ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN

SERIE FINANCIAMIENTO DEL DESARROLLO

48

ON ECONOMIC BENEFITS AND FISCAL REQUIREMENTS OF MOVING FROM UNFUNDED TO FUNDED PENSIONS

Robert Holzmann

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ABSTRACT

The reform of public pension systems in the member countries of the European Union has been on the agenda for many years. Since conventional approaches to reform the largely unfunded retirement income schemes proves politically tedious while insufficient to put the schemes into long-term financial equilibrium, the option encouraged by the seeming success of the Chilean pension reform of 1981, and promoted throughout the world by the World Bank. While such a shift has many potential advantages, and for the European Union could foster the development of the internal market under a common currency, an unconditional promotion such as shift is also problematic. It resembles the advice to somebody who spends too-high-a-share of his income on housing rent, urging him to look for a smaller and cheaper flat, but suggesting at the same time to think about buying a flat.

The objective of the papers is to outline the potential benefits of such a shift, to provide policymakers and economists engaged in such a pension reform plan with a better understanding of the fiscal task, and to highlight main fiscal options and constraints. The liabilities towards the current generation of retirees and workers resulting from unfunded pension provisions constitute a huge hidden public debt. Making this implicit social security debt fully explicit, repaying it and thus reversing the initial redistribution towards the start-up generation, is for most countries quite likely beyond their political, economic and fiscal capacity. Thus, a shift requires various simultaneous steps such as i) a benefit reform of the unfunded scheme, reducing the implicit debt, ii) a redesign of the basic tier remaining unfunded to minimise distortions on factor markets, iii) a design of the timing and form of the debt made explicit and the fiscal flows involved, and iv) a careful calculation of the compensation amount to render the switching decision by individual workers voluntary but cost efficient. Theoretical considerations and the empirical evidence for Chile suggest the feasibility and potential Pareto-improvement of such an approach, but it may require a contractionary fiscal stance.

I. INTRODUCTION[1]

The reform of public pension systems in the member countries of the European Union (and the OECD) has been on the agenda for many years (see Heller et al. 1986, Holzmann 1988). The rising debt level in view of the Maastricht fiscal criteria and the growing perception of the negative effects of fiscal imbalances on economic performance have heightened the reform need of this biggest public expenditure programme (Group of Ten, 1995, IMF 1996a, b, and c, OECD 1995 and 1996 a and b, Franco and Munzi 1996). The necessity of an early and lasting reform of the essentially unfunded retirement income schemes are well known: population ageing (due to low fertility rates and rising life expectancy), further system maturation in many countries (due to past policy decisions on coverage and benefit level), the likely negative labour market implications (due to high contribution rates and the insufficient contribution/benefit link), and, the negative consequences for private and national saving (perhaps, due to the unfunded character of the scheme but certainly due to the negative effects on public saving as a result of fiscal imbalances of the schemes).

The conventional measures to fiscally redress an unfunded pension scheme are also well known, and limited: i) An increase in revenues (through higher contribution rates or taxes); in view of rising international tax competition, and the static (and dynamic) excess burden such a policy would imply, such a move is largely excluded; ii) Lower other public expenditure (such as on education or defence). In view of the scope of the task (some 1 to 10 percentage points of GDP between 2000 and 2030) such an approach would be equivalent to eliminating all defence spending in the US and all spending on public services and defence in Japan (OECD 1995); iii) an increase in the retirement age. An increase by 5 years would roughly eliminate the fiscal imbalance over the next 35 years in Japan, Germany, the UK and the US, and it would eliminate over half of the imbalance in Canada, France, and Italy (OECD, 1995). Yet the increases in the standard retirement age or the tightening of the eligibility criteria to raise the effective retirement age in recent reforms have proven to be politically extremely difficult, while modest; and iv) reduction in the benefit level per retiree through lower initial pension benefit, lower indexation, higher taxing or enhanced means-testing. Some or all of these measures have been applied in the recent reforms in EU countries (see Franco and Munzi 1996, ISSA 1996), but they are unlikely to put the pension scheme on a sound, long-term financial footing. Those reforms were mostly driven by short-term budgetary considerations but little by a long-term fiscal view. For this very reason pension reform remains a standing agenda in essentially all industrialised countries.

A further reform option, namely to move to a (partially) funded scheme, is often proposed, but rapidly rejected by the well known argument of the double burden on the transition generation such a move would imply. Several European countries are operating supplementary funded pensions on a mandatory/contractual basis (most importantly UK, Switzerland, Netherlands, Denmark, but also Sweden and Finland), but the specifics of these countries, and the often long-term history of the introduction makes the opponents

of such a reform approach often discard this option. Indeed, while the argument of a double burden has some validity, it requires a closer investigation, confronting those people who categorically reject such an option, but also those who unconditionally embrace it.

The Chilean pension reform of 1981, shifting from an unfunded, publicly managed, and defined benefit scheme to a fully funded, privately managed, and defined contribution scheme has heightened the world-wide interest in the feasibility of such a reform approach, and the potential benefits which may result. This very reform is held co-responsible for the impressive performance of the Chilean economy since the mid-80s, and has encouraged reformers throughout the world to imitate, at least partially, the Chilean approach: various countries in Latin America such as Argentina (1994), Peru (1993), Colombia (1994), Uruguay (1996) and Mexico (1992, 1997) have already begun to shift towards mandatory funded provisions, other countries, such as Costa Rica and Nicaragua are likely to follow; and a few former centrally planned economies, such as Croatia, Hungary, Latvia, Poland and Slovenia are making preparatory steps in this direction.[2] In addition to its government-provided pensions, Australia recently mandated employer-organised retirement savings for workers. Most of these countries do not envisage a full shift towards funded provision, and the move towards a two tier mandatory scheme, consisting of an unfunded and a funded tier, has been encouraged by a World Bank report ever since (World Bank, 1994).

A move towards funded retirement provisions promises various benefits at political and economic level, ranging from higher credibility of such a reform approach to the positive impact on financial sector development and national saving. Yet, in order to reap the potential benefits from such a shift requires substantial changes of the current unfunded scheme and important support by the fiscal policy, rendering an unconditional promotion of a (partial) shift from an unfunded to a funded retirement scheme problematic. It resembles the advice to somebody who spends too-high-a-share of his income on housing rent, urging him to look for a smaller and cheaper flat, but suggesting at the same time to think about buying a flat. While such a move may prove very useful because of lower current expenditure and potential capital gains, it requires important shifts in intertemporal consumption behaviour. Furthermore, the buyer may be confronted with cash-flow problems (having to pay interest and principal) when exposed to stochastic income realisation. A similar problem arises for countries when shifting from an unfunded to a funded scheme, and this demands a close investigation of the change in stocks and flows involved. The objective of this paper is to provide policymakers and economists involved in such a pension reform with a better understanding of the fiscal task, and to highlight main fiscal options and constraints.

To this end the specific objective of the paper is fivefold: i) To highlight the potential benefits of such a reform. The ongoing reform discussion and recent reform attempts in different parts of the world have stressed various benefits at political and economic level of such a reform approach to which specific advantages in the context of the European Union can be added. ii) To investigate the interrelation between and scope of fiscal stocks and flows involved in a shift from an unfunded to a funded pension scheme (UF-FF shift). The stocks comprise, inter alia, the existing commitment towards current and future retirees staying with the unfunded scheme, and the compensation amount for forgone unfunded benefits/past contributions resulting from a switch from unfunded to funded provisions. The fiscal flows comprise, inter alia, the operational deficit of the social security fund resulting from the loss of contributors, and the disbursement of the compensatory amount. iii) To explore expenditure minimising procedures for the UF-FF shift and the appropriate timing. For political reasons, a voluntary decision by

individuals to switch to the new and funded system is preferable. This requires an understanding of the intertemporal decision making process by the individual, which, by the same token allows for an endogenous determination of the switching age while minimising the fiscal costs. iv) To investigate the main options for financing the fiscal flows of such a reform, the potential scope of revenue enhancing measures and effects as a result of the transition, such as the claimed favourable effect on capital accumulation, saving and total factor productivity, and the use of government assets. v) To present preliminary empirical findings of the Chilean pension reform and the economic and fiscal issues involved.

The structure of the paper is as follows: Section 2 shortly presents the potential benefits of a move from unfunded to funded provisions. Section 3 highlights the links between stocks and flows, including the strategies for reducing the implicit debt to be made explicit, and the individual switching decision. Section 4 outlines the main financing options, including the potential sources of financing the transition which may result from enhanced economic growth or the use of government assets. Section 5 summarises empirical evidence of the Chilean pension reform and its impact on economic growth, capital formation and saving, including the financing of the debt made explicit, while Section 6 concludes.

II. POTENTIAL BENEFITS OF MOVING TO FUNDED PROVISIONS

For the shift towards a (partially) funded scheme, various potential benefits at the political and economic policy level may be claimed. Those arguments are influenced by the dragging reforms in western and eastern Europe, and the apparent success of the Chilean reform of 1981 (Holzmann 1996). In addition, for the European Union further and specific arguments for a common move towards mandatory and funded provisions can be advanced. This Chapter presents the core of those arguments, but does not investigate their validity nor the conditions under which they may apply.[3] This is partly taken up in later chapters.

At the *political level*, three effects stand out. First, the approach provides for a break in the deadlock of traditional reform attempts since its suggests a time consistent and hence credible reform (Holzmann, 1994a). Second, the approach isolates retirement provisions to a large extent from political interference and risk (Godoy-Arcaya and Valdés-Prieto, 1997; Diamond 1994). Last but not least, it heightens workers for financial issues and enterprise performance, reducing the dichotomy between capital and labour (Piñera, 1991).

i) The observed political resistance throughout the world against the reforming of an unfunded scheme along conventional lines (such as a change in the benefit structure and an increase in retirement age) undoubtedly stems from distributional conflicts but seemingly also reflects a credibility problem (Holzmann, 1994a). Politicians cannot make a convincing commitment that the proposed traditional reform is a lasting one (i.e. puts the scheme on sound and long-term financial basis), and that they have no incentive to change the benefit/contribution structure for political reasons in the near future. Given this time inconsistency problem individuals have an incentive to oppose a traditional reform from the very beginning. Shifting to a funded scheme can provide for a break in the deadlock of reform for three main reasons: Firstly, by stressing the economic advantages and the positive impact on economic growth by such a reform it allows for arguments that all can win, thus abandoning intractable zero-sum games and shifting the discussion from simple distributional concerns to efficiency and growth issues. Secondly, by separating explicitly the language for saving-insurance (individual accounts and individual equity) from the language of redistribution and social protection it provides for transparency. Last, but not least, such a shift reduces the scope of future opportunistic behaviour by politicians and thus enhances the incentives for individuals to agree.

ii) The provision of public and unfunded pensions are subject to many sources of political risk (Diamond, 1994): The first and most obvious one is the granting of excessive benefits to existing retirees when the system is not mature (and hence contribution revenue are largely sufficient to cover expenditure), combined with promises for future retirees that cannot be met. A second one is depletion of accumulated assets through other use and/or low rate of returns, making the originally promised benefits not financiable. A third risk is the excessive responsiveness of benefits to short-term conditions of the government budget (as currently experienced in the EU for the

preparation of the third stage of EMU). A forth, but not last risk is the excessive responsiveness of benefits to the long-run condition of the government budget. Against this background it is claimed that funded pension schemes á la Chile provide a good isolation from the risk of over-sensitivity to the state budget and the risk of excessive distribution to earlier generations. The protection against those risk is seen in the identification of individual accounts (and their returns) as private property, entitled to the same protection as other assets.

iii) Even in highly industrialised countries most individuals receive their income from dependent work only, thus focusing their interest on high wages and safe employment. As a result, the demand for too high wages and for high job security is largely perceived as a way to redistribute income from capital to labour, and any negative feedback on the future own income position is mostly ignored. Furthermore, high rates of return on investment, and hence high profits, are often perceived as indecent, given rise to popular demand for redistribution through high taxation of capital income. Against this background it is claimed that shifting to funded pensions attenuates the traditional conflict between capital and labour (and the aversion of large parts of the population against financial markets) since workers become aware of their interest in a high rate of return (Piñera, 1991). Such a perception is particularly strong under a defined contribution scheme where a higher rates accrue exclusively to the individual.

At the *economic level*, three main reform effects are claimed. First, the reform establishes a close link between contributions and benefits, thus reducing the labour market distortions traditional and unfunded programs are considered to be fraught with (World Bank, 1994). Second, the reform approach furthers and accelerates financial market developments and thus efficiency of resource allocation (Davis, 1995, Holzmann, 1996). Last, but not least, the reform affects positively national saving and capital accumulation (inter alia, IMF, 1995). From all three effects —less distorted labour markets, better functioning financial markets, and higher capital accumulation—, and their interaction, a higher growth path should result.

i) In unfunded pension schemes the link between contributions and benefits is traditionally weak: as a result of mingling distributive function and the saving-insurance function of old-age income support; as a result of imposing on the scheme labour market and other pension-unrelated functions; and as a result of its unfunded nature, offering a rate of return well below the rate of return on capital investments. In consequence, individuals perceive social security contributions largely as taxes, giving rise to labour market distortions and leading to tax evasion (informal market activities), distorted labour supply and incentives for early retirement. In view of the high (and often rising) social security contributions in much of Europe, those distortions are often held co-responsible for the persistent labour market problems in this part of the world. While much of these distortions, in principle, may be eliminated in a reformed unfunded scheme, it is claimed that moving towards a two tier scheme, with a clear separation between the (unfunded) distributive and the (funded) annuity component, is a more effective and efficient approach (World Bank, 1994, Chapter 7).

ii) Despite the globalisation of financial markets over the last decade, many national capital markets in Europe (and outside) are still underdeveloped when assessed by some measures such as equity market capitalisation, the scope and form of capital market instruments, the speed of innovation, and market structure. The final verdict on the relative advantages of bank-based (traditional in central, southern and eastern Europe) versus market-based (traditional in Anglo-Saxon countries) financial intermediation is still out, but recent developments seemingly indicate a trend towards market-based intermediation, and all countries want to invigorate their share market as a means to

further enterprise creation, long-term investment and employment. There is also rising theoretical and empirical support for an old conjecture that the efficiency of financial markets has a strong bearing on economic growth.[4] Given the impact of pension funds on the demand for capital market instruments, instrument innovation, and market structure, making the capital market deeper, more liquid and more competitive, a shift towards funded retirement provisions could importantly accelerate such a development.

iii) The decline in total saving in the OECD area as a whole over the past 30 years or so, and the long-term rise in the real interest rate which accelerated since the beginning of the 1980s have heightened the fear of a future global capital shortages with adverse consequences for future output (see Group of Ten, 1995, OECD, 1996). This concern about the future national saving rate which is likely to be negatively impacted by ageing (directly through the age-specific consumption-saving pattern, and indirectly through its budgetary consequences) adds to the standing claim that an unfunded scheme reduces national saving (at least transitorily until the system matures), thus the capital stock, and consequently the output level (and in many endogenous growth models also the growth path). Against such a background, a shift towards funded provisions would be welcome if it increases national saving and hence capital formation. Such an impact is often claimed and seemingly fostered by the Chilean experience where national saving in percent of GDP increased from 8.2 percent in 1981 to an all-time high of 27.6 percent in 1995 (see IMF, 1995, Holzmann, 1997b).

For the *European Union*, three further and important advantages for a common move to a mandatory two tier system, consisting of an unfunded basic tier, financed from general taxation/social security contributions, and a funded supplementary tier in form of a defined contribution plan, may be claimed:

i) Despite the creation of an internal market as of 1993, labour mobility between the EU member states remains low; without some (modest) mobility, the envisaged gains from specialisation and economies of scale and scope in the EU will be limited. While cultural barriers may certainly explain part of the labour immobility, differences in pension and other social policy legislation quite likely have also a bearing. The current co-ordination rules between the EU-countries reduce the obstacles somewhat, but remain fully operative as far as supplementary pensions are concerned (with regard to transportability, taxation, etc.). With rising pressure on public pensions, the importance of supplementary (individual or occupational) provisions will increase. Having a co-ordinated and funded second tier on a defined contribution basis, with full transferability of funds when changing the country of residence, would reduce those obstacles importantly. Clearly, this would also require important steps in the area of tax co-ordination if tax exemptions for premiums and returns is granted, while only the pay-outs to retirees are taxed.[5] Labour mobility gains importance once a common currency is introduced, and alternative instruments to cope with asymmetric and country specific shocks are required. Furthermore, a common scheme for all employed in each EU-country would also foster labour mobility between sectors (e.g. between public and private sector employment) and regions in federal states.

ii) All European economies are exposed to the effects of globalisation, including the rising (gross) capital movements for portfolio and direct investment purposes. Such a development, while allowing for a more efficient allocation of world wide capital and thus also for domestic efficiency gains, is often opposed by the wage-earning population in the EU because they experience only the disciplinary effects of mobile capital on the wage level (but little the increase in labour productivity and hence wage rate, which depends on the net inflow), but do not participate in the higher capital returns. With (partially)

funded pensions all European wage earners would also have a stake in national and world-wide capital market gains, leading to supporting but not opposing the inevitable shift from the traditional stakeholder to a shareholder society.

iii) Last but not least, partial funding of pensions would also better protect the future retirees against the symmetric demographic shocks all European countries are exposed to. With an asymmetric ageing in Europe one could envisage a risk-pooling through intra-European migration (while keeping individual country schemes), or a common unfunded scheme (and differences in demographic developments between the states, like in the USA). However, fertility rates in western Europe have been below reproduction level for some time, and there are little indications for a reversal. Eastern European reform countries follow this development with a lag of one to two decades, and also life expectancy is expected to increase further. Against this likely demographic scenario of a parallel ageing of European populations, funded pensions may provide some insurance: If such a shift in the financing mode leads to a higher saving rate and a higher domestic capital stock, higher pension benefits should result; even without an increase in the European saving rate, investing part of the fund assets internationally allows a risk diversification (and hence yielding a higher return at given risk, or lower risk at given return).

In summary, there are seemingly many convincing arguments why European countries should think more intensively of a, preferably co-ordinated, shift away from unfunded towards funded provisions on a mandatory basis. Yet, all these arguments, even if perfectly valid and empirically fostered, may not be sufficient if the central obstacle of financing the transition is not overcome.

III. DETERMINING THE FISCAL TASK: STOCKS AND FLOWS

As it is well known, an unfunded pension scheme constitutes a commitment towards current retirees and workers, and thus is equivalent to a (hidden) public debt. Shifting to a funded scheme makes this implicit debt explicit, which has eventually to be repaid. The shift between implicit and explicit public debt, and the fiscal flows involved, however, depend on the way how the transition is structured. While most theoretical papers dealing with a shift from unfunded to funded provisions are recognisant of the stock-flow link when addressing the intergenerational welfare and intertemporal macroeconomic issues, most empirical papers on such a reform concentrate on the fiscal flows only when addressing the fiscal and distributional issues involved. This section outlines the main links between stocks and flows to be taken into consideration, supported by limited empirical data, and supplemented by some heuristic simulations.

1. The scope of pension liabilities

Given the debt nature of pension obligations, as a first step the scope of this debt has to be to assessed since it determines the potential fiscal implications of a transition. Current pension expenditures are only a good indicator for existing commitments under steady-state conditions. In the case of an ageing population, rising labour force participation and pension coverage or non-mature benefit structure the trend in current expenditure level tends to underestimate the trend in outstanding commitments.

There exist three main definitions of pension liabilities (Franco, 1995):

a) Accrued-to-date liabilities: these represent the present value of pensions to be paid in the future on the basis of accrued rights; neither the future contributions, nor the accrual of new rights by them are considered.

b) Current workers and pensioner's liabilities: in this case it is assumed that pension schemes continue their existence until the last contributor dies, while no new entrants are allowed; both the future contribution of existing members and their new rights are therefore allowed under current rules.

c) Open-system liabilities: these also include the present value of contributions and pensions of new workers under current rules; the range of options extends from including only children not yet in the labour force, to an infinite perspective.

Table 1 highlights the interrelation between the alternative definitions of pension's liabilities, the corresponding and alternatively used concept of social security debt or wealth, and the concept of actuarial deficit, the balancing item. The difference between the three main definitions of pension liabilities reflects alternative views of which generations, and their claims, should be considered. The difference between the gross and net concept results from taking account of assets (financial reserves and present value of future contributions); the net concept is equivalent to the balancing item, the actuarial deficit. The concept of debt or wealth represents alternative views from the side

Table 1

ALTERNATIVE DEFINITIONS OF PENSION LIABILITIES/SOCIAL SECURITY DEBTS OR SOCIAL SECURITY WEALTHS/ACTUARIAL DEFICITS AND THEIR INTERRELATION

	Assets	Liabilities	Definition of Balance	Definition of Liability
	Financial reserves	Present value of pensions in disbursement		
	Actuarial Deficit I	Present value of future pensions due to past contributions		
1	Gross Social Security Debt I	Gross Social Security Debt I	*Actuarial Deficit I*	**Accrued to Date Liability**
	Present value of future contributions of current workers	Present value of future pensions due to future contributions of current workers		
	Actuarial Deficit II			
2	Gross Social Security Debt II	Gross Social Security Debt II		
1+2	Gross Social Security Debt of Current Generation	Gross Social Security Debt of Current Generation	Actuarial Deficit I+II = **Net Social Security Wealth/Debt**	**Current Workers and Pensioner's Liability**
	Present value of contributions of future generations	Present value of pensions due to contributions of future generations		
	Actuarial Deficit III			
3	Gross Social Security Debt of Future Generation	Gross Social Security Debt of Future Generation		
1+2+3	Gross Social Security Debt of all Generations	Gross Social Security Debt of all Generations	Actuarial Deficit I+II+III = **Total Actuarial Deficit**	**Open System Liability**

Source: Own presentation.

of government (debt) or individuals (wealth). For example, the gross social security debt of the current generation (as seen from government) corresponds to the gross social security wealth (as seen from the individuals); and the net social security wealth corresponds to the actuarial deficit of the current generation. The concept of net/gross social security wealth was introduced into the pension discussion by Feldstein (1974).[6]

For an unfunded/fully funded pension shift (UF-FF shift), it is the first definition which is relevant, since it is the value of accrued rights which has to be compensated and thus becomes explicit debt (unless the government defaults on her pension commitments). For a given pension system, the main assumptions which determine the level of the accrued pension liabilities (or social security debt I, henceforth SSD) are the real interest rate, real wage growth, inflation rate, and survival probabilities. For countries where the public pension system has accumulated financial reserves, the existing assets have to be subtracted.

Table 2 illustrates the scope of the SSD for selected OECD countries in 1990. The estimates have only illustrative character and constitute a lower bound, since they often concentrate on the main schemes only (disregarding, for example, civil servants' pensions), leave out disability and survivors pensions, or ignore social pensions and means-tested and related supplements.[7] Nevertheless, those estimates indicate that the hidden public debt, the SSD, is extremely important and dwarfs the explicit financial debt existing in those countries. Comparing the SSD with the annual pension expenditure also confirms a rule of thumb that for reasonable parameter assumptions the ratio is in the range of 15 to 30.[8]

Table 2

NET ACCRUED PENSION LIABILITIES AND FINANCIAL DEBT FOR SELECTED OECD COUNTRIES, 1990

(in percent of GDP)

Country	Gross Liabilities			Existing Assets	Net Liabilities	Pension Expend. 1/	Gross Liabilit./ Pension Exp.	Financial Liabilities	Total gross Liabilities
	Retired	Workforce	Total						
	(1)	(2)	3) =(1)+(2	(4)	(5)=(3)-(4)	(6)	(7) = (3)/(6)	(8)	(9)=(3)+(8)
France	77	139	216	0	216	9,0	24,0	40	256
Germany	55	102	157	0	157	6,9	22,8	44	201
Italy	94	165	259	0	259	10,6	24,4	101	360
(after 1992 reform	94	148	242	0	242	10,6	22,8	101	343
United Kingdom	58	81	139	0	139	6,6	21,1	35	174
Canada	42	71	113	8	105	3,9	29,0	73	186
Japan	51	112	163	18	145	5,7	28,6	70	233
Unites States	42	70	112	23	89,0	5,1	22,0	55	167

Assumptions: Pension benefits are price indexed; real earnings grow by 2 percent; discount rate is selected at 4 percent from 1990 to 2010, declinding to 3 percent in 2050.

Source: Van den Noord and Herd (1994), OECD data base, and own calculations.

1/ Only old-age pension expenditure around 1990; figures for Japan include survivors and disability pensions.

2. Reducing the scope of the SSD to be made explicit

Given the actual average pension expenditure level of EU countries and of many emerging market economies in eastern Europe of 10 percent of GDP and above, this amounts to a SSD of some 150 to 300 percent of GDP, and sometimes above, with often rising tendency. Moreover, in the case of the eastern European reform countries the actual expenditure level is often downward biased through benefit and indexation caps for budgetary reasons. Making the debt of such an amount fully explicit, and eventually having to repay it, does not seem feasible. This begs for strategies to reduce the amount of SSD made explicit.

i) *Strategy I* consists in *reducing the SSD* via a reduction of future commitments through an increase in the retirement age, decrease in the annual accrual factor or change in the indexation procedure (say, from wage to price indexation). In fiscal speech, the government partially defaults on her pension commitments.[9]

A reform of the unfunded scheme in parallel with a partial or full shift to a funded scheme appears required in most countries since the unfunded schemes are essentially financially unsustainable, and a mere shift in the financing mechanism is of little help. So far, all reform countries in Latin America have adjusted eligibility and benefit rules before or in parallel with a shift in the financing mechanism. In order to reduce the amount of SSD made explicit, the reform has to be implemented as early as possible (discussed below).

Figures 1a and 1b sketches the scope and changes of the SSD under different benefit reform options, the impact of ageing on the SSD, and the divergence in development between stocks and flows. The results are based on a heuristic overlapping generation-type simulation model which mimics the essential features of a unfunded two-tier pension scheme.[10]

Benefit indexation: Starting out with price indexation under the base-line scenario (implying a steady-state SSD of some 160 percent of GDP), with a change to wage indexation in period -10, the SSD jumps immediately by over 20 percent of GDP and continues further to increase for some 30 years till the difference to the baseline scenario reaches almost 40 percent of GDP, or 1/5 of the original SSD level. With initial wage indexation, a change to price indexation in period -10 leads to an immediate drop in the SSD level by some 24 percent of GDP before gradually approaching the baseline level after some 40 years.

Retirement age and accrual rate: Changing the retirement age from 60 to 65, or even from 60 to 70 during the periods 1 to 20 has an effect on the SSD well before the implementation of the reform, and the long-term impact on SSD is substantial. However, the results also reveal that in an earnings-related scheme the effects are somewhat compensated if the accrual rate is not adjusted accordingly (i.e. if individuals working longer and retiring later accrue further pension rights). Linking a strong increase in the RA with a decrease in the accrual rate essentially halves the SSD.

Both changes in policy parameters and their effects on SSD are a first indication of the importance to introduce policy changes well in advance of a UF-FF shift if the transition costs are to be minimised. Figure 1a also indicates the increase of the SSD as a result of *rising life expectancy* (as of period 1). Again, SSD jumps with the future change in life-expectancy, i.e. the stock effects of future changes are immediately capitalised. Figure 1b exhibits this difference between stock and flow developments with regard to SSD and pension expenditure (each measured as a percent of GDP). While the fiscal flow variable —the pension expenditure— are initially identical, differences in future

Figure 1a: Social Security Debt under alternative Policy Scenarios

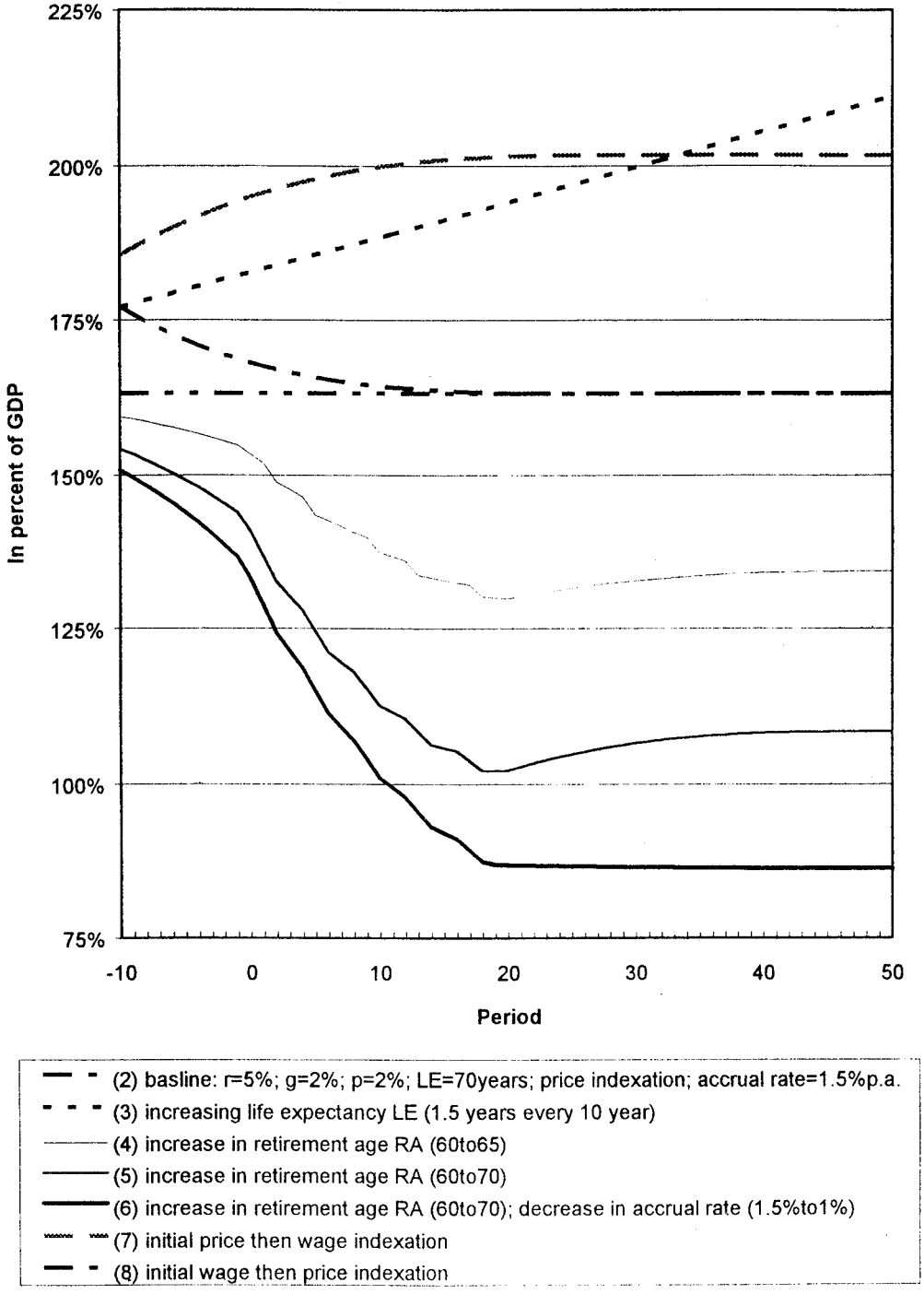
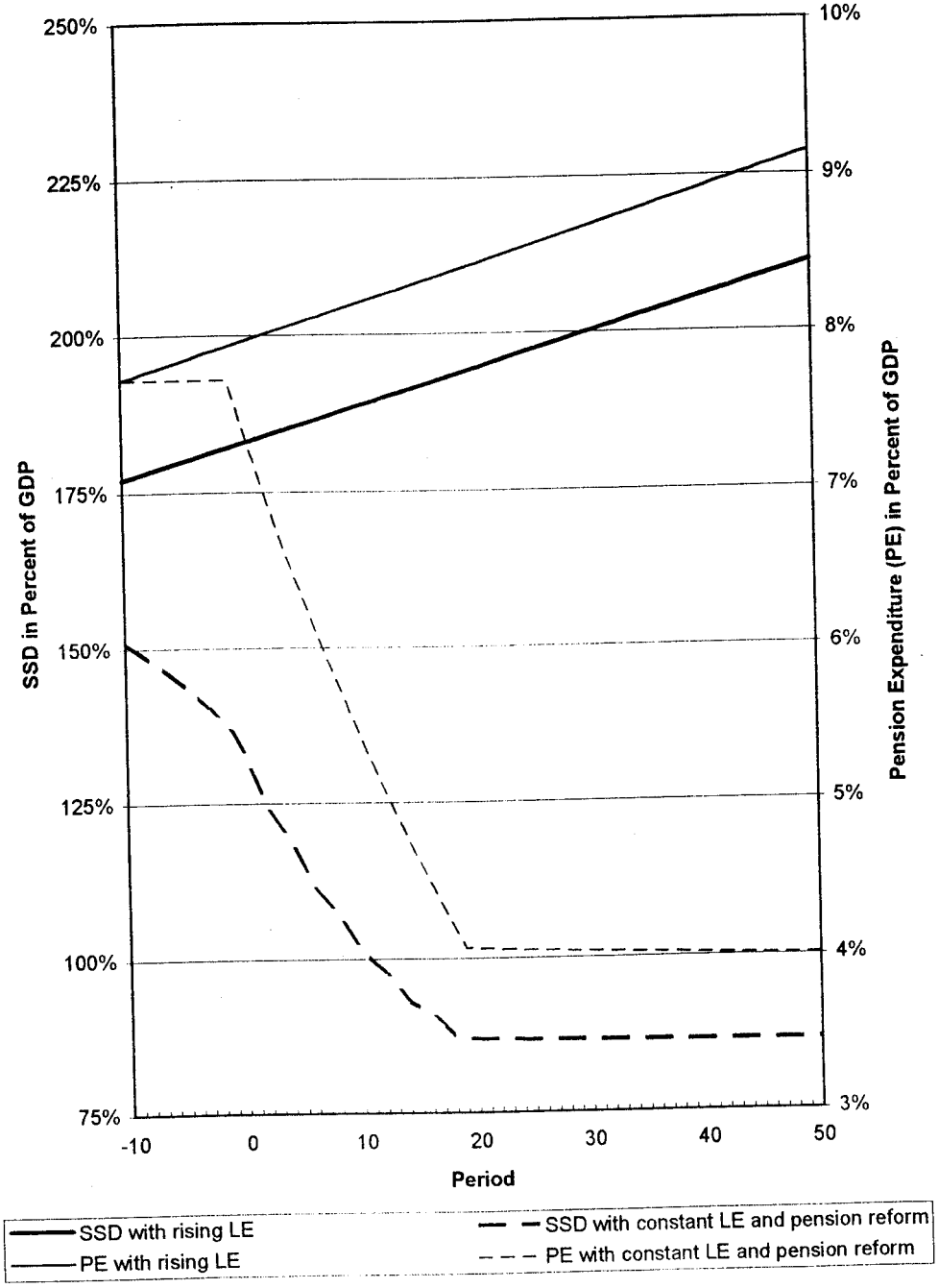


Figure 1b: Social Security Debt and Current Pension Expenditure



However, there are also (potential) risks of a partial shift only which are the following:

(1) Keeping the reduced, but traditional, unfunded tier does not contain the various sources of political risk, discussed above.

life expectancy and policy setting have an immediate impact on SSD. The initial difference amounts to almost 30 percent of GDP.

ii) *Strategy II* consists in a *partial shift* towards a funded system, thus making only part of the SSD explicit. The resulting (mandatory) pension scheme consists of an unfunded and a funded tier, and the distribution between both is determined by fiscal and other considerations. Such an approach is applied in Argentina and other Latin American countries (Queisser, 1995), and is under preparation in some eastern European reform countries (Latvia and Hungary), and also under consideration in Poland, Croatia and Slovenia (see Holzmann 1997a).

A partial UF-FF shift has both advantages and risk. The main (potential) advantages are three-fold:

1) It proportionately reduces the potential scope of the implicit debt made explicit and can thus lead to a manageable fiscal task. While the repayment of, say, 200 percent of GDP in debt appears difficult, or even impossible, the repayment of half of this amount is in the range of the Chilean pension reform.

2) Basing retirement income on both an unfunded and a funded scheme allows for risk diversification and may be welfare enhancing. It can be argued that the internal rate of return of an unfunded scheme —the natural growth rate— is a stochastic variable which exposes each pension cohort to an income risk. The same can be claimed for the internal rate of return of a funded scheme —the interest rate. Thus, if the covariance of both returns is lower then 1, a mixed financing mechanism reduces the overall income risk and provides positive welfare effects.[11]

3) Public and earnings-related pension schemes traditionally have a distributional and an annuity component, and it is the mingling of both and the lack of a clear contribution/benefit link which is held responsible for the various distortions inflicted by public and unfunded schemes (see e.g. Schmidt-Hebbel, 1993). Separating both components into an unfunded distribution-oriented tier, and a truly earnings-related funded tier is claimed to reduce the distortions importantly (World Bank, 1994).

However, there are also (potential) risks of a partial shift only which are the following:

1) Keeping the reduced, but traditional, unfunded tier does not contain the various sources of political risk, discussed above.

2) Unfunded and funded tiers have different rates of return. Temporarily lower rates of return in the funded tier may exert a political pressure for higher benefits under the unfunded tier in order to compensate for; conversely also higher rates of return may introduce a pressure for higher unfunded benefits from those parts of the population which are little covered by the second tier.

3) The unfunded tier is much more exposed to the ageing of population, and the problem of long-term financing this implies.

iii) *Strategy III* consists in applying an expenditure-minimising procedure for the determination of the compensatory amount for those individuals willing to switch to the funded scheme, and hence forgoing the benefits of the unfunded one. For political considerations, the switching decision should be left to the individual. For cash-flow and economic considerations, the approximate switching cohort should be known in advance. This requires knowledge of the individual/cohort decision process, which also allows the determination of expenditure-minimising compensation for all switchers. Put differently, setting the switching age exogenously (say, all below age 40 have to join the funded scheme) either does not conform with individual preferences and thus undermines the political support of the reform. Or it reflects individual preferences but is at least as expensive as the individual voluntary decision.

The move to a funded scheme which promises a higher rate of return (and hence a higher benefit level for a given contribution rate, or an equal benefit level for a lower contribution rate) raises the question if a compensation for a major segment of the age cohorts is at all required. If, despite the lower contribution record, the higher rate of return under the funded scheme allows the individual to achieve a benefit level at least as high as remaining with the unfunded scheme, it has an incentive to switch to the new scheme without any compensation. The Annex outlines a simple (deterministic) approach to model the individual decision process, and the conditions under which an uncompensated switch takes place. Figure 2 highlights the interest rate-wage growth rate differential required in order in induce an age cohort (consisting of identical individuals with perfect foresight, hence abstracting from uncertainty and risk aversion, but including survivor probabilities, and a potential span of activity between age 21 to 60/65/70, and of retirement between age 61/66/71 and 100) to switch to the funded scheme. The results suggest that for reasonable rates' differentials (say, the range of 1.5 to 3 percentage points) no compensation for individuals in the age range of 33 and 44 (and below) may be required. The resulting savings, however, are likely to be limited since the present value of future benefit claims of that age segment is small.

iv) Given the scope of the existing pension commitments, most countries will have to apply all strategies simultaneously in order to keep the resulting fiscal obligations manageable. This raises the question of an *appropriate structure for the first and unfunded tier* which may allow to minimise the risks raised above.

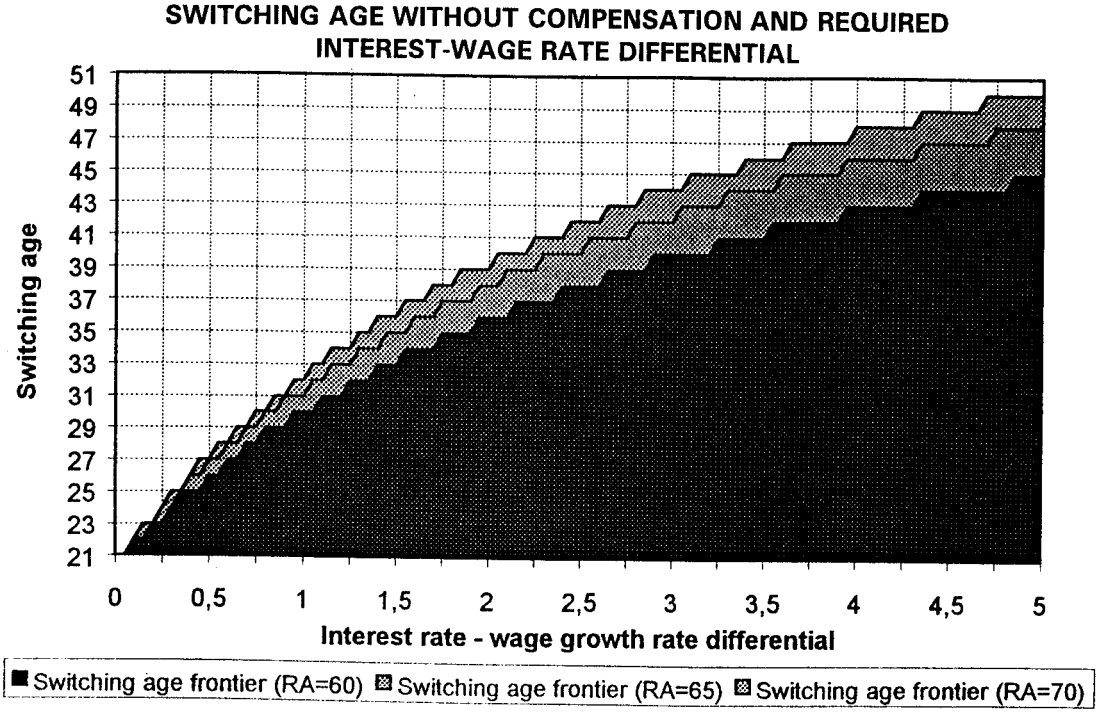
A microeconomically ingenious approach to structure the basic and unfunded tier, going back to a suggestion by Buchanan (1968), was recently adopted in Sweden (see ISSA 1996, p. 43) and Latvia (see Fox et al., 1996), and is also under consideration in Poland; it has the following characteristics:

The new unfunded tier is a "notionally defined contribution" scheme. The system starts by giving everyone paying the social security contribution an account. As contributions for the pension system are paid, the account is credited, as if it were a saving account, and the accumulated capital earns a "rate of return" equal to the growth of the average wage on which contributions are collected. At retirement, the pension paid is equal to the accumulated capital (inclusive of the notional interest rate earnings) divided by the expected post-retirement life span of all those of that persons age. The pension is price-indexed.

This approach has various advantages, in particular: 1) the system provides incentive for formal labour force participation since any contribution evasion leads at the end to a lower benefit level; 2) the system is largely immune against political trickering, since any special treatment of groups has to be followed-up by explicit contribution payments; 3) individuals have an incentive to stay on the labour market and to extend their working lives; 4) the system adjusts endogenously to an increase in life-expectancy, since any increase will automatically lead to lower pension benefit giving rise to an incentive to retire later, and, last but not least, 5) the benefit structure may allow an easy integration with a funded second tier of a truly defined contribution type.

The main problem of this approach is the reserve accumulation it requires against temporary adverse economic shocks, and most importantly, against the ageing of population. Since the system is an unfunded one, but promises a rate of return based on past average wage growth, expected changes in beneficiary/contributor ratios require corresponding financial reserves if future transfers from the state budget should be prevented. While the calculation of a long-term expenditure-covering contribution rate is technically relatively easy, the actual accumulation of reserves and the receipt of a

Figure 2



market-based rate of return may constrained by political pressure for an alternative use of these funds. For this reason an adjusted version of that, "notionally defined contribution plan", proposed by Boskin et al. (1988) may be more appropriate. In their scheme, the notional interest rate is set by actuaries, based on forcasts, so that the system is forcasted to be in balance over the projection period.

3. Speed of transition, timing of reforms and cash-flow considerations

i) The speed of transition is determined by the decision at which age a switch to the funded scheme should take place. There are two extreme options: Under the *radical option*, all commitments —for those who have just entered the labour force to those who are already retired— are compensated. Thus, the total SSD is made explicit in one stroke and has to be financed on the financial market; the cash flow requirements equal the SSD. Under the *minimal option*, only the new entrants to the labour market participate in the funded scheme. This reduces the cash flow requirements to the rising operational deficit (the difference between revenue and expenditure), since the expenditure remain for many years while the contributions decrease continuously. As a result, the transition is only completed once the last eligible person dies (after some 80 years). Most reforms will choose a switching age among the current working generation, say age 40, as a compromise between considerations to speed-up transition and cash-flow limitations.

Figure 3a to 5a highlight the change in the composition of the total public pension debt under different assumptions about the age of the switching cohort and over time. The decision takes place at the end of period 0 and the switch in period 1. Since the *interest rate in this simulation is set equal to the growth rate*, the overall debt level in

percent of GDP remains unchanged, only the composition of debt becomes different.[12] The corresponding b-Figures exhibit the cash-flow requirements of those changes: the operational deficit, the compensation for forgone unfunded benefits (paid at retirement, or at death to the survivors when active), and the interests on the now explicit fiscal debt.

In Figure 3 all workers below retirement age shift to the funded (earnings-related) scheme and are compensated for their accrued pension rights by recognition bonds (RB). These bonds earn the market rate of return (equal to the rate of discount) and are disbursed at retirement (inclusive of the accumulated interest earnings). The affiliation to the basic scheme remains unchanged for all workers. As a result, almost 2/3 of the SSD of the earnings related scheme is exchanged against RB. The overall amount of RB decreases with the retirement of each cohort and the redemption of each bond. The corresponding cash flow requirement is presented in Figure 3b. The expenditure consist of four elements: the operational deficit since the earnings-related system is left with no contributors but all retirees, the RB disbursed to the retiring cohort in each year, the value of RB of those workers dying before retirement (and for which it is assumed that this value is handed over to the family), and the interests on the now explicit fiscal debt. It is assumed that all cash-flow requirements are debt financed. The total cash-flow requirement is extremely front-loaded and peaks in the first year of transition.

In Figure 4 all workers prior to the change remain with the old system and hence no RB are required. The change in the debt composition takes place between SSD and accumulated deficits which consists of the operational deficit and interest payments only. The cash-flow requirement is very much back-loaded and peaks after 40 years. The transition is completed only after 80 years.

In Figure 5 a medium scenario is presented since only workers 41 years of age and below switch to the new system. Since their acquired rights under the unfunded scheme are relatively low so is the level of RB issued for compensation. Consequently the "recognition bond carrot" is slim and long. As a result of this intermediate switching approach, the cash-flow requirements are largely centred, peaking after 20 years.

Figure 3 to 5 demonstrate the trade-off between the speed of transition and the timing of the cash-flow requirement. The faster the envisaged transition, the more the cash-flow requirement is front-loaded.

Under the assumption of the above simulation —the interest rate r equals the growth rate g— no deficit in the economic sense emerges from the UF-FF shift since the liability position of government remains unchanged. In the more relevant case of $r > g$ a *true transition deficit* emerges which is equivalent to interest rate-growth rate difference times the SSD made explicit. A capitalisation of that true transition deficit would make the financial debt in percent of GDP grow without bounds, violating the conventional solvency condition for government, and thus has to be financed by general revenue (discussed below). In a perfect foresight economy it is the only deficit which matters economically.

The *timing of the reforms* of the unfunded scheme linked with the switch to a funded scheme is of primordial importance for the economic costs of transition, and the size and path of the cash flows involved. The reform of the unfunded scheme serves, inter alia, to reduce the outstanding social security debt. Consequently, such a reform should be in place prior to the shift towards the funded scheme: This reduces the implicit debt to be made explicit, and hence the fiscal flow requirements involved. Figure 6 and 7 highlight the importance of an early reform under the assumption that the real interest rate is 5 percent (i.e. discount rate and rate of return of funded scheme), and that the prices and real wages increase by 2 percent p.a. (the latter rate is equal to the rate of

Figure 3.a: Total Public Pensions Debt
(r=g=p=2%; switching till RA=60)

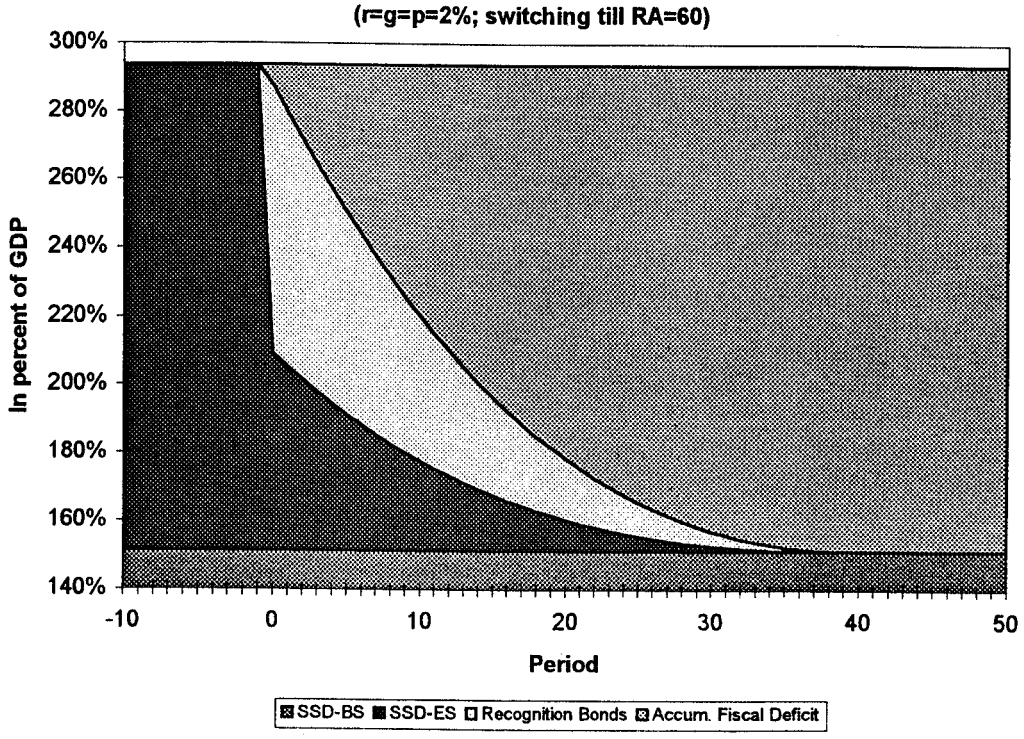


Figure 3.b: Cash-Flow Requirements during Transition
(r=g=p=2%; switching till RA=60)

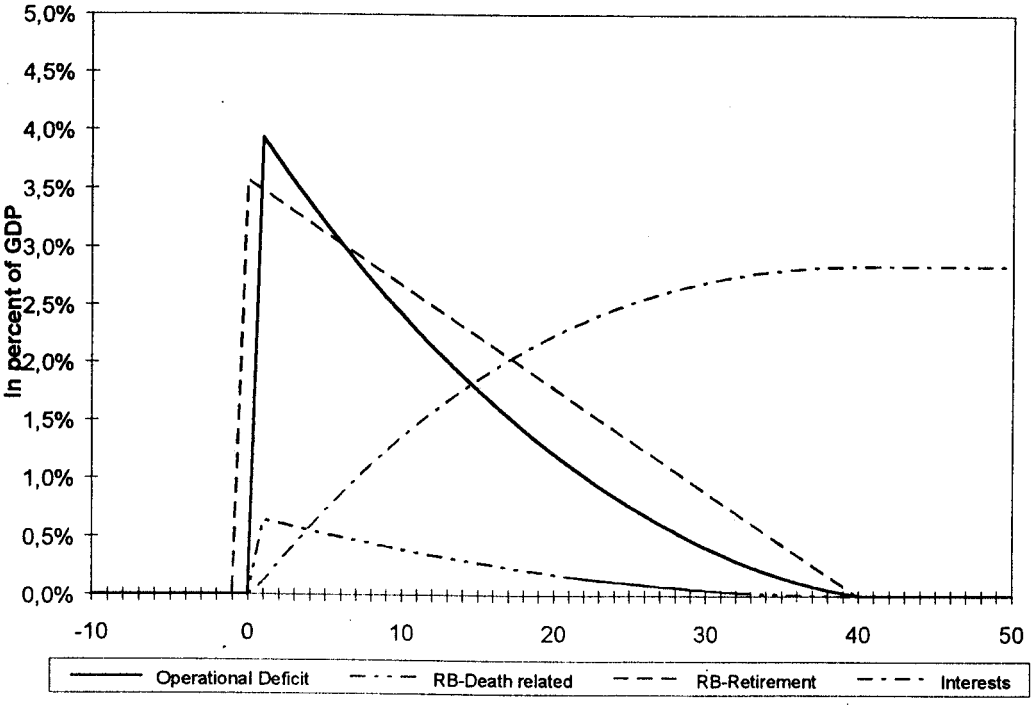


Figure 4.a: Total Public Pension Debt
(r=g=p=2%; new entrants only)

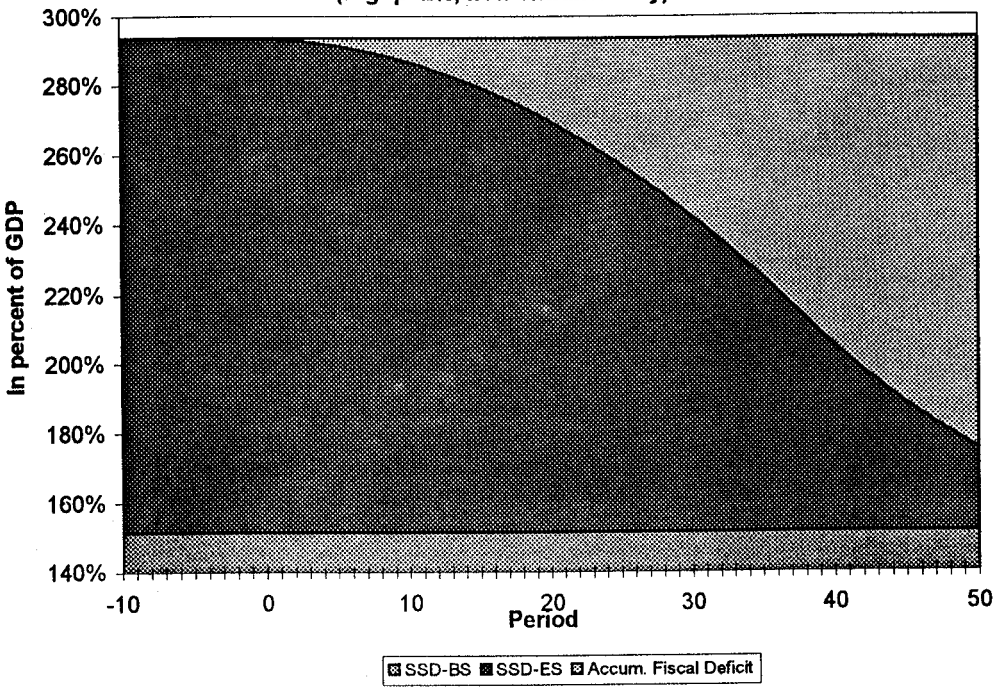


Figure 4.b: Cash Flow Requrements during Transition
(r=g=p=2%; new entrants only)

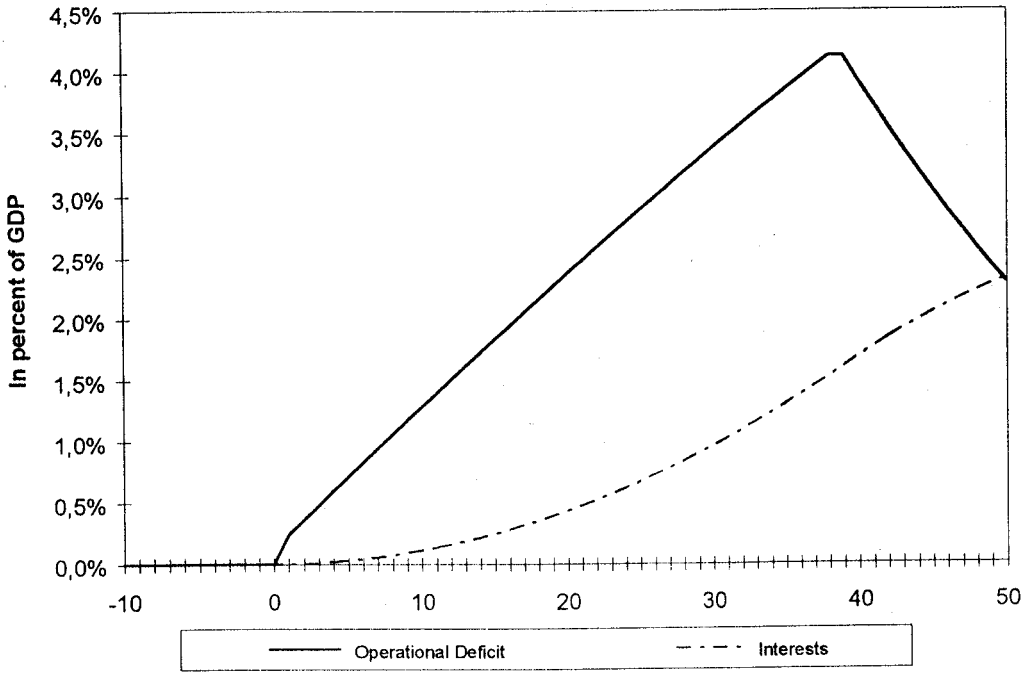


Figure 5.a: Total Public Pension Debt
(r=g=p=2%; switching below age 42)

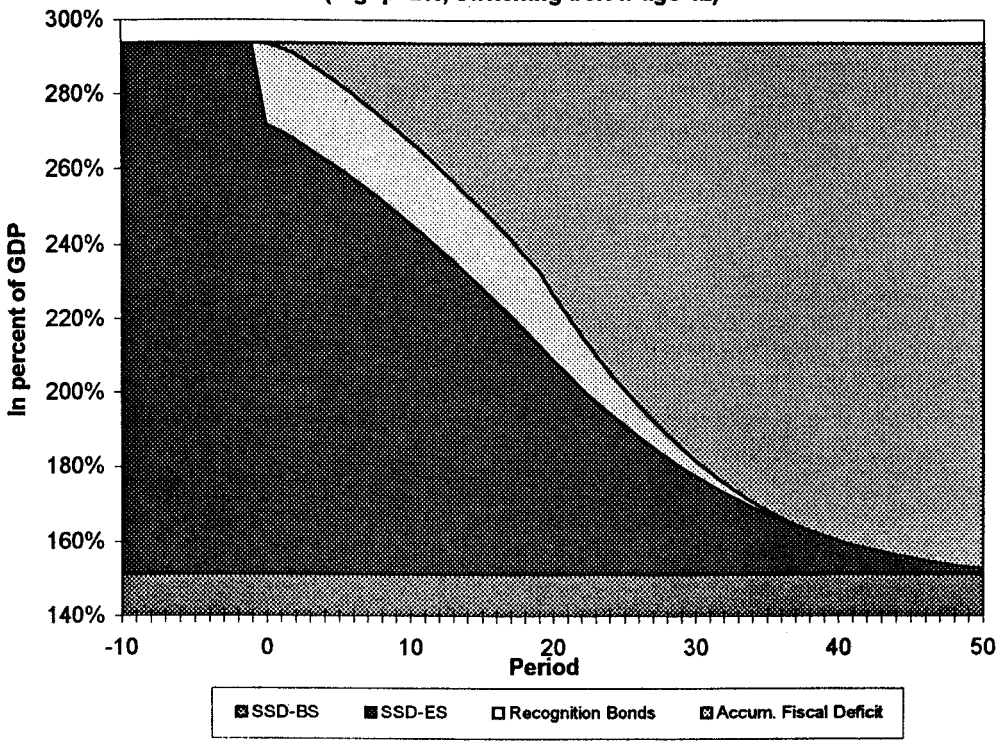
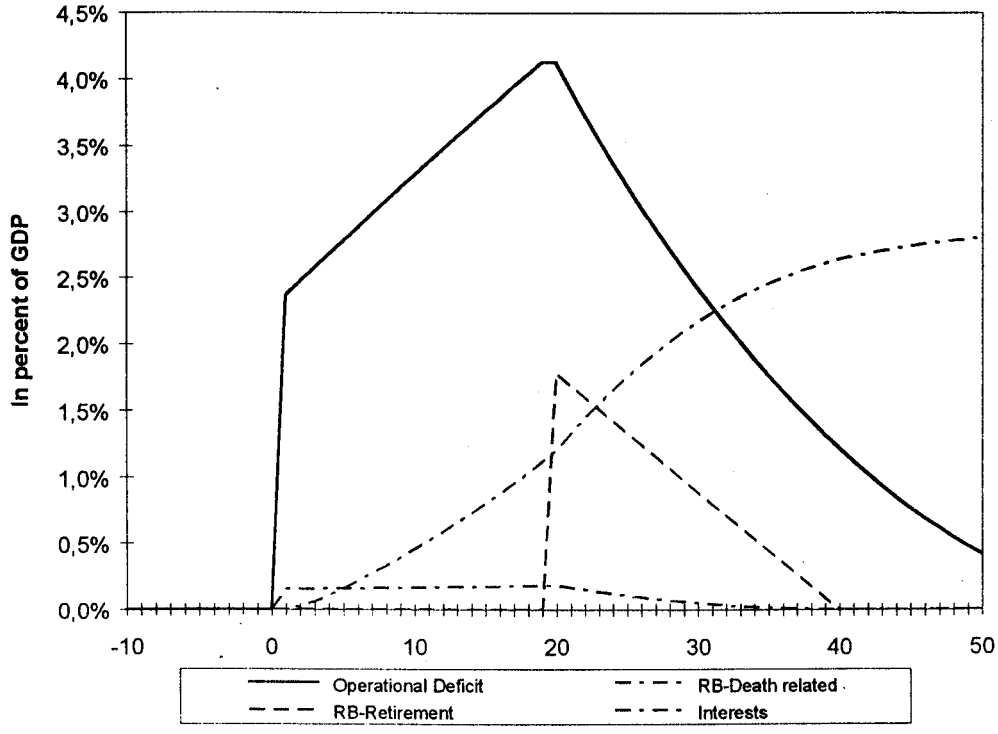


Figure 5.b: Cash Flow Requirements during Transition
(r=g=p=2%; switching below age 42)



return from the unfunded scheme since no population growth is assumed). In both figures an identical reform of the unfunded scheme takes place: an increase in the retirement age from 60 to 70 over a span of 20 years/periods (with an increase by one year every two years for computational reasons) and a reduction in the annual accrual rate from 1.5 percent to 1 percent over the same time span. The only difference is the timing of the reform. In Figure 6, the reform starts 20 years before the switch to the funded scheme, and hence is completed at the time of shifting from the earnings-related unfunded to the earnings-related funded scheme; in Figure 7, the reform starts concurrent with the shift. The switching decision by the individuals, and hence the age cohorts concerned, is endogenously determined, with no compensation paid. This results in a switch of all cohorts aged 44 and below under both reforms (since anybody aged 44 and below at the time of reform anyhow retires at age 70).

Figures 6 and 7 indicate the importance of an early reform. In Figure 6.a. —the early reform scenario— the SSD (for both the basic and earnings-related scheme) is almost halved at a time of the financing shift, and the SSD of the earnings-related scheme made explicit is a mere 42 percent of GDP. The operational deficit (Figure 6.b) is frontloaded and reaches a maximum of some 2% of GDP after 30 years; the true transition deficit, which has to be budgetary financed in order to avoid an increase in financial debt rises slowly from slightly below to above one percentage point of GDP. The slight initial fluctuations are due to the discontinuous increase in the retirement age. This result contrasts with the late reform scenario (Figure 7). Due to the parallel implementation of benefit and financing reform the SSD continues to decrease initially, albeit slightly and remains constant once the reform is fully effective in period 20. The implicit SSD made explicit amounts to almost 82 percent of GDP. Also the operational deficit and true transition deficit exhibit a higher path. The fluctuation in the latter are due to the discontinuous increase in the retirement age (one year every two calendar years); while keeping the total debt constant, this reduces every second year the budgetary financing requirement.

ii) Cash-flow considerations are also important for the timing of the *disbursement of the compensatory amount*, if such a payment is required. The result in Figure 2 was derived in a perfect foresight economy; however, under uncertainty and risk aversion, individuals may not be willing to switch unless some compensation is provided (as done in all Latin American reforms so far). The highest cash-flow requirement occurs if the compensation is paid at switching age. It amounts to the disbursement and financing of the corresponding SSD for all switchers, but the financing of government debt instruments would be provided by the individuals receiving the compensation amount (or their financial intermediaries in which the money is invested). An intermediate cash-flow requirement takes place if the compensation (inclusive of interest payments) is paid only at retirement (such as the recognition bonds in the Chilean reform). In this case, the payment is distributed over the span of all switching cohorts and under a model-like setting the bonds mature with each switching cohort retiring. The minimum cash-flowrequirement occurs if, further on, the recognition bonds are annuitised at retirement (similar to the compensatory pension in the Argentinean reform). In this case the cash-flow requirement is restricted to the sum of the annuity payments and spread to the year when the last pensioner dies. Thus, in fact, the RB or annuity solution equals to a forced credit by the switching individuals.

Table 3 attempts to summarise the reform-induced changes in the composition of the SSD for Chile and Colombia. Both reforms entail a similar estimated level of the SSD to be made explicit, and in both countries the corresponding fiscal flows are predominantly generated by the operation deficit.

Figure 6.a: Total Public Pension Debt
(r=5%; g=p=2%; Unfunded benefit reform in period -20 to -1)

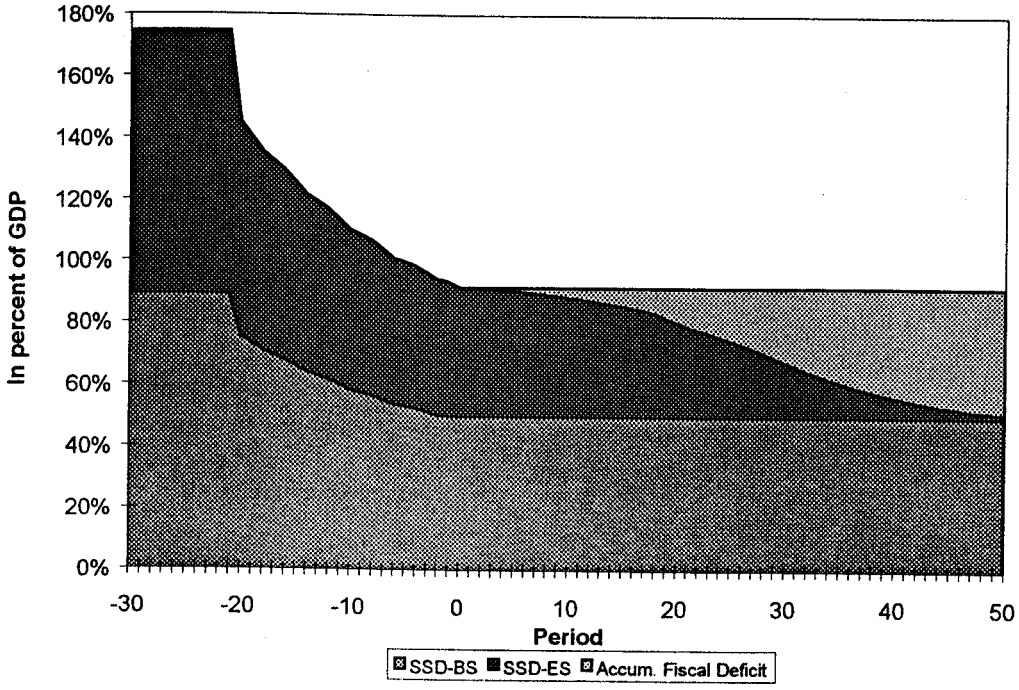


Figure 6.b: Cash Flow Requirements and True Transition Deficit
(r=5%; g=p=2%; unfunded benefit reform in period -20 to -1)

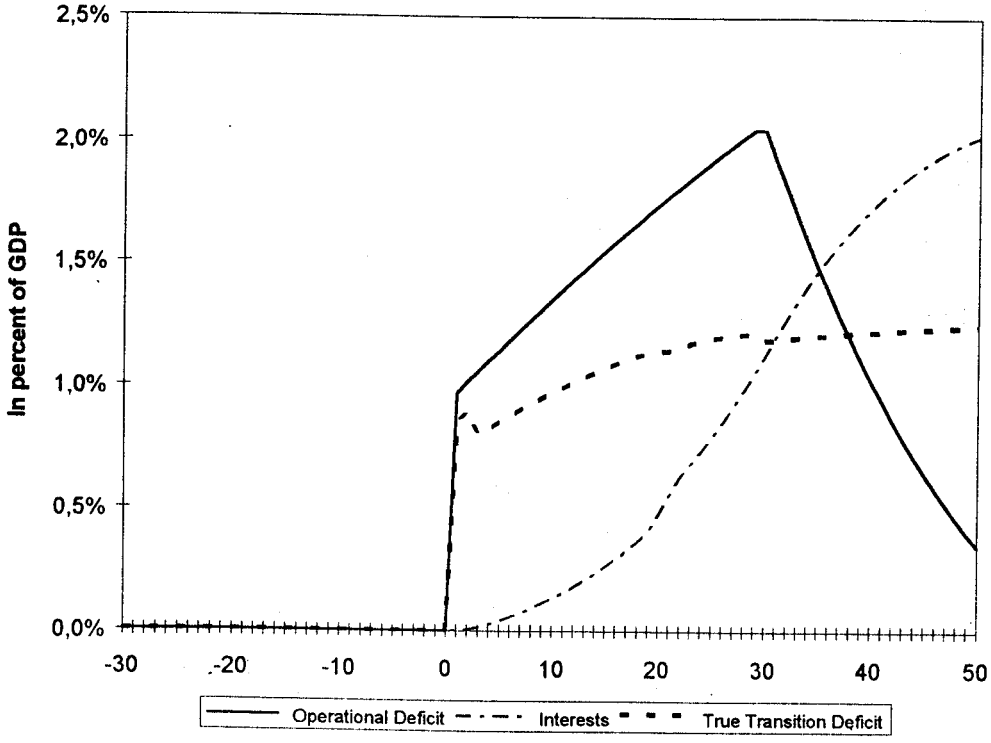


Figure 7.a: Total Public Pension Debt
(r=5%; g=p=2%; unfunded benefit reform in period 0 to 19)

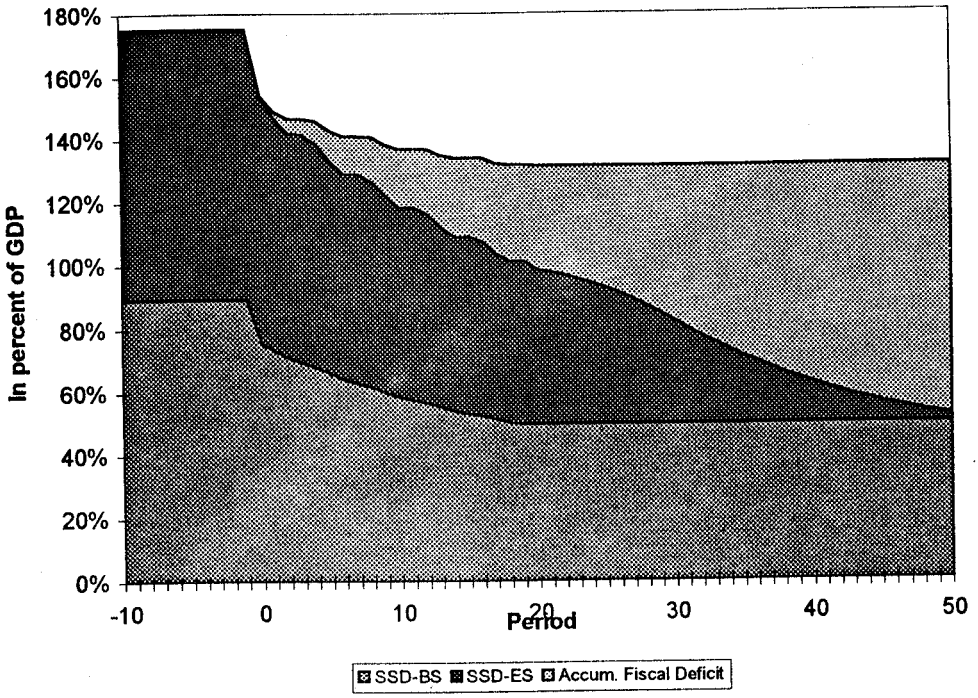


Figure 7.b: Cash Flow Requirements and True Transition Deficit
(r=5%; g=p=2%; unfunded benefit reform in period 0 to 19)

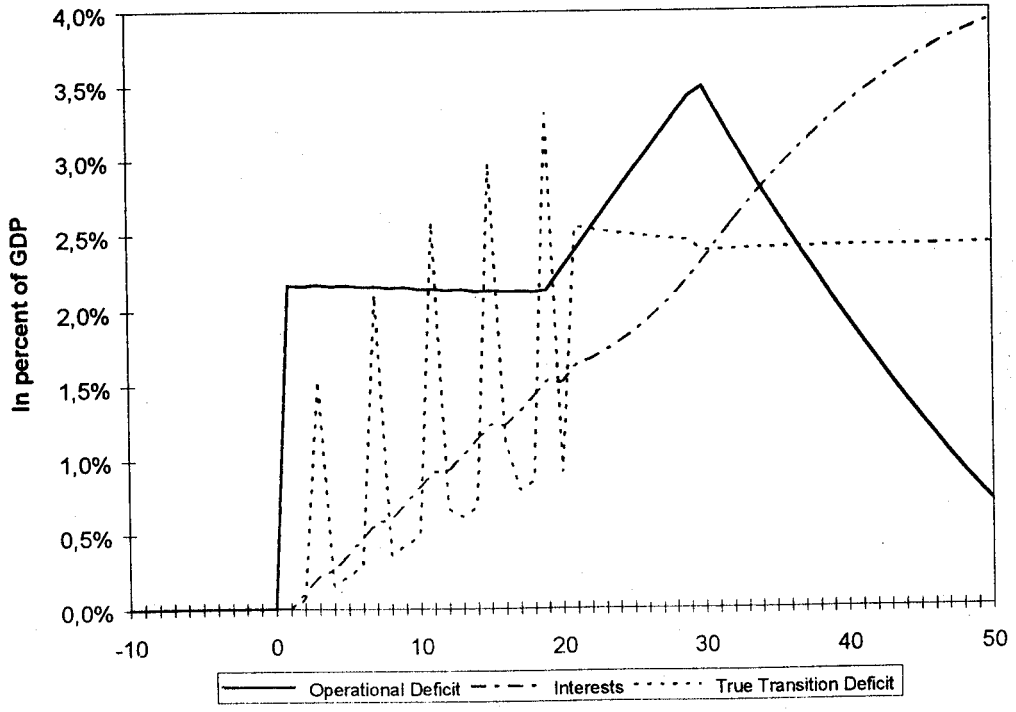


Table 3

SHIFTING FROM UNFUNDED TO FUNDED PENSIONS: THE RESTRUCTURING OF SSD

	Chile (1981) (in % of GDP)		**Columbia (1994)** (in % of GDP)	
Social Security Debt of unreformed system 1/	n/a		125,7	
- **reform of unfunded scheme**	n/a		-37,6	2/
- **reformed unfunded scheme**	n/a		-4,5	
Social Security Debt made explicit	126,0	in percent 100%	83,6	in percent 100%
o/w				
operational deficit 3/	99,9	79%	69,2	83%
compensation amount 3/	26,1	21%	14,4	17%

n/a: not available

1/ Calculated from accumulated deficits under alternative scenario simulations and the assumption of interest rate equal to the economic growth rate. See Schmidt-Hebbel (1995).

2/ Includes effects from higher contribution rates beside increased retirement age and changes in benefit structure.

3/ Calculated from the discounted flow projections under the assumption that the interest rate equals the economic growth rate.

Sources: Arrau (1992), Schmidt-Hebbel (1995), and own calculations.

4. Transition and financial market reactions

A temporary widening of the fiscal deficit which results from a (partial) UF-FF shift and which merely reflects a redistribution of total debt between implicit and explicit liabilities should have little effect on the pure interest rate. The capital stock and national saving are only marginally effected by such a deficit; any additional credit demand by government is supplied by the saving of the newly established funded provisions. Also, there should be no negative direct impact on the balance of payments.

With regard to reaction of the (international) financial markets, and a change in the risk premium in response to higher fiscal deficit and debt levels, however, the question goes unanswered. Since the total public debt remains unchanged —a priori—, one would expect any risk premium to remain unchanged too. Yet, financial markets may not be interested in the total debt, but only in the financial debt since any risk premium reflects the default probability of the latter. The result will thus depend on the assessment of the default probability by financial markets with regard to both kinds of debt (implicit and explicit), and their interaction.

If financial markets perceive that governments will never default on her pension obligations (i.e. introduce a reform of the unfunded tier which reduces her commitments towards current retirees and workforce), with a rising SSD the risk of a default on her financial debt should increase since the set of policy options to repay that debt is reduced (there is less scope for tax increases, but scope for inflation tax since pension benefits are typically secured in real terms). Accordingly, a rise in the SSD should increase the risk premium on financial debt, while a decline should reduce it. On the other hand, if financial markets are convinced that the government will first default on the pension commitment before defaulting on her financial obligations, the level of the SSD and thus any change should be inconsequential for the imposed risk premium on financial market debt. In such a case, however, a reform of the pension system which reduces the implicit debt, but increases the stock of financial debt, would tend to increase the risk premium, with negative impacts on the budget and the economy. If the default on both kinds of debt is considered equally likely, the risk premium should be driven by the size of the total debt.

There is no empirical evidence on all three conjectures. The concentration of the drafters of the Maastricht treaty on the financial debt (and deficit) when formulating the fiscal criteria for a participation in the EMU (the European Monetary Union) to be started in 1999 is consistent with the second conjecture, since no regard is given to important differences in SSD among the member countries (see Table 2).[13] If this conjecture were true and the European Union would strictly control for financial debt and deficit only, this could constrain future reform attempts among those EU countries with already a fragile fiscal condition; it could also have important consequences for central and eastern European countries against their endeavour to join the EU in the near future. Many of those countries are making preparations, or at least plans for a partial UF-FF shift, but are afraid of adverse financial markets and/or EU reactions. Similar concerns are also raised with regard to the reaction of IFIs (like the International Monetary Fund) to a reform-induced widening of the fiscal stance.

IV. OPTIONS FOR FINANCING THE TRANSITION

Shifting from an unfunded to a funded scheme raises the issue of the repayment of the implicit debt of the unfunded pension scheme and the burdening of the transition generation, or of all future generations. For this reason countries have generally rejected this reform option since both a higher explicit debt level or budgetary financing through a contractionary fiscal stance were excluded. However, the welfare economic issue of a "Pareto-improving transition", —i.e., making at least one generation better and no other worse off— receives a different assessment once economic externalities of the reform are taken into account. The fiscal issues of Pareto-improving financing of the debt conversion has be set against the background of intergenerational redistribution, changes in efficiency of taxation and macroeconomic effects. This section outlines the main financing options under both neo-classic and endogenous growth considerations, including the use of privatisation proceeds.

1. Debt and budgetary financing in a neo-classic world

Whatever the transition path chosen, radical or minimal, an UF-FF shift will burden at least one generation unless the economic benefits generated by such a reform allow for a full compensation of the transition generation(s). In the conventional neo-classic world, an unfunded pension scheme is Pareto-efficient even when the interest rate permanently exceeds the natural growth rate if the given scheme does not create economic distortions; e.g. it is financed via lump-sum taxes and provides lump-sum transfers. Although only the first generation gains and all later generations are worse off, there exists no mechanism to reverse the situation without the welfare position of at least one generation deteriorating (Breyer 1989). The result is intuitively and immediately understandable, since it amounts to an application of the second basic theorem of welfare economics: any lump-sum redistribution of income entails an allocation which is different but also Pareto-efficient (Hamburg 1990).

i) There are two well known fiscal alternatives to finance a transition —pure debt financing and pure budgetary financing— with known and less known effects:

Under *pure debt financing*, all the SSD made explicit is added to the financial debt since no debt repayment takes place. Nevertheless, the budget is affected since a higher revenue or lower expenditure level is required to finance the true transition deficit resulting from an interest rate- economic growth rate difference. Otherwise, as noted above, the explicit (and thus total debt) grows without bounds (in absolute terms and in percent of GDP). In industrialised countries, the interest rate-growth rate difference ranges between some 2 and 6 percent,[14] giving rise to a long-term true transition deficit of 1 to 3 percent of GDP if only SSD of some 50 percent of GDP (roughly a quarter of the total SSD) were to be made explicit and not repaid. This is a permanent burden resulting from transition which is distributed over all future generations.

Under *pure budgetary financing* (through higher revenue or lower expenditure, keeping the sustainable fiscal position constant), the government combines a pension reform with a contractionary fiscal policy. The later policy reverses the initial intergenerational distribution, and burdens the transition generation in favour of all future generations. In the setting of a traditional OLG-model, such a policy causes first-order increases in the level of national saving, capital, output and real wages. These increases rise with the share of pensioners in the population and the degree of closeness of the economy, and falls with the prevalence of voluntary intergenerational transfers (see, for example, Schmidt-Hebbel, 1993).

ii) The costs of transition can be reduced or even eliminated under both debt and budgetary financing if the new pension scheme exhibits *lower negative externalities* compared to the unreformed scheme. Lower negative externalities can be motivated by the many distortions an unfunded scheme may exert on intertemporal consumption or on labour supply decisions, resulting in an excess burden. Through the UF-FF shift, the reduction or elimination of the excess burden may be used to repay the implicit debt of an unfunded scheme within finite time (Hamburg 1990). Since public pension schemes and the way they are financed, quite definitely entail numerous distortions, a change in the funding mechanism may thus actually improve welfare. The conclusion rests, however, on the assumption that the funded scheme is less distortionary for individual saving decisions and labour supply than the unfunded one. Yet, such a result is not necessarily linked with the funding procedure but, under the assumption of elastic labour supply, is typically related to an inadequate benefit/contribution link of unfunded schemes. Public and earnings-related pension schemes traditionally have a distributional and annuity component, and it is the mingling of both components and the lack of a clear contribution/benefit link which is claimed to be responsible for the distortions (Schmidt-Hebbel, 1993 and World Bank, 1994). However, these distortions may also be reduced in an unfunded scheme, by separating both components more clearly as, for example, in a two-tier scheme with a basic tax-financed flat-rate scheme (of a universal or assistance type) taking care of distributional and poverty considerations, and a fully earnings-related one, financed by earmarked contributions only; albeit at theoretical level it remains unclear if such a separation always creates fewer distortions than a well-conceived traditional social insurance scheme. The basic component will exist in any alternative concept and the incurred distortions are the inevitable consequence of introducing distributional activities, and forced saving always affects labour supply in a distortive manner unless assumptions about perfect credit markets are made, allowing individuals to borrow freely against their future labour and pension income. Then the remaining, potentially avoidable, distortions are reduced to the effects of an alternative funding mechanism. These effects may exist since a nondistortionary pension scheme requires actuarial neutrality which can be achieved in an unfunded scheme only if the implicit rate of return (the natural rate of growth) equals the rate of interest (i.e., the golden rule of growth holds; Breyer and Straub (1993) and Perraudin and Pujol (1995)). Put differently, a pension system can still entail a sizeable net tax on labour even if the contribution/benefit link is tight, provided that the system's implicit rate of return is below market.[15]

Simulation studies with OLG-models á la Auerbach-Kotlikoff (1987) suggest that the welfare gains resulting from the elimination of labour market distortions are comparatively small. A model calibrated on the German pension system exhibits welfare gains of some 9 percent of life-time resources to future generations if the transition generation is *not* compensated. With compensation, the welfare gains to future generations are reduced to some 2 percent (Raffelhüschen 1993). Simulations by Kotlikoff

(1995) provide higher welfare gains to future generations of 4.5 percent (while compensating the transition generation) when assuming that the benefit-tax linkage is low, that the initial tax structure features a progressive income tax, and that consumption tax is used to finance the transition. However, when the initial tax structure is a proportionate income tax, the tax-benefit linkage is strong, when income taxes are raised to finance the transition, and when the transition generation is fully compensated, there is 3.1 percent welfare loss to future generations.

iii) The considerations in traditional OLG-models highlight the *critical assumption* for a Pareto-improving transition in a neo-classic model setting, namely that the benefit-tax link of the system to be replaced is weak, and that general taxation (income or consumption tax) is at the margin less distortionary than social security contributions (payroll taxation). This is not necessary the case in a closed economy, even less so in an open economy. Furthermore, the net efficiency gain declines with the incidence of worker-consumption myopia.

In a closed economy setting, the results depend on the particular structure of preferences. Simulations results indicate that for particular parameter combinations a shift between wage and income taxation produce predominantly, but not always efficiency gains (Auerbach and Kotlikoff, 1987), and Auerbach, Kotlikoff and Skinner (1983) conclude from second-best theory that income taxation will not always be more efficient than wage or payroll taxation.

In an open economy, the probability of net efficiency gains is likely to be further reduced. With capital much more mobile than labour, the effective taxation of capital income is reduced or even eliminated so that the tax incidence falls essentially on the less mobile factors of production (labour and land). In consequence, shifting from payroll taxation to general taxation as part of the pension reform may not change the tax incidence and the distortionary effects, only the way taxes are levied.

The welfare economic effects get even more uncertain if social security contributions are used to finance the cash requirements of transition. Such an approach is under consideration in various countries of eastern Europe (see Holzmann, 1997a), and has recently also been proposed for Spain (Piñera, 1996). It consists in curtailing the expenditure for the unfunded tier (through increase in retirement age and change in the benefit structure) while keeping the contribution rate for switchers and non-switchers till the implicit debt made explicit is repaid. Since this approach further loosens the contribution/benefit link for both switchers and non-switchers, the excess burden of the wage taxation is likely to increase.

Summing up, under a traditional neo-classic setting, the financing of an UF-FF shift is technically feasible but difficult to justify in economic terms: the long-term welfare gains are small and can be achieved only at the burden of the transition generation unless net-efficiency gains through the corresponding shift in the mode of taxation are realised. The likelihood for those gains, however, are small. Thus additional positive economic effects of such a pension reform are required in order to justify such a shift in welfare economic terms, and provide the necessary financing in fiscal terms. They may be found in the impact on economic growth.

2. Debt and budgetary financing under (endogenous) growth effects

There are four main avenues a UF-FF shift may introduce positive externalities, leading to a higher growth rate than otherwise: 1) a higher employment level; 2) a higher national saving rate; 3) a higher rate of capital accumulation; and 4) a higher rate of technical

progress. While effect 2) and 3) are identical in a closed economy, in an open economy they can diverge. All four effects (or a subset) can interact and strengthen each other once considerations of endogenous growth are taken into account.

The central economic benefit which is claimed to result from a UF-FF shift is its impact on financial market developments, which in turn influences positively capital formation, saving and economic growth.[16] In addition, an improved financial market may result in higher productivity, leading to a temporary rise in technical progress. Furthermore, embedding those considerations in endogenous growth theory, improved financial markets may permanently lead to a higher growth rate than otherwise were the case. In consequence, the enhanced economic resources may allow for a Pareto-improving repayment of the SSD made explicit.

i) For the link of pension reform, financial market development and economic growth, the *channels of economic effects* and their empirical magnitude are important. Yet, our understanding of the pension fund-financial market link, and the financial market-economic growth link is still weak and its modelling in its infancy.

As regards the impact of pension funds on financial market developments, the central claim is that their specific demand for financial market instruments (with regard to risk, liquidity and maturity), their addition to existing financial market intermediaries (such as banks and insurance companies), and the (potential) competitive set-up of pension funds makes the financial market broader and deeper, more liquid and more competitive. A casual comparison between financial markets in countries with strong and weak tradition in funded pension arrangements (say, the anglo-saxon countries and most of continental Europe) supports such a view, but so far is little substantiated by modelling and empirical data (see Davis, 1995).

The claim that the effectiveness of financial markets and the level (or rate of growth) of real activity are closely related, however, is not new and empirical investigations have been undertaken for decades.[17] Against the background of neo-classic growth theory, however, these studies could argue only for temporary efficiency effects resulting from financial market developments. More recent developments in growth theory allow for level as well as growth path effects.

However, these recent models concentrate on specific aspects of financial markets and their impact on real activity: for example, financial markets provide liquidity, allowing a shift from current liquid, but unproductive, assets towards less liquid, but more productive assets (Bencivenga and Smith, 1991, Levine, 1991, Bencivenga et. al. 1996). Or, financial markets promote the acquisition and the dissemination of information allowing for better resource and risk allocation (e.g. Diamond, 1984, and Greenwood and Jovanovic, 1990). Or, financial markets permit agents to increase specialisation, shifting away from specialised and less productive technologies (Cooley and Smith, 1992, Saint-Paul, 1992).

All these models cover important aspects of financial markets and their impact on real activity, providing important analytical insight on issues raised by the literature for decades. However, they all fall short of providing a comprehensive framework of the different effects of financial markets and of empirically testable relationships. This still awaits future work. Various recent empirical papers demonstrate the link between financial variables, financial sector reform and economic growth and efficiency (such as Levine and Zervos, 1996; Johnston and Pazarbasioglu, 1995), but their econometric specifications are little linked to an underlying theoretical model.

ii) To introduce potential growth effects of financial market developments in an EG-model in a simple manner, borrowing from Villanueva (1993), the following structure is proposed:[18]

[1] $dK / dt = s(\kappa,...)Y - \delta K,$ with $\partial s/\partial \kappa > 0$

[2] $dT / dt = \alpha(\kappa, ...)K / L + \lambda T,$ with $\alpha > 0, \partial \alpha/\partial \kappa > 0.$

The saving ratio s (i.e., investment ratio in a closed economy) is positively related to variable measuring the depth, liquidity, and maturity of financial markets, summarised in the parameter κ. Further variables which may influence the domestic saving rate are public saving behaviour or tax regulations. Also the change in technical progress dT/dt is not only dependent on the exogenously given rate of labour-augmenting technical change λ, but also on an efficiency variable α, which interacts multiplicatively with the capital/labour ratio. $\alpha(\kappa, ...)$ depends on the financial market variable κ and also on other variables traditionally quoted in the literature (such as level of export orientation and share of education expenditure in the budget). λ captures other growth effects not explicitly detailed in the model.[19]

In this model, the steady-state growth rate of the economy depends positively on the level of κ

[3a] $[(dY/dt)/Y]^* = s(\kappa,...)f(k^*) / k^* - \delta$

[3b] $= \alpha(\kappa,...)k^* + \lambda + n = g^*(k^*)$

with k^* the steady-state capital intensity measured in efficiency units of labour.[20] The model leads to the traditional result for $\alpha = 0$. With $\alpha > 0$, however, a higher saving rate leads not only to an increase in the optimal capital/labour ratio (as in the traditional growth models), but also to a higher steady-state growth rate, which in traditional models is not influenced by the saving rate.

A further important property of the model under an optimal consumption plan (i.e. $\partial c^*/\partial s = 0$) is that both that steady-state growth rate and optimal net return on capital are higher than the exogenous rates of technical progress and population growth:

[4] $f'(k^*) - \delta = g^*(k^*) + \alpha(\kappa,...)k^* = \lambda + n + 2\alpha(\kappa,...)k^*$

Under such a golden-rule condition, the optimal rate of return is higher than $\lambda + n$ when $\alpha > 0$ because of two factors: the impact of higher savings (i.e., capital accumulation) on the equilibrium growth rate, and the required compensation of capital for a higher equilibrium output growth induced by the efficiency term $\alpha(\kappa,...)k^*$.

This difference between the old and new growth path $-2\alpha(\kappa,...)k^*-$ may be used to finance the transition, i.e. to repay the implicit debt without burdening the transiton generation. Compensating the transition generation by the conventional rate of return of an unfunded scheme only (i.e., by $\lambda+n$, assuming that α was zero prior to the UF/FF shift), while using part of the growth differential for financing the transition allows, in principle, for the construction of a Pareto-superior UF-FF transition.[21] One approach could be to pay wages (and pensions) to individuals according to the old growth path till the growth differential allowed to repay the implicit debt. Since in a competitive setting the marginal product of each worker increases at the same rate as his efficiency, $g^*(k^*)-n$, in order to capture the full growth differential, this requires the use of lump sum taxation to ensure Pareto-indifference for the transition generation till the social security debt is repaid.

iii) For the repayment of the public debt, however, additional *fiscal considerations* are required. Additional resources resulting from higher growth can be captured by the

government only in a non-distortionary manner if lump-sum taxation could be applied. In such a case, all additional resources (compared to the benchmark of no pension reform) could be used to repay the SSD in a Pareto-efficient manner. In case of distortionary taxation, the empirically relevant case, however, essentially constant tax rates on an enhanced tax base allow to captured only part of the enhanced economic resources if an increase in tax-related distortions should be prevented. Thus, in order to maximise consumption utility (through consumption smoothing) while minimising tax distortion (through tax smoothing) would speak in favour of a temporary widening of the reform induced fiscal stance, and gradual repayment in the years thereafter.

3. The use of privatization assets

European Union countries with strong tradition of a large public sector (such as Austria, France and Italy), and even more the former centrally planned economies, have important government assets (public enterprises, land, etc.). In principle, those assets can be used to co-finance an UF-FF shift. In economic terms, government assets (GA) are exchanged against government liabilities (SSD). Since selling those assets on large scale on the market often proves difficult, in particular in the emerging market economies of eastern Europe, this has led to various proposals to swap the GA against SSD. Compared to a free distribution of assets to the population via vouchers, as it is done in several eastern European reform countries such as the Czech Republic, Bulgaria, Poland and Russia, the net-asset position of government would remain unchanged, whereas under the first approach, the net-asset position would deteriorate and would have to be compensated via future increased taxes. While such a swap in accounting terms is easy, it poses important problems with regard to intergenerational equity, liquidity and corporate governance, and the scope of the swap is likely to be limited.

Very tentative calculations for eastern Europe suggest a potential range of some 3 to 70 percent of social security debt which could be compensated for by government assets (Holzmann, 1994a). Empirical data on Hungary and Poland indicate that a actual ratio is rather to be found in the lower range, around some 5 to 10 percent. The 1994 plan in Hungary was to transfer assets worth some Forint 400 billion to the Social Security Fund (roughly equivalent to the level of pension expenditure, or 12 percent of GDP, or 10 percent of privatisable assets). The Polish privatisation plan originally envisaged a transfer of 20 percent of government assets the Social Security Fund(s). According to the latest plan, the assets to be transferred could amount to PLN 50 billion (as valued by the Ministry of Privatisation), or only PLN 25 billion (as estimated by the Ministry of Finance). This compares with pension expenditure of PLN 35.7 billion in 1994 (some 15 percent of GDP) or an estimated SSD of around PLN 900 (some 380 percent of GDP). In consequence, only some 5 percent (or less) of the SSD could be swapped.

These estimates are of similar magnitude as calculated for some Latin American reform countries. To co-finance the Colombian pension reform, Schmidt-Hebbel (1995) quotes estimates of the percent value of privatisation revenue of 10 percent of GDP; this compares to the long-term financing requirements of 83,6 percent of GDP (the SSD made explicit).

The scope for a GA/SSD swap in the member countries of the European Union seems even more limited. Recently, in order to comply with the Maastricht debt criteria, all EU countries started to sell government assets to reduce the debt ratio towards the 60 percent debt limit (in percent of GDP), leading in 1994 for the average of the EU to a negative residual in the general government debt/deficit position of some 0.4 percent

of GDP (i.e. the government debt level changed less than indicated by the deficit level, a proxy for the privatisation effort; see Holzmann et al. 1996).

In summary, very tentative calculations and information suggest that only a relatively small portion of current public pension obligations could be exchanged even if major parts of government assets were used to finance the transition.

V. FINANCING THE TRANSITION: THE CHILEAN EXPERIENCE

The experience of the Chilean pension reform of 1981[22] has received wide international attention as by many domestic and foreign observers this very reform is held co-responsible for the excellent economic performance since the mid-1980s (see Table 4). If confirmed, that experience could serve as an example of a Pareto-improving transition from an unfunded to funded pension scheme. Yet, the claimed link between the UF-FF shift, financial market developments, capital formation and saving, and economic growth has been little subject to empirical investigation. This section reports on the pertinent findings by the author which are presented comprehensively in Holzmann (1996). The results are consistent with the hypothesis of a pension reform-financial market-economic growth link, but highlight also the role of the restrictive fiscal stance applied.

1. Pension reform and financial market developments

A central claim about the effects of the Chilean pension reform is its contribution to the development of the financial sector (see, for example, IMF, 1995). The general hypothesis is that rising investment needs of the pension funds, the instruments thereby created, and competitive set-up of the privately managed pension funds made the financial market deeper, more liquid, competitive and efficient. In turn, this very development is conjectured to have contributed to higher saving, capital accumulation and economic efficiency (i.e. technical progress) and thus economic growth. In order to measure that link in a first step various indicators of financial market development are constructed (FMI);[23] in a second step the impact of the development of pension funds (AFP) assets on those indicators is statistically investigated; in a third step the impact of the FMI on total factor productivity and capital stock accumulation is econometrically tested (for details see Holzmann, 1996).

Essentially all investigated FMIs exhibit a strong upward movement once the banking crisis of 1981/83 has been solved (Figure 8). The correlation of AFP assets and FMIs, and of AFP shares in total traded shares and FMIs, is very strong with coefficients in simple regressions close to 1 and R^2 of 0.9 and above. At a monthly level, there is also a strong correlation between the turnover in asset trade (in bonds, shares, etc.) and the level of assets held by the pension funds at the end of month (as a proxy for turnover since no such data are available), with a break around the turn of 1984/85. Before 1985, the correlation is zero or negative, except for the trade in assets with fixed return (ρ = 0.65); this corresponds to the period when pension funds were restricted to the holding of debt instruments. For the period January 1985 to June 1995 the correlation between the monthly turnover in each asset and the stock of pension fund assets at month-end is always above 0.9. This empirical evidence is consistent with the claim that pension funds made the financial markets deeper and more liquid. Using yearly data for asset mispricing indicators (Korajczyk, 1996) and indicators of pension fund assets, the statistical

Table 4. Chile: Macroeconomic Indicators and Pension Fund Performance, 1970-95

Macroeconomic Indicators	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
GDP growth (real)	2,1%	9,0%	-1,2%	-5,6%	1,0%	-13,3%	3,2%	8,3%	7,8%	7,1%	7,7%
Inflation - CPI (Dec.-Dec.)	34,9%	22,1%	163,3%	508,4%	375,9%	340,7%	174,3%	63,5%	30,3%	38,9%	31,2%
Unemployment rate (Oct-Dec.)	5,7%	3,9%	3,3%	5,0%	9,5%	14,9%	12,7%	11,8%	14,2%	13,6%	10,4%
Real Exchange rate 1/	48,5	45,2	41,9	62,7	95,0	123,8	111,4	100,0	119,3	122,9	106,5
Private saving rate (in % of GDP)	8,9%	11,8%	12,2%	7,7%	17,6%	-0,6%	9,0%	6,7%	7,7%	6,1%	6,5%

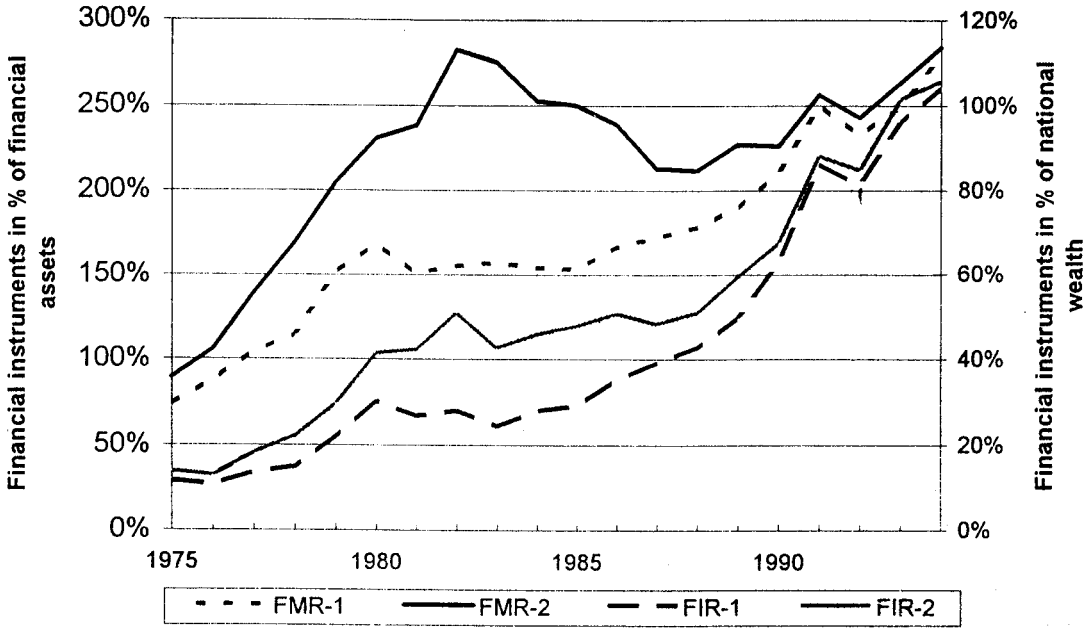
Macroeconomic Indicators	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
GDP growth (real)	6,7%	-13,4%	-3,5%	6,1%	3,5%	5,6%	6,6%	7,3%	9,9%	3,3%	7,3%	11,0%	6,3%	4,2%	8,5%
Inflation - CPI (Dec.-Dec.)	9,5%	20,7%	23,1%	23,0%	26,4%	17,4%	21,5%	12,7%	21,4%	27,3%	18,7%	12,7%	12,2%	8,9%	8,2%
Unemployment rate (Oct-Dec.)	11,3%	19,6%	14,6%	13,9%	12,0%	8,8%	7,9%	6,3%	5,3%	5,7%	5,3%	4,4%	4,5%	5,9%	4,7%
Real Exchange rate 1/	92,6	103,3	124,0	129,6	159,2	175,1	182,7	194,7	190,2	197,4	186,3	165,4	168,7	160,5	156,9
Private saving rate (in % of GDP)	2,7%	4,1%	7,2%	4,9%	8,7%	10,7%	15,2%	17,2%	16,5%	19,4%	19,9%	19,4%	19,2%	20,7%	20,8%
Pension Funds (AFP) Performance															
Rate of return (real)	21,3%	28,8%	21,3%	3,5%	13,4%	12,3%	5,4%	6,4%	6,9%	11,5%	29,7%	3,1%	16,2%	18,2%	-2,5%
AFP Assets in % of GDP	0,9%	3,6%	6,4%	8,6%	10,6%	12,7%	14,2%	15,1%	17,7%	24,3%	30,4%	30,6%	37,3%	41,1%	38,8%
AFP Assets in % of market assets															
Enterprise bonds	0,4%	0,9%	8,4%	10,2%	7,7%	11,1%	27,1%	46,0%	47,5%	58,2%	60,8%	61,0%	56,7%	57,2%	...
Shares	0,0%	0,0%	0,0%	0,0%	0,0%	2,0%	3,2%	4,2%	4,8%	5,5%	8,3%	10,1%	11,4%	10,6%	...

1/ An increase indicates a real depreciation of the domestic currency (1977=100)

Source: Central Bank of Chile, Monthly Bulletin, and Superintendency of AFP, Statistical Bulletin.

Figure 8

CHILE: FINANCIAL MARKET INDICATORS



analysis is consistent with the claim that the pension fund activities enhanced efficiency and risk allocation.[24] With the gradual relaxation of regulations for pension fund investments, their portfolio also has become more diversified, providing important financing instruments for the private sector. Various econometric evidence suggests that pension funds are operating efficiently and the selected portfolio, given the restrictions on asset investments which are only gradually lifted, is on the (restricted) efficiency frontier (Walker 1991a and 1991b, Zuñiga-Maldonado, 1992). In a competitive environment this may constitute indirect proof of the overall efficiency of the financial system. Yet, all this evidence does not establish watertight proof that the establishment of pension funds has been the decisive factor for the impressive development of financial markets since the mid-1980s. The empirical evidence is only consistent with the claim.

2. Financial market developments and economic growth

To test econometrically the impact of FMIs on technical progress (measured via the total factor productivity, TFP, i.e. the residual in the growth accounting equation) and capital accumulation (the change in capital stock, K%), in view of the limited number of observations (maximum 1975 to 1994) a rather simple econometric specifications, with few other explanatory variables has to be applied. The unemployment rate (UER) and its change (ΔUER) is a proxy to capture the strong cyclical effects during the initial period of investigation, respectively to measure income expectations and their change. The lagged FMI-variables (with an Almon-lag type structure)[25] are normalised to the

respective sample average of 1 in order to allow for a direct interpretation of the coefficients. The results are presented in Table 5 and 6.

To estimate the impact of *FMI on total factor productivity (TFP)* this basic specification is applied, with lagged TFP and the unemployment rate to capture catch-up and cyclical effects, leading to a very satisfying statistical fit (Table 5). Adding the financial market indicators improves the overall fit, yielding for the lagged FMI-variables coefficients which are significant at a 5 percent level and below, while reducing the significance of the constant. The estimated parameter values prove to be robust for different specifications and time periods of estimation (not shown), and the lagged impact of financial market indicators (compared to including contemporaneous effects, which prove statistically totally insignificant) gives confidence in the causality. Taken at face value, the results would suggest strong effects of financial market developments on TFP. Using the (long-run) point estimates and assuming an equilibrium unemployment rate of 5 percent, the exogenous technical progress would amount to some 1 percent, to which around 1 percent of technical progress generated by financial market developments are added, yielding a long-term annual TFP of around 2 percent. The estimated FMI-effect of around 1 percent is likely to proxy other effects, which may be highly correlated with financial market developments, such as reductions in exchange rate restrictions and increasing openness of the economy. Given data restrictions, the separation of these effects is not possible currently.

With regard to *FMIs and capital formation*, the econometric testing suggests that the change in capital stock follows an adjustment process, with the lagged variable entering very significantly, and this is also influenced by cyclical effects, or expectations about future income developments, measured by the unemployment rate (Table 6). Entering the lagged FMI variables leads to an improvement in the equation fit and to coefficients which are consistent in sign and significant at a 5 percent level and below. Again, taking the (long-run) point estimates for the FIR/FMR variables at face value, the

Table 5

CHILE: TOTAL FACTOR PRODUCTIVITY AND FINANCIAL MARKET DEVELOPMENTS

Endogenous variable: TFP	Constant	TFP(-1)	Unempl. Rate	ΔUER(-2)	FMI(-1)	
EQ(1)	0,055 (4,38)	-0,125 (1,66)	-0,566 (4,77)	-0,569 (4,42)		R^2=0,871 DW=1,77
EQ(2) FMI_1=ΔFIR1	0,025 (1,47)	-0,175 (1,72)	-0,374 (2,87)	-0,679 (5,73)	0,013 (2,32)	R^2_c=0,916 DW=1,48
EQ(3) FMI_1=ΔFIR2	0,0349 (2,28)	-0,132 (1,53)	-0,462 (3,96)	-0,703 (5,34)	0,010 (2,02)	R^2_c=0,908 DW=1,75
EQ(4) FMI_1=ΔFMR1	0,042 (5,54)	-0,260 (3,69)	-0,509 (7,67)	-0,541 (7,58)	0,012 (5,01)	R^2_c=0,964 DW=2,48
EQ(5) FMI_1=ΔFMR2	0,055 (5,48)	-0,119 (1,86)	-0,613 (6,38)	-0,645 (6,07)	0,005 (2,70)	R^2_c=0,926 DW=2,43

OLS; period of estimation: 1979-94, with lagged variables for FMI estimator starting as of 1975. Absolute t-value in parenthesis.

Table 6

CHILE: CAPITAL FORMATION AND FINANCIAL MARKET DEVELOPMENTS

Endogenous variable: K%	Constant	K%(-1)	UER	FMI(-1)	
EQ(6)	0,030	0,79	-0,21		R^2_c=0,945
	(5,10)	(9,11)	(5,14)		DW=1,63
EQ(7)	0,026	0,526	-0,175	0,008	R^2_c=0,962
FML_1=ΔFIR1	(4,78)	(3,74)	(4,38)	(2,19)	DW=1,92
EQ(8)	0,033	0,565	-0,247	0,007	R^2_c=0,963
FML_1=ΔFIR2	(6,33)	(4,64)	(6,38)	(2,28)	DW=2,21
EQ(9)	0,026	0,746	-0,193	0,004	R^2_c=0,966
FML_1=ΔFMR1	(5,17)	(10,3)	(5,55)	(2,61)	DW=2,00
EQ(10)	0,038	0,684	-0,295	0,005	R^2_c=0,969
FML_1=ΔFMR2	(6,95)	(8,88)	(6,78)	(2,85)	DW=2,37

OLS; period of estimation: 1979-94, with lagged variables for FMI estimator starting as of 1975. Absolute t-value in parenthesis.

long-term increase in capital stock is some 5 + percent, reduced by an assumed long-term unemployment rate of 5 percent by 1 percentage point, but increased by the enhanced financial markets by 0,5 to 1,0 percentage points, or some 1/8 to 1/4 of its "natural" level. This result hints to sizeable effects of financial market developments on the formation of the capital stock which have to be added to the effects of TFP in their growth consequences.

Putting the low and high parameter estimates for the FMIs on total factor productivity and capital accumulation together with a crude estimate for labour market effects[26] into a growth accounting equation provides a first indication about the possible overall growth effects of the pension reform (Table 7). Taken at face value, the result suggests that the reform may have increased the growth rate by some 1 to 3 percentage points p.a. If such an effect were to be permanent, in a very crude estimate, the result suggests that this would allow Chile to repay the social security debt made explicit of around 100 percent of GDP in some 33 to 100 years, without burdening the transition generation, if all the additional economic resources can be captured by the government in a non-distortionary manner, and if the individuals can be compensated along the old-growth path. With an actual and unchanged share of budgetary revenue in GDP of around one third, the government captures less and the repayment period increases to some 100 to 300 years. In view of the cash-flow requirements of the transition (operational deficit and redemption of recognition bonds) of some 5 percent of GDP, but additional budgetary revenue (at constant revenue share of 1/3) of only 1/3 of 1 percent to 1 percent of GDP, this would suggest a transitory rise in the explicit fiscal debt. Yet the data suggest otherwise.

Table 7

CHILE: THE IMPACT OF THE PENSION REFORM ON THE ECONOMIC GROWTH RATE

	Low estimate	High estimate
Through TFP 1/	0,4%	1,1%
Through capital formation 2/	0,5%	0,6%
Through labour market 3/	0,0%	1,1%
Total	**1,0%**	**2,9%**

Source: Own calculation based on Tables 5 and 6.

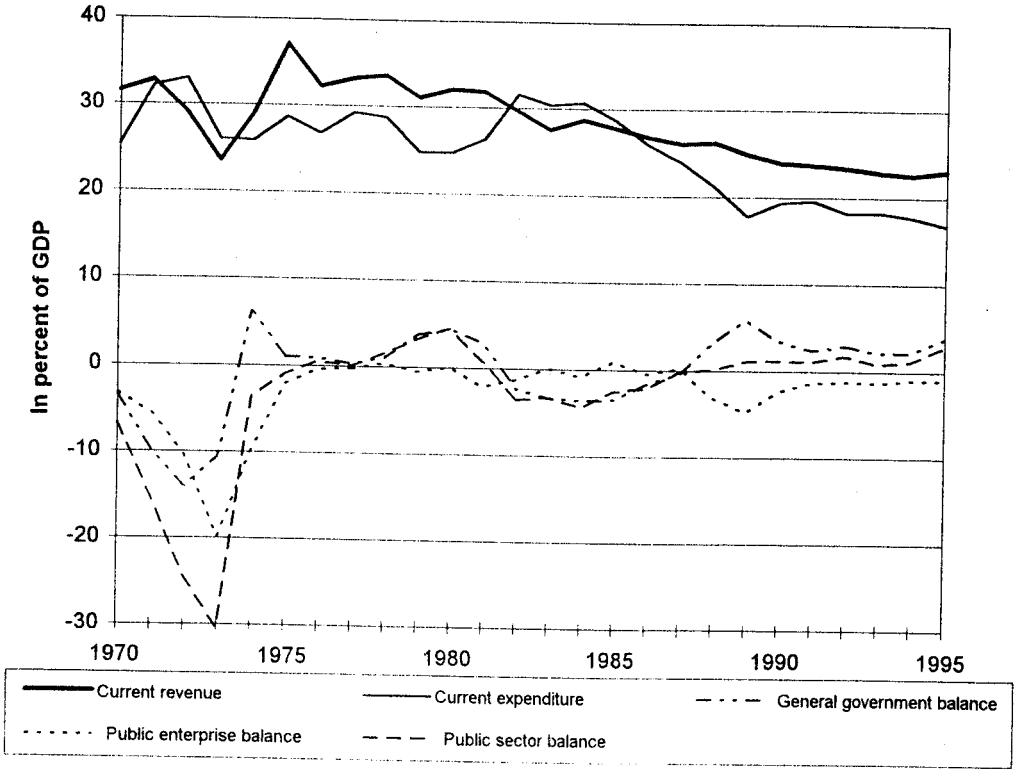
1/ Implied long-run parameter estimates for FMI-variable in EQ(2) and EQ(5), Table 5.
2/ Implied long-run parameter estimates for capital formation variable in EQ (7) and EQ(9), Table 6, times capital elasticity of 0.35.
3/ High estimate: difference between employment and population growth of 1,7% p.a. during period 1980-94 times labour elasticity of 0.65.

3. Pension reform and fiscal stance

The cash flow requirements amounting to some 5 percent of GDP p.a. are essentially financed from budgetary resources. Figure 9 highlights the contribution of fiscal performance and public saving to support the transition from an unfunded to a funded pension scheme. The difference between current general government revenue and expenditure in Figure 9 measures public saving which becomes negative only during the initial four 4 years of transition (1982-85) before the pre-reform rate of public saving of some 5 percent of GDP is again re-established. In view of the declining share of current revenue as a percent of GDP due to various tax reforms and tax rate cuts, strengthening of the fiscal stance was achieved by program reforms and expenditure cuts (see Larraín, 1991, Marshall and Schmidt-Hebbel, 1994). The new democratic government which came into office in 1989 has stabilised the expenditure level but not reversed it. In general, a restrictive fiscal policy which pays off government debt through higher taxes or lower expenditure and hence shifts resources from current to future generations encourages higher saving and capital formation. In addition, international evidence suggests that private saving reacts also to the form of fiscal retrenchment —higher taxes or lower expenditure—, with the private saving rate reacting positively and significantly to a fall in general government current expenditure (Masson et al. 1995). That feature is also dominant in the Chilean budgetary policy and may thus have strengthened the rise in private saving.[27]

Figure 9

CHILE: FISCAL STANCE, 1970-95



In summary, the Chilean experience suggests a positive and sizeable impact of pension reform on economic growth, allowing, in principle, a Pareto-improving transition since the additional economic resources may permit the payment of the social security debt made explicit in the long run. However, the Chilean government decided to repay that debt earlier through fiscal retrenchment, thus burdening the transition generation. Yet, this very tight fiscal stance may have also contributed to the outstanding economic performance, through the crowding-in of private investment, and a higher credibility of the overall economic reform programme in and outside Chile.

VI. CONCLUDING REMARKS

The transition from an unfunded to a funded pension scheme creates a formidable task for fiscal policy. The liabilities towards the current generation of retirees and workers resulting from unfunded pension provisions constitute a huge hidden public debt. Making this implicit social security debt fully explicit, thus reversing the initial redistribution towards the current generation, is for most countries quite likely beyond their political, economic and fiscal capacity. Thus, a transition requires various simultaneous steps such as the i) benefit reform of the unfunded scheme, reducing the implicit debt, ii) a redesign of the basic tier remaining unfunded to minimise distortions on factor markets, iii) a design of the timing and form of the debt made explicit and the fiscal flows involved, and iv) a careful calculation of the compensation amount to render the switching decision by individual workers voluntary but cost effective.

Theoretical considerations and the Chilean experience strongly suggest the feasibility and potential Pareto-efficiency of such an approach. The unfunded-fully funded shift can importantly contribute to financial market developments which in turn impacts very positively on total productivity, capital accumulation, labour market performance, thus economic growth. The latter can generate enhanced economic resources which allow to repay the debt made explicit. While a long-term increase in the economic growth rate allows, in principle, a medium-term increase in the explicit public debt to be repaid in the future out of enhanced resources, negative financial market reactions to a higher explicit fiscal debt and macroeconomic considerations may warrant a more contractionary fiscal stance from the very beginning. As suggested by the Chilean example, this requires major reforms of other public expenditure and revenue programs.

Expectations about the potential benefits of such a reform approach together with the inability to reform the unfunded scheme along conventional lines have motivated many reform countries in eastern Europe to initiate reform considerations, partly already draft laws in this direction. A two-tier mandatory pension scheme, consisting of a reformed and reduced unfunded and a newly introduced funded tier currently constitutes the reform design in those countries. Yet, as regards the fiscal requirements for such an UF-FF shift, more thoughts and efforts have to be given. However, if successful, the reform approach in the future member countries of the European Union could stimulate and invigorate the reform discussion in the Union itself.

Notes

[1] An early version of this paper was prepared and presented at the seminar of the Fiscal Affairs Department of the IMF while I was academic scholar in summer 1995; revised versions under slightly different titles were presented at the ECLAC Fiscal Seminar (Santiago de Chile, January 1996), a seminar on the future of social security by the Commission of the European Union (Brussels, June 1996), and a seminar by the Institute of Contemporary German Studies of the John Hopkins University (Washington, D.C., October 1996). I am indebted to the participants of those seminars for constructive critique and valuable suggestions. The usual disclaimer applies.

[2] For a survey of the recent Latin American pension reform attempts, see Queisser (1995); for a survey and assessment of the current reform discussion in Eastern Europe, see Holzmann (1997a).

[3] Hence, the paper falls short of an analysis of the potential risks of funded schemes (such as full or partial default, moral hazard, etc.), of the financial market requirements (including regulatory and supervisory needs), of the economic impact (such as the change in incorporate governance), or of distributional effects. However, even a cursory exposition of those issues is beyond the scope of this paper. For a critical review of alternative approaches to reform the public pension scheme against the background of recent country' experiences, see Diamond (1996); for financial market issues of funded pension schemes, see Davis (1995).

[4] For references see the papers in The World Bank Economic Review 1996, Vol. 10.

[5] For a recent discussion and further literature on taxing funded pension schemes and budgetary policy, see Franco (1996).

[6] In the steady state, with an actuarially fair pension system without financial reserves, both accrued-to-date liabilities (the gross social security debt I) and the net-social wealth coincide since the present valued of further liabilities resulting from future contributions and the present value of future contributions cancel out.

[7] The overall pension expenditure in most OECD countries are much higher and national estimates of the (net) social security debt arrive at values which are up to 50 percent above the presented ones (see Franco, 1995).

[8] The upper estimate of this multiple can be cross-checked under the assumption of wage growth equal to the interest rate, and a constant demographic structure. With, on average, some 10 to 20 years of retirement spell, the accrued obligation amounts to 5 to 10 times the annual expenditure. In addition, the accrued obligation with regard to the current working generations have to be taken into account. With some 30 to 40 years of average activity, the accrued obligation amounts to some 15 to 20 times the annual expenditure. Taking both upper estimates for the retired and working generation together results in accrued obligations of 30 times the annual expenditure. Of course, price indexation instead of wage indexation (or a positive interest-wage growth difference) reduces this estimate.

[9] The view of partial default when downward adjusting an unfunded pension scheme is not universally shared. Some claim that when a pension scheme is simply a public benefit programme, financed from general taxation, a downward revision in generosity through benefit cuts and reduced eligibility is standard procedure for the government which has to cope with her intertemporal budget constraint (and temporal imbalances between revenue and expenditure). This view is well taken. However, things get more complicated when individuals pay specific contributions and expect future specific benefits in exchange. Under such a setting one may claim that property rights are established (indeed, in some European countries pension rights receive such a status in the ruling of the constitutional court). Then the dividing line between property rights established through the purchase of government bonds and the payment of pension contributions becomes thin, or not existing. While in the case of bonds, the partial non-repayment of principle (and interests) is generally considered a partial default, the imposition of an inflation tax or changes in the tax treatment of interest revenue may not; economically, however, they are equivalent. The same difference or similarity emerges in the case of pension benefits, say, between a direct cut in benefits and a reduction in benefit indexation. Some argue that a difference exists when the contributions are too low to buy future high benefits, and hence individuals should have rationally expected a later

adjustment in benefits initially promised; thus, such an adjustment constitutes no default. Yet the same argument could also be made with regard to government bonds, if the government promises a high interest rate (because of a high risk premium) but given its budgetary stance it is not able to deliver, and hence downward adjusts its commitments (i.e. it partially defaults).

[10] The model has been calibrated to reflect economies with a comprehensive two-tier pension system consisting of a basic tier and an earnings-related tier. Under the base-line assumption, the life-expectancy (LE) is 70 years, the basic tier amounts to 20 percent of average wage, the accrual rate in the earnings-related tier to 1.5% p.a., and the retirement age is 60. This results in an average replacement rate of some 50% (net of contribution payments), a contribution rate on net wages of some 30 percent, and an expenditure share of some 9% of GDP. The baseline scenario implies a SSD of some 163 percent of GDP, with a real interest - real growth rate differential of 3pp. Reducing this gap to 2pp increases the SSD by some 30pp of GDP. For the motivation of the specific model approach and basic model features, see Annex A.

[11] For Austrian evidence of a negative covariance between the internal rate of return of the public scheme and the market rate of interest see Holzmann (1988).

[12] Under the steady state conditions assumed in the model, the implicit SSD grows with the national wage bill (equal to the growth rate of GDP), while the SSD made explicit grows with the interest rate if cash-flow requirements are debt financed. This leaves the total debt in percent of GDP unchanged.

[13] The Maastricht treaty as the latest step in the process of European integration schedules the completion of the European internal market by introducing a common currency around the turn of the century. To be allowed to participate in the European Economic and Monetary Union, a member state of the EU must fulfil five conditions signalling nominal economic convergence, the famous convergence criteria. Three are monetary (on inflation, long-term interest rates and exchange rates) and two are fiscal criteria: a "sustainable government financial position" deemed necessary for participation in EMU is checked by observing how public deficit and public debt, both measured in percent of GDP, stand relative to official reference values of 3 percent and 60 percent. Contrary to the monetary criteria, the fiscal criteria are not only entry conditions for joining EMU, but they are also valid as fiscal restrictions once a country participates in EMU. For most EU countries, the fiscal criteria constitute the binding constraint. For a critical assessment of the Maastricht fiscal criteria, see Holzmann et al. (1996).

[14] Feldstein (1996) calculates for the US and the period since 1960 a difference of 6.7 percentage points, based on the real pre-tax return on nonfinancial corporate capital averaging 9.3 percent, and the annual rate of growth of real wages and salaries (the implicit rate of return of the unfunded scheme) averaging 2.6 percent. This estimate is upward biased compared to a long-term government bond interest rate-economic growth rate differential. Still, his very conservative risk adjustment yields a difference of 3.8 percent.

[15] The implicit tax of an unfunded scheme which results from a interest rate - wage growth rate differential (taken as the rates of return of unfunded and funded scheme, respectively) can be high. For a given contribution rate, comparing the benefit level of a funded and unfunded scheme under different interest rate - wage growth rate differentials provides an indication for the size of the implicit tax. For a replacement rate of 50 percent, the required contribution rate of an unfunded scheme is some 22 percent under standard survival probabilities, a potential working spell of 21 to 65, and a potential retirement spell of 66 to 100. With such a contribution rate, an individual could achieve a replacement rate of 108 percent with a rate differential of 2 percentage points, and a replacement rate of 160 percent with a rate differential of 3 percentage points. This correspond to an implicit tax of 54 percent and 69 percent respectively (calculated as the replacement rate for funded minus replacement rate of unfunded scheme divided by that of the funded one).

[16] At the labour market level, the type of pension scheme (UF/FF) and the perceived contribution/benefit link can determine the distribution of labour supply between the formal and informal sectors. If the latter is less productive, a pension reform which moves labour supply to the formal sector will enhance overall productivity and in an EG-model can lead to a higher growth path (Corsetti 1994).

[17] See, for example, Goldsmith (1969), McKinnon (1973) and Shaw (1973).

[18] The other equations of this growth model are traditional and specify the Output Y via a production function with constant returns of scale to capital K and labour N (man-hours in efficiency units)

$$Y = F(K,N) = Nf(k),$$

an exogenous growth rate n of population/employed (in man-hours L)

$$dL/dt = nL,$$

a definition equation between N and L via the technical-change multiplier T

$$N = TL, \text{ and}$$

the capital coefficient

$$k = K/N.$$

d(.)/dt is the time derivative and δ the rate of depreciation of capital.

[19] Since the model features an external effect, the solution of the social planner's problem will not necessarily coincide with the competitive equilibrium in the decentralised economy. In the latter, each agent will take K/L, the economy-wide ratio of capital per head as given, thus ignoring the effect of her investment decision on the rate of technological progress. In consequence, in a decentralised economy individuals tend to overinvest and output to grow more rapidly, but consumption per efficiency unit is lower because a larger share of output has to be devoted to keeping K/L at its steady-state value. However, if the social planner chooses a savings rate below the one in the decentralised solution, his choice will become binding and the central and decentral outcome will coincide if an appropriate nondistortive enforcement mechanism can be found (such as auctioning of the saving/investment volume). If the social planner chooses a higher saving rate, the value decentralised solution will prevail. For the following, we consider the social planner's solution, implicitly assuming that government succeeds in containing the overinvestment by the economic agentsetthe saving rate below the one derived in the decentralised economy.

[20] This result is valid for both environments but the steady state capital intensity in the competitive equilibrium k^{**} tends to exceed the planner's solution k^*.

[21] In the decentralised solution the net rate of return with externalities is $f'(k^*) - \delta = \lambda + n + \alpha(\kappa,...)k^*$, still leaving a growth differential of $\alpha(\kappa,...)k^*$ for compensation of the transition generation.

[22] In a nut-shell, the Chilean reform consisted of a shift from a conventional unfunded and defined benefit plan to a funded defined contribution plan, in replacing public administration of the program with private administration of competing pension funds (AFPs), and in separating the social assistance element from the mandated saving element of retirement provisions. Government involvement remains high with regard to supervision and regulation of the new mandatory but funded scheme, the guarantee of minimum benefits, and the financing of the transition. Otherwise, the market is allowed to play its role. For a detailed survey and analysis of the Chilean pension reform in English see Diamond and Valdés-Prieto (1993).

[23] The financial market indicators constructed and presented in this paper are the following: The FIR (financial interrelation ratio) compares the scope of financial instruments with net wealth of the economy (approximated by the capital stock); the FMR (financial intermediation ratio) compares the scope of financial instruments with the assets of the financial institutions. Two alternative measures of financial instruments are considered and thus four FMIs calculated.

[24] The mis-pricing indicators measure the actual performance of financial assets compared to a reference performance based on alternative model calculations. If the pension fund activities improve the performance of the finance market the mis-pricing should decrease with enhanced fund activities. The simple correlation coefficients between the mis-pricing and pension fund indicators prove to be correct sign, are statistically significant at 5 percent error level, and range between -0,27 and -0,52.

[25] The approach uses the data structure of the Almon lag to calculate a composite variable $\Delta FMI(l,s)_t = 1^s\Delta FMI_t + 2^s\Delta FMI_{t-1} + ...l^s\Delta FMI_{t-l}$. Thus, for instance, $\Delta FMI(2,2)_t = \Delta FMI_t + 4\Delta FMI_{t-1} + 9\Delta FMI_{t-2}$.

[26] The impact of pension reform on labour market performance was not econometrically investigated. Yet, since 1980 the growth rate of labour force was 1,7 percentage points p.a. above the growth rate of the working population, the value which is taken for deriving the high-growth estimate.

[27] With regard to the impact of pension reform on private saving, the empirical evidence suggests a reverse causality from higher economic growth to higher saving since —contrary to the conventional view— the direct saving effect of the reform is low, initially even negative; see Holzmann (1996) and (1997b).

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Annex A

THE APPLIED SIMULATION MODEL

In order to investigate the impact and effects of pension reform on the economy OLG-models à la Auerbach-Kotlikoff have been established as a main instrument, and are widely used (for example, Arrau, 1991, Arrau and Schmidt-Hebbel, 1993, Cifuentes and Valdés-Prieto, 1994, Schmidt-Hebbel, 1993 and 1995, Perraudin and Pujol, 1994, Kenc and Perraudin, 1996). Those OLG-models provide important insights into economic intertemporal interactions, but have also severe limitations. Primarily, in their current structure they allow only for one control variable —consumption. This excludes the investigation of other decision processes, such as on switching between funded and unfunded schemes. Secondly, the models are based on a deterministic life-time (say, till age 75). Nondeterministic life-times and hence the use of survival probabilities are important to gauge the full effects of different indexation procedures or the actuarial effects on switching-decisions. Thirdly, the current OLG-models do not allow one to investigate the effects of aging on the SSD and the transition costs. Last, but not least, the model-type is a very cumbersome and time consuming instrument to investigate different options of pension reform.

For these reasons a somewhat different model type is applied, which may be described as an overlapping cohort model in an open economy (i.e., we assume a given interest rate, wage profile, etc.). This spreadsheet-based model views the period −50 to +120, with cohorts aged 21 to 100. It consists of a demographic module (using synthetic survival probabilities, see Keyfitz, 1977), a labour market module (allowing for formal and informal activities), a simple output market module (allowing the calculation of GDP), a pension module (covering both funded and unfunded pensions), and a fiscal module. It is highly parameterized and allows for the investigation of a wide range of assumptions, both economic and pension related. Most importantly, it allows for the endogenous and expenditure minimising selection of the switching age as a result of a cohort decision process.

The model allows the analysis of a wide range of reform options and their fiscal implications. The draw-back of spreadsheet-based model implementation is the long calculation time for each simulation.

Annex B

INDIVIDUAL SWITCHING DECISION AND COMPENSATORY AMOUNT

To derive the compensatory amount which is required to initiate a switch from unfunded to funded earnings-related pensions, a simple, perfect foresight economy is assumed. The result can also be derived under rational expectations and risk-neutrality. For the decision to switch from an unfunded to a funded system it is assumed that at the decision date **T** (end of period), each (identical) individual in the age cohort of age **A** compares the present value of expected life-time resources LTR at retirement age **RA** under the unfunded and funded scheme:

$$(A1)\quad LTRU(A)_{RA} <> LTRF(A)_{RA}$$

If the present value of life-time resources under the funded scheme exceeds that of the unfunded, a switch takes place. The steering variable for the government is the compensatory amount $CP(A)_{RA}$ paid at retirement.

The life-time resources under the unfunded scheme consist of the gross-wage compensation minus the contributions to the basic and earnings-related system while active, and the basic and earnings-related benefits while retired. Other forms of taxation are ignored.

$$(A2)\quad LTRU(A)_{RA} = \sum_{a=21}^{A} [w_a (1 - c^{ub}_a - c^{ue}_a) (1+r)^{A-a}] S(A, RA) (1+r)^{RA-A}$$

$$+ \sum_{a=A+1}^{RA} w_a (1 - c^{ub}_a - c^{ue}_a) S(A, a) (1+r)^{RA-a}$$

$$+ \sum_{a=RA+1}^{100} (b^{ub}_a + b^{ue}_a) S(A, a) (1+r)^{RA-a}$$

$$(A3)\quad LTRF(A)_{RA} = \sum_{a=21}^{A} [w_a (1 - c^{ub}_a - c^{ue}_a) (1+r)^{A-a}] S(A, RA) (1+r)^{RA-A}$$

$$+ CP(A)_{RA}$$

$$+ \quad \sum_{a=A+1}^{RA} w_a \, (1 - c^{ub}_a - c^{fe}_a) \, S(A, a) \, (1+r)^{RA-a}$$

$$+ \quad \sum_{a=RA+1}^{100} (b^{ub}_a + b^{fe}_a) \, S(A, a) \, (1+r)^{RA-a}$$

with **w** the gross wage/contribution base; $\mathbf{c}^i$ the contribution rates for the unfunded basic (ub), unfunded earnings-related (ue), and funded earnings-related (fe) scheme, respectively; **r** the interest rate (for simplicity held constant); **S(A, a)** the survival probability from age **A** to age **a**; and $\mathbf{b}^i$ the corresponding benefits under the different schemes. The maximum age is set at 100, and wages and benefits are assumed to be paid at the end of period. For the ease of notation, the retirement age **RA** is the last year of activity.

Since the net-wage till the decision age A is the same under both options —the first term in equation (2) and (3), they cancel out in both equations; the same is true for basic contribution and benefit above the decision age A. Consequently, the switching decision problem can be reduced to

$$(4) \quad \sum_{a=RA+1}^{100} b^{ue}_a \, S(A, a) \, (1+r)^{RA-a} - \sum_{a=A+1}^{RA} w_a \, c^{ue}_a \, S(A, a) \, (1+r)^{RA-a}$$

$$< CP(A)_{RA} +$$

$$+ \quad \sum_{a=RA+1}^{100} b^{fe}_a \, S(A, a) \, (1+r)^{RA-a} - \sum_{a=A+1}^{RA} w_a \, c^{fe}_a \, S(A, a) \, (1+r)^{RA-a}$$

For equal contribution rates under the unfunded and funded scheme the terms for the contribution payment cancel out and (4) can be rewritten as

$$(5) \quad CP(A)_{RA} > \sum_{a=RA+1}^{100} (b^{ue}_a - b^{fe}_a) \, S(A, a) \, (1+r)^{RA-a}$$

where b^{ue}_a is the unfunded benefit under full contribution record (depending on the internal rate of return of an unfunded scheme), and b^{fe}_a is the funded benefit under the reduced contribution record since switching age (depending on the interest rate r).

From equation (5) the lowering impact of a higher interest rate on the compensatory amount can be immediately deducted: Firstly, and obviously, it increases the discount factor. Secondly, and more importantly, while a higher interest rate leaves the unfunded benefit b^{ue}_a unchanged it increases unambiguously the value of the funded benefit b^{fe}_a and hence the difference between both. Despite a shorter contribution record to the funded scheme, for a high enough interest rate, the difference will become negative! For a given interest rate the change in sign will increase with the length of the contribution record, i.e. the lower the switching age. Hence, if the rate of return for the funded scheme is well above that of the unfunded one, for a large section of the younger age cohort the compensatory amount can zero while initiating a switch.

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