag is the lag truncation chosen for the Bartlett kernel. No-constant specification or time trend was used for all series except AMPD whose constant and time trend were used.

FIGURE A1

Evolution and correlogram of the series[a]



Source: Treasury and central bank of Brazil.

[a] AC = autocorrelation, PAC = partial autocorrelation. The figures 1 to 21 indicate the number of lags. The ordinates record the autocorrelation and partial autocorrelation values.

TABLE A5

AIC, SIC and HQ criteria for VAR

VAR	with constant		no constant	
Order	SIC	HQ	SIC	HQ
0	22.43041	22.34540		
1	15.18016	14.75511	15.18027	14.84023
2	14.89359*	14.12851*	14.75558*	14.07551*
3	15.42656	14.32144	15.35733	14.33722
4	15.90623	14.46108	16.02932	14.66918
5	16.47140	14.68622	16.53693	14.83675

Source: Authors' estimates on the basis of the Schwarz (SIC) and Hannan-Quinn (HQ) criteria.

Note: (*) denotes lag order selected by the criterion.

TABLE A6

Granger causality test

VAR (2)

Null Hypothesis:	Obs	F-Statistic	Probability
DSELIC does not Granger Cause DAMPD	62	0.15207	0.85927
DAMPD does not Granger Cause DSELIC		0.40028	0.67200
DDIVINDEX does not Granger Cause DAMPD	62	0.55802	0.57544
DAMPD does not Granger Cause DDIVINDEX		0.03362	0.96696
DDEBGDP does not Granger Cause DAMPD	62	1.02862	0.36404
DAMPD does not Granger Cause DDEBGDP		0.16018	0.85237
DDIVINDEX does not Granger Cause DSELIC	62	0.74929	0.47730
DSELIC does not Granger Cause DDIVINDEX		7.63111	0.00116
DDEBGDP does not Granger Cause DSELIC	62	2.82503	0.06763
DSELIC does not Granger Cause DDEBGDP		1.20975	0.30581
DDEBGDP does not Granger Cause DDIVINDEX	62	0.86605	0.42607
DDIVINDEX does not Granger Cause DDEBGDP		2.41721	0.09826

Source: Authors' estimates.

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Preliminary Overview of the Economies of Latin America and the Caribbean (LC/G.2355-P). United Nations publication, Sales No. E.07.II.G.161, ECLAC, Santiago, Chile, December 2007, 178 pages.

During much of 2007, the Latin American and Caribbean region witnessed a great deal of volatility in financial markets owing to uncertainty about the impact that the financial crisis in the United States could have on that country's and the world's real economies. This crisis has not, however, had any significant repercussions in terms of the level of economic activity or international trade, and most of the economies in the region have continued to grow rapidly. This growth —estimated at 5.6% for the region as a whole— has been driven primarily by domestic demand, with particularly sharp increases being noted in private consumption and gross capital formation.

The strength exhibited by domestic demand pushed up imports sharply, while the volume of goods exports rose more slowly than the region's GDP for the first time in six years. All the same, most natural-resource exporters have benefited from higher price levels, and the region marked up yet another improvement (this time of about 2.6%) in its terms of trade. Higher export prices were also a contributing factor in the region's fifth consecutive surplus on the balance-of-payments current account. The considerable upswing in imports brought the surplus down from 1.7% of GDP in 2006 to 0.7% in 2007, however, thus reversing the upward trend in the current account surplus observed since 2002.

The region also received a larger inflow of foreign direct investment than at any time since 1999 (about US$ 95 billion), as well as a somewhat less remarkable but still sizeable inflow of portfolio investment. These flows were reflected in a hefty surplus on the financial account. As a result, net international reserves climbed steeply (by the equivalent of 3.5% of regional GDP), while the region's external debt, measured as apercentage of GDP, continued to shrink; however, its levels of country risk rose in response to turbulence in financial markets.

Economic policymakers were faced with a variety of challenges. Fiscal revenues were up, thanks to high growth rates, efforts to streamline tax collection and, in some countries, the high prices brought by natural resources. Public spending also rose steeply, however, and, as a result, the overall balance on the countries' central government accounts (which, as a simple average, had yielded a surplus in 2006) showed a deficit in 2007. The primary surplus was smaller as well.

At the world level, fuel and food prices were on the rise. In some countries, this trend was exacerbated by adverse weather conditions that depressed the supply of agricultural products. In some cases, demand pressures were also a contributing factor. The end result was that, for the first time since 2002, the region's inflation rate was close to 6%, as compared to 5.0% in 2006. Since, in many cases, this increase in price levels was combined with strong domestic demand, in many countries the authorities decided to raise interest rates. In a number of instances, these decisions involved a number of trade-offs, since the copious foreign-exchange inflows triggered by current account movements (trade surpluses, remittances from emigrant workers), together with sizeable inflows on the financial account (foreign direct investment and portfolio investment), as well as the weakness of the dollar and higher inflation, resulted in the appreciation of many of the countries' currencies in real terms.

The trends observed in the region's labour markets in earlier years carried over into 2007. Job creation remained brisk and was once again centred around wage employment. This led to a reduction in the unemployment rate from 8.6% in 2006 to 8.0% in 2007. The upturn in formal employment was a particularly outstanding feature of this trend, while real wages rose at measured pace (1.5% at the regional level). The increase in total wages contributed to a further reduction in poverty and to a notable increase in household consumption. In many countries, these factors, combined with a considerable expansion of credit, generated a significant demand-side impulse for economic growth.

Thus, a number of the economic features seen in recent years were repeated in 2007: high economic growth rates in historical terms (although other world regions attained higher rates), surpluses on the primary fiscal and current accounts, an improvement in the terms of trade, lower unemployment, higher international reserves and a smaller external debt. There were also some changes, however, although on the whole they were fairly moderate: a slackening of the growth rate in the volume of exports, higher inflation and a reversal of the steady upward trend in the fiscal surplus.

The outlook for 2008 will depend, to a large extent, on developments in the world economy. Although the most likely scenario is a slowdown in the United States economy followed by a partial recovery, the possibility of a recession with major impacts worldwide cannot be ruled out. The more probable outcome, however, remains that of a fairly slight slackening of the pace of growth in the world economy that would have a limited impact on emerging economies. In the case of Latin America and the Caribbean, these factors are expected to result in a moderately lower economic growth rate in 2008 (4.9%) than in 2007.

Centroamérica y México: políticas de competencia a principios del siglo XXI, Libros de la CEPAL, No. 95 (LC/G. 2343-P), United Nations publication, Sales No. S.07.II.G.91, ECLAC subregional headquarters in Mexico, January 2008, 298 pages.

This book focuses on development and the challenges for competition policy in the Latin American countries, particularly Mexico and the Central American nations. Half of the Central American countries have only recently passed competition legislation and created competition agencies. And all of them, like Mexico, face difficulties in applying their anti-trust legal framework effectively. Hence the main purpose of this work is to analyse the distortions in the markets of the region —especially in telecommunications and banking— and the legal and institutional instruments on which competition policy is based, as well as mechanisms that could be developed to resolve those distortions. The legal regulation of competition and regional cooperation to improve the workings of markets are essential to bring that objective to fruition.

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