Organisation de Coopération et de Développement Economiques
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AGEING WORKING PAPERS

Maintaining Prosperity In An Ageing Society: the OECD study on the policy implication of ageing

WORKING PAPER AWP 5.2

FISCAL ALTERNATIVES OF MOVING FROM UNFUNDED TO FUNDED PENSIONS

This is one of a series of analytic papers that supported the OECD's ageing study, a "horizontal" project in the sense that it involved a number of OECD directorates. The results of the entire project are summarised in *Maintaining Prosperity in an Ageing Society*, OECD 1998. In particular, Chapters II and IV of *Maintaining Prosperity* drew on this paper.

The paper outlines the potential benefits of a shift towards partial advance funding of retirement income, and highlights the main fiscal options and constraints. Most countries find that it is beyond their political, economic and fiscal capacities to make explicit the huge debt that is implied by unfunded schemes and to repay that debt — thus reversing the initial redistribution towards the start–up generation. Thus a shift requires simultaneous steps of the followig sort: (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 plan for the form, the timing and the fiscal flows involved in making the debt explicit; and (iv) a careful calculation of the compensation needed to render the switching decision by individual workers voluntary but cost efficient.

The author, Robert Holzmann, carried out this study under the Development Centre's research project on "Macroeconomic Interdependence and Capital Flows". It has also been released under the same title as the Development Centre's Technical Paper No. 126.

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RÉSUMÉ

La réforme des systèmes publics d'assurance vieillesse est devenue un enjeu des politiques publiques dans un grand nombre de pays. Les approches classiques pour réformer en profondeur les régimes de retraite par répartition sont difficiles à mettre en œuvre aux niveaux politique et économique, aussi évoque-t-on de plus en plus la possibilité d'une réorientation partielle vers des systèmes de retraite par capitalisation. Toutefois, cette stratégie pose également problème. Ce document souligne les avantages potentiels d'une telle orientation et met en évidence les principales options et contraintes budgétaires. Les engagements pris envers la génération actuelle de retraités et d'actifs dans le cadre d'un système de répartition représentent un endettement public énorme et qui n'apparaît pas de manière officielle. La plupart des gouvernants considèrent que transformer cette dette implicite en un endettement totalement explicite, la rembourser et, ce faisant réaffecter la redistribution initiale sur la génération de départ, irait au-delà de leurs capacités politiques, économiques et budgétaires. Une réorientation implique donc plusieurs mesures simultanées : *(i)* une réforme du système par répartition réduisant l'endettement implicite ; *(ii)* une refonte de la base du régime par répartition afin de minimiser les distorsions sur les marchés des facteurs ; *(iii)* un plan portant sur l'organisation, le calendrier et les flux budgétaires nécessaires pour rendre la dette explicite ; et *(iv)* un calcul minutieux de la compensation nécessaire pour que la décision de passage d'un système à un autre par les actifs prenne un caractère volontaire mais rentable.

SUMMARY

The reform of public pension systems has become a key policy issue in many countries. Because conventional approaches to reform largely unfunded retirement income schemes prove politically and economically difficult, attention has focused on the option of a partial shift towards funded provisions. Yet this too presents problems. This paper outlines the potential benefits of such a shift and highlights the main fiscal options and constraints. The liabilities to the current generation of retirees and workers under an unfunded pension scheme constitute a huge, hidden public debt. Most countries find that making this implicit debt fully explicit, repaying it and thus reversing the initial redistribution towards the start-up generation, lie beyond their political, economic and fiscal capacities. Thus, a shift requires simultaneous steps of the following sort: *(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 plan for the form, the timing and the fiscal flows involved in making the debt explicit; and *(iv)* a careful calculation of the compensation needed to render the switching decision by individual workers voluntary but cost efficient.

PREFACE

Major pension reforms which imply moving from an unfunded Pay-As-You-Go scheme to a funded scheme typically face various stumbling blocks. A significant hurdle, in both OECD and non-OECD countries, is the fiscal cost of that transition. Such pension reform results in sharp falls in government revenues; social security contributions are diverted to the new funded scheme, while the call on government pension expenditures declines only gradually as existing pensioners are still entitled to their pensions from the Pay-As-You-Go system.

The much-studied 1981 pension reform in Chile had been financed to a large extent by government budget surplus accumulated in the years preceding the reform. Such a fiscal performance is not easily replicated in a political environment that is less authoritarian than Chile's was at that time. By highlighting the main fiscal options and constraints of pension reform, Professor Robert Holzmann (Vienna/Saarbrücken), the World Bank's Director of the Sector Board for Social Protection, shows ways of reducing and stretching the fiscal cost of moving from unfunded to funded pension schemes. His suggestions merit careful attention by reform-minded governments around the world.

This paper is part of the OECD Development Centre research project "Macroeconomic Interdependence and Capital Flows", and serves as an input to the OECD's Ageing Population Project.

Jean Bonvin
President
OECD Development Centre
August 1997

I. INTRODUCTION[1]

The reform of public pension systems has attracted discussion for many years (see Heller *et al.*, 1987; Holzmann, 1988; World Bank, 1994). Growing perceptions of the negative effects of fiscal imbalances and high contribution rates on economic performance have heightened the need to reform these large public expenditure programmes, not only in industrialised countries (Group of Ten, 1995; IMF, 1996a, b, c; OECD, 1995, 1996a and b; Franco and Munzi, 1996), but also in many middle and low income countries in Eastern Europe and Latin America. The imperative, more proximate reasons for early and lasting reform of essentially unfunded retirement income schemes also are well known: population ageing due to low fertility rates and rising life expectancy; further system maturation in many countries, the result of past policy decisions on coverage and benefit levels; the likely adverse labour market implications of high contribution rates and insufficient links between contributions and benefits; and the negative effects on private and national saving, arising possibly from the unfunded character of the schemes and certainly from the impact on public saving of the fiscal imbalances that they generate.

The conventional measures to redress the fiscal consequences of an unfunded pension scheme have serious limitations:

— *Increase revenues* through higher contribution rates or taxes. Rising international tax competition and the static as well as dynamic excess burdens implied by such a policy largely exclude such a move;

— *Lower other public expenditure* such as education or defence. The scope of the task would require the equivalent of eliminating all defence spending in the United States and all spending on public services and defence in Japan (OECD 1995);

— *Raise the retirement age*. An increase by 5 years would roughly eliminate the fiscal imbalance over the next 40 years or so in many countries. In recent reforms even modest steps to hike the standard retirement age or tighten the eligibility criteria to raise the effective retirement age have proven extremely difficult politically; and

— *Cut the benefits per retiree* through lower initial pension benefits, lower indexation, higher taxing or enhanced means-testing.

Recent reforms in West European and other countries applied some or all of these measures (see Franco and Munzi, 1996; ISSA, 1996), but they are unlikely to put pension schemes on a sound, long-term financial footing.

Short-term budgetary considerations rather than a long-term fiscal view largely drove the reforms. The renovation of unfunded public pension systems remains a standing agenda item for most countries throughout the World.

Many countries reject a further reform option, moving to a partially funded scheme, because such a move would imply a double burden on the transition generation. Yet while the double-burden argument has some validity, this option merits closer scrutiny by both those who categorically reject it and those who unconditionally embrace it.

The Chilean pension reform of 1981, which shifted from an unfunded, publicly managed and defined benefit system to a fully funded, privately managed and defined contribution scheme, heightened worldwide interest in the feasibility of such an approach and its potential benefits. This reform played a large role in the impressive performance of the Chilean economy since the mid 1980s and it has encouraged reformers throughout the world to imitate, at least partially, the Chilean approach. In Latin America, Argentina (1994), Peru (1993), Colombia (1994), Uruguay (1996) and Mexico (1992, 1997) have already begun to shift toward mandatory funded provisions; other countries, such as Costa Rica, Nicaragua and Venezuela likely will follow. Among the formerly centrally planned economies, Croatia, Hungary, Latvia, Poland and Slovenia have taken preparatory steps in this direction[2], and Russia and Kazakhstan have recently announced plans for a Chilean-type reform. Australia recently mandated employer-organised retirement savings for workers in addition to its government-provided pensions. Most of these countries do not envisage a full shift towards funded systems. The World Bank encourages moving towards a two tier mandatory scheme with both an unfunded and a funded component (World Bank, 1994).

Funded retirement provisions promise both political and economic benefits, ranging from the higher credibility of the approach itself to the positive impact on financial sector development and national saving. Yet reaping the potential benefits requires substantial changes to unfunded schemes and important fiscal policy support, which render problematic any unconditional promotion of even a partial shift from an unfunded to a funded scheme. It resembles advising someone who spends too much of his income on rent to think simultaneously about looking for a smaller and cheaper flat and buying it as well. While such a move may lower current expenditure and offer potential capital gains, it requires important shifts in intertemporal consumption behaviour. The buyer may confront cash-flow problems in paying interest and principal when exposed to conjectural, stochastic income expectations. Countries face similar problems when shifting from unfunded to funded schemes and this demands close investigation of the changes in stocks and flows involved.

This paper provides policy makers and economists involved in pension reform with a better understanding of the fiscal task and highlights the main fiscal options and constraints. It has five specific objectives:

— To highlight the potential benefits of a move from unfunded to funded provisions (UF-FF shift). The ongoing discussion and recent reform attempts in different parts of the world have stressed various political and economic benefits as well as specific advantages in the context of the regional economic associations (such as the European Union and Mercosur).

— To investigate the individual switching decision as well as the scope and interrelation of fiscal stocks and flows involved in such a shift, including strategies for reducing the implicit debt to be made explicit, and. The stocks comprise, *inter alia*, the existing commitment towards current and future retirees who stay with the unfunded scheme and the compensation for foregone unfunded benefits/past contributions resulting from the shift. The flows comprise, *inter alia*, the operational deficit of the social security fund resulting from the loss of contributors, and the disbursement of the compensation.

— 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 individual's intertemporal decision-making process and should allow for an endogenous determination of the switching age while minimising the fiscal costs.

— To investigate the main options for financing the fiscal flows, including the potential sources of financing the transition which may result from enhanced economic growth (greater capital accumulation, saving and total factor productivity) or the use of government assets;

— To present preliminary empirical findings on the Chilean pension reform, the economic and fiscal issues involved, and its impact on economic growth, capital formation and saving, including the financing of the debt made explicit.

II. POTENTIAL BENEFITS OF MOVING TO FUNDED PROVISIONS

The arguments which claim potential political and economic benefits for the shift towards a partially funded scheme are influenced by both the slow, limping reforms of unfunded schemes and the apparent success of the Chilean reform of 1981 (Holzmann 1996). For regional economic associations, further specific cases exist for a common move towards mandatory and funded provisions. This section presents the core of those arguments but investigates neither their validity nor the conditions under which they may apply[3], a task partly taken up later.

At the *political level*, three effects stand out. First, the approach can break deadlock in traditional reform attempts because it implies a time-consistent and hence credible reform (Holzmann, 1994). Second, it largely isolates retirement provisions from political interference and risk (Godoy-Arcaya and Valdés-Prieto, 1997; Diamond 1997). Third, it heightens workers' concern for financial issues and enterprise performance, reducing the dichotomy of interests between capital and labour (Piñera, 1991).

Political resistance throughout the world to reforming an unfunded scheme along conventional lines (*e.g.* a change in the benefit structure and an increase in retirement age) undoubtedly stems from distributional conflicts but also reflects a credibility problem (Holzmann, 1994). Politicians cannot make convincing commitments that a traditional reform can last on a sound, long-term financial basis, and that they would have no political incentive to change the benefit/contribution structure in the future. Given this problem of time inconsistency, individuals oppose a traditional reform from the start. Shifting to a funded scheme can break the deadlock in three main ways. First, by stressing the economic advantages and the positive impact on economic growth, it opens arguments that all can win, thus abandoning intractable zero-sum games and shifting the discussion from distributional concerns to efficiency and growth issues. Second, it provides transparency by explicitly distinguishing between the saving-insurance functions of a pension system (individual accounts and individual equity) from those of redistribution and social protection. Third, it reduces the scope for future opportunistic behaviour by politicians.

Public and unfunded pensions are subject to many sources of political risk (Diamond, 1997). The first and most obvious involves granting excessive benefits to existing retirees when the system is not mature and contribution revenues largely cover expenditure, combined with promises to future retirees that cannot be met. Another concerns depletion of accumulated assets through low rates of return and/or by spending them for other uses, which erodes the financial viability of originally promised benefits. Others reflect the excessive responsiveness of benefits to conditions of the government budget in both the short and the long term. Proponents of funded schemes like the Chilean one claim that they provide isolation from the risks of sensitivity to the state budget and of excessive distribution to earlier generations, by identifying individual accounts and their returns as private property, entitled to the same protection as other assets.

Most individuals receive their income only from dependent work; thus they seek high wages and job security, the demand for which they perceive largely as a way to redistribute income from capital to labour; they mostly ignore any negative feedback on their own future income positions. High profits and high rates of return on investment are often perceived as indecent, giving rise to popular demand for redistribution through greater taxation of capital income. One argument runs that shifting to funded pensions attenuates this traditional conflict between capital and labour and the aversion of large parts of the population to financial markets as workers become aware of their interest in a high rate of return (Piñera, 1991). Such a perception can have particular strength under a defined contribution scheme where a higher rate of return accrues exclusively to the individual.

Three main reform effects are also claimed in *economic terms*. First, the reform establishes a close link between contributions and benefits, thus reducing the labour market distortions of traditional, unfunded programs (World Bank, 1994). Second, reform furthers and accelerates financial market development and thus efficiency of resource allocation (Davis, 1995, Holzmann, 1996). Third, reform positively affects 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.

The traditionally weak link between contributions and benefits in unfunded pension schemes results from mingling the distributive and saving-insurance functions of old-age income support, from imposing labour market and other functions unrelated to pensions; and because their unfunded nature offers a rate of return well below that on capital investments. Because the link is both weak and poorly revealed, individuals perceive social security contributions largely as taxes. This gives rise to labour market distortions, tax evasion through informal market activities and incentives for early retirement. With social security contributions high and often rising in many

countries, critics often hold these effects in part responsible for persistent labour market problems and high levels of informal labour market activities. While a reformed unfunded scheme could in principle eliminate many of the distortions, reformers claim that moving towards a two tier scheme, with a clear separation between an unfunded distributive and a funded annuity component, offers a more effective and efficient approach (World Bank, 1994, Chapter 7).

Despite the globalisation of financial markets over the last decade, most national capital markets remain underdeveloped in terms of equity market capitalisation, the scope and form of capital market instruments, the speed of innovation and market structure. No final verdict exists on the relative advantages of bank-based financial intermediation (traditional in central, southern and eastern Europe) versus market-based institutions (customary in Anglo-Saxon countries)—but recent developments suggest a trend towards market-based intermediation; all countries want to invigorate their share market to further enterprise creation, long-term investment and employment. Theoretical and empirical support grows for an old conjecture that the efficiency of financial markets has a strong bearing on economic growth[4]. Because pension funds make the capital market deeper, more liquid and more competitive through their impact on the demand for capital market instruments, instrument innovation and market structure, a shift towards funded retirement provisions may importantly accelerate such a development.

The decline in total saving in the OECD area over the past three decades and the long-term rise in the real interest rate which has accelerated since the beginning of the 1980s have heightened the fear of future global capital shortages with adverse consequences for future output (see Group of Ten, 1995, OECD, 1996b). The ageing of populations likely will reduce national saving rates directly through the age-specific consumption-saving pattern and indirectly through its budgetary consequences. These concerns add 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. A shift towards funded provisions would be welcome if, as often claimed, it could increase national saving and hence capital formation. The Chilean experience apparently fostered such an impact; national saving increased from 8.2 per cent of GDP in 1981 to an all-time high of 27.6 per cent in 1995 (see IMF, 1995, Holzmann, 1997b).

For the *regional economic associations (REAs)* in industrialised and developing countries alike, a common move to a mandatory two tier system, consisting of an unfunded, basic component financed from general taxation and social security contributions and a funded, supplementary one in the form of a defined contribution plan, may promise three further and important advantages. The first involves improved labour mobility, traditionally low among

the member states of REAs. The lack of at least some modest mobility will limit both the envisaged gains from specialisation and economies of scale and scope. While cultural barriers may certainly explain part of the mobility problem, differences in pension and other social policy legislation quite likely also have a bearing. Co-ordination rules, often based on bilateral agreements, reduce the obstacles somewhat; but barriers — *e.g.* poor transportability, excessive taxation — remain fully operative for supplementary pensions. 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. This would also require important steps in tax co-ordination if tax exemptions for premiums and returns are granted while only the pay-outs to retirees are taxed[5]. Furthermore, a common scheme for all employed in each country would also foster labour mobility between sectors (e.g. between public and private sector employment) and regions in federal states.

Second, ordinary citizens would develop a greater self interest in the global capital market. All economies feel exposure to the effects of globalisation, including rising portfolio and direct investment. While this allows more efficient allocation of capital worldwide and thus also domestic efficiency gains, the wage-earning population often objects because it feels chiefly the disciplinary effects of mobile capital on the wage level and only slightly the diffused effects of higher labour productivity and hence wage rates, which depend on net rather than gross capital inflows; it does not participate in the higher capital returns. With partially funded pensions all wage earners would obtain a stake in national, regional and world-wide capital market gains, leading them to support rather than oppose the inevitable shift from the traditional stakeholder polity to a shareholder society.

Third, partial funding of pensions would better protect future retirees against the demographic shocks which can affect all countries. With asymmetric ageing in an REA, one could envisage either pooling risks among individual country schemes through intra-REA migration, or a common unfunded scheme with differences in demographic developments among jurisdictions, as in the United States. Against the more likely demographic scenario of a parallel ageing of REA populations due to proximity and common cultural norms, 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 REA saving rate, investing part of the fund assets internationally allows risk diversification, yielding a higher return at a given risk or lower risk for a given return.

III. DETERMINING THE FISCAL TASK: STOCKS AND FLOWS

The previous section cited many convincing arguments for countries to think more intensively of a shift away from unfunded towards mandatory funded provisions. Yet all of them, even if perfectly valid and empirically supported, may not suffice if the central obstacle of financing the transition is not overcome. 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 an explicit one which must eventually be repaid. The shift between implicit and explicit public debt, and the fiscal flows involved, depend on how the transition is structured. While most theoretical papers dealing with such shifts recognise the stock-flow link when addressing the intergenerational welfare and intertemporal macroeconomic issues, most empirical papers concentrate on only the fiscal flows when addressing the fiscal and distributional issues involved. This section, supported by limited empirical data and supplemented by some heuristic simulations, outlines the main links between the relevant stocks and flows.

The Scope of Pension Liabilities

Because pension obligations constitute debt, the scope of this debt determines the potential fiscal implications of a transition. Current pension expenditures provide a good indicator of existing commitments only under steady-state conditions. With ageing populations, rising labour force participation and pension coverage, or non-mature benefit structures, trends in current expenditure levels tend to underestimate trends in outstanding commitments. Franco (1995) provides three main definitions of pension liabilities:[6]

— *Accrued-to-date liabilities*: these represent the present value of pensions to be paid in the future on the basis of accrued rights; neither future contributions nor their accrual of new rights are considered.

— *Current workers and pensioner's liabilities*: this definition assumes that pension schemes continue their existence until the last contributor dies while no new entrants are allowed; both the future contributions of existing members and their new rights are therefore allowed under current rules.

— *Open-system liabilities*: these 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 interrelations among the alternative definitions of pension liabilities, the corresponding and alternatively used concept of social security debt or wealth, and the concept of actuarial deficit, the balancing item. The differences in the three main definitions of pension liabilities reflect alternative views of which generations and their claims should be considered. The difference between the gross and net concepts 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 concepts of debt or wealth represent alternative views from the

Table 1. **Alternative Definitions and Interrelations Among Social Security Debt, Social Security Wealth and Actuarial Deficits**

	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 Liabilities
	Present value of future contributions of current workers *Actuarial Deficit II*	Present value of future pensions due to future contributions of current workers		
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 Deficits I+II =* Net Social Security Debt or Wealth	Current Workers' and Pensioners' Liabilities
	Present value of contributions of future generations *Actuarial Deficit III*	Present value of pensions due to contributions of future generations		
3	Gross Social Security Debt of Future Generations	Gross Social Security Debt of Future Generations		
1+2+3	Gross Social Security Debt of All Generations	Gross Social Security Debt of All Generations	*Actuarial Deficits I+II+III =* Total Actuarial Deficit	Open-System Liabilities

Source: Author's own presentation.

side of government (debt) or individuals (wealth). For example, the gross social security debt of the current generation (as seen by government) corresponds to the gross social security wealth (as seen by 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) [7].

For a complete UF-FF shift, the first definition applies because it comprises the value of accrued rights which must be compensated and thus converted into explicit debt (unless the government defaults on its pension commitments). In a given pension system, the main assumptions which determine the level of accrued pension liabilities (or social security debt I, henceforth SSD) include the real interest rate, real wage growth, the inflation rate and survival probabilities. When the public pension system has accumulated financial reserves, these existing assets have to be subtracted.

Table 2 illustrates the scope of the SSD for selected OECD countries in 1990. These only illustrative estimates constitute lower bounds because they often concentrate on the main schemes only (they disregard civil servants' pensions, for example), leave out disability and survivors' pensions, or ignore social pensions and means-tested and related supplements[8]; they also differ from other estimates in methodology and assumptions (see Van den Noord and Hurd, 1994, Kane and Palacios, 1997). Nevertheless, the estimates indicate that the hidden public debt, the SSD, is extremely important and dwarfs the current explicit financial debt in those countries. Comparing the SSD with annual pension expenditure also confirms a rule of thumb that for reasonable parameter assumptions the ratio between the two lies in the range of 15 to 30[9].

Table 2. **Net Accrued Pension Liabilities and Financial Debt for Selected OECD Countries, 1990**
(Per cent of GDP)

	France	Germany	Italy		United Kingdom	Canada	Japan	United States
			1990	1992[1]				
Gross Liabilities								
1. Retired	77	55	94	94	58	42	51	42
2. Workforce	139	102	165	148	81	71	112	70
3. Total (= 1+2)	216	157	259	242	139	113	163	112
4. Existing Assets	0	0	0	0	0	8	18	23
5. Net Liabilities (= 3 - 4)	216	157	259	242	139	105	145	89
6. Pension Outlays[2]	9.0	6.9	10.6	10.6	6.6	3.9	5.7	5.1
7. Ratio of Gross Liabilities to Pension Outlays (=3/6)	24.0	22.8	24.4	22.8	21.1	29.0	28.6	22.0
8. Financial Liabilities	40	44	101	101	35	73	70	55
9. Total Gross Liabilities (= 3 + 8)	256	201	360	343	174	186	233	167

Assumptions: Pension benefits are price indexed; real earnings grow by two per cent; the discount rate is four per cent from 1990 to 2010, declining to three percent in 2050.
Notes: 1. After 1992 reform.
2. Old-age pension expenditures only around 1990; figures for Japan include survivors' and disability pensions.
Sources: Van den Noord and Herd (1994), OECD data base and author's own calculations.

Reducing the Scope of the SSD to be Made Explicit

Actual pension expenditure levels both in EU countries and in the emerging market economies in eastern Europe and Latin America of five to 15 per cent of GDP imply SSDs of some 100 to 300 per cent of GDP—sometimes even more and often tending to rise. Converting such amounts to fully explicit debt and eventually having to repay it do not seem feasible. This begs for strategies to reduce the amount of SSD made explicit.

The first strategy would reduce the SSD by curtailing future commitments — through an increase in the retirement age, a decrease in the annual accrual factor or a change in the indexation procedure (say, from wage to price indexation). In fiscal speech, the government partially defaults on its pension commitments[10]. Most countries need such a reform of the unfunded scheme in parallel with a partial or full shift to a funded scheme, because the unfunded schemes are essentially unsustainable financially and a mere shift in the financing mechanism would help little. So far, all reforming 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.

Figures 1a and 1b on the following two pages sketch the scope and changes of the SSD under different benefit reform options, the impact of ageing on the SSD, and divergent movements of stocks and flows. The results are based on a type of heuristic, overlapping-generation simulation model which mimics the essential features of an unfunded two-tier pension scheme[11].

Benefit indexation (Figure 1a): With initial price indexation under the baseline scenario (implying a steady-state SSD of some 160 per cent of GDP) and a change to wage indexation in period -10, the SSD jumps immediately by over 20 per cent of GDP and continues to increase for some 30 years until the difference from the baseline scenario reaches almost 40 per cent of GDP, or one-fifth 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 by some 24 per cent of GDP and it gradually approaches the baseline after some 40 years.

Retirement age and accrual rate (Figure 1a): 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; the long-term impact on SSD is substantial. In an earnings-related scheme, however, the effects are somewhat attenuated if the accrual rate is not adjusted accordingly (i.e. if individuals working longer and retiring later continue to accrue further pension rights). Linking a strong increase in the retirement age (RA) with a decrease in the accrual rate essentially halves the SSD.

Figure 1a: Social Security Debt under alternative Policy Scenarios

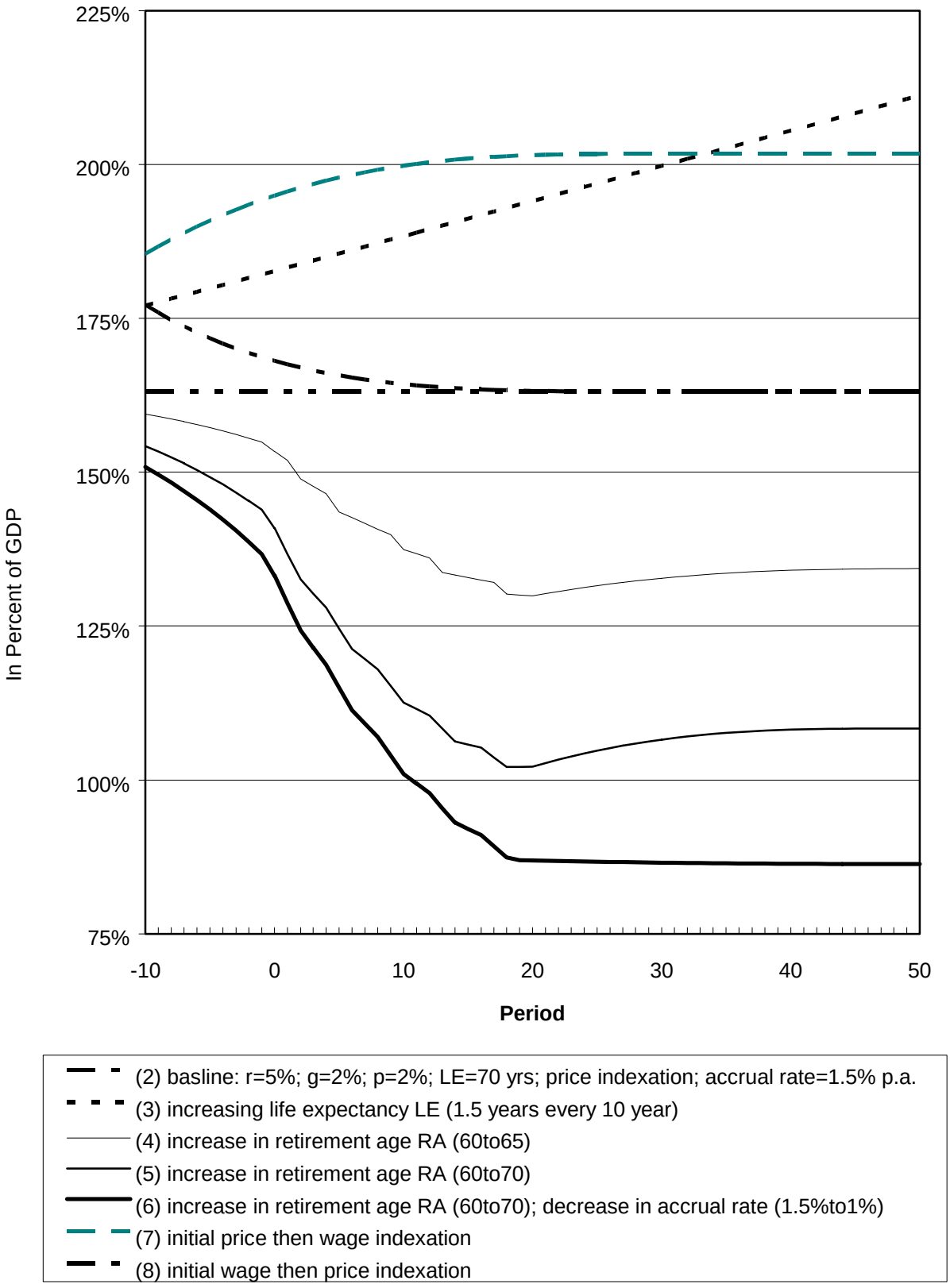
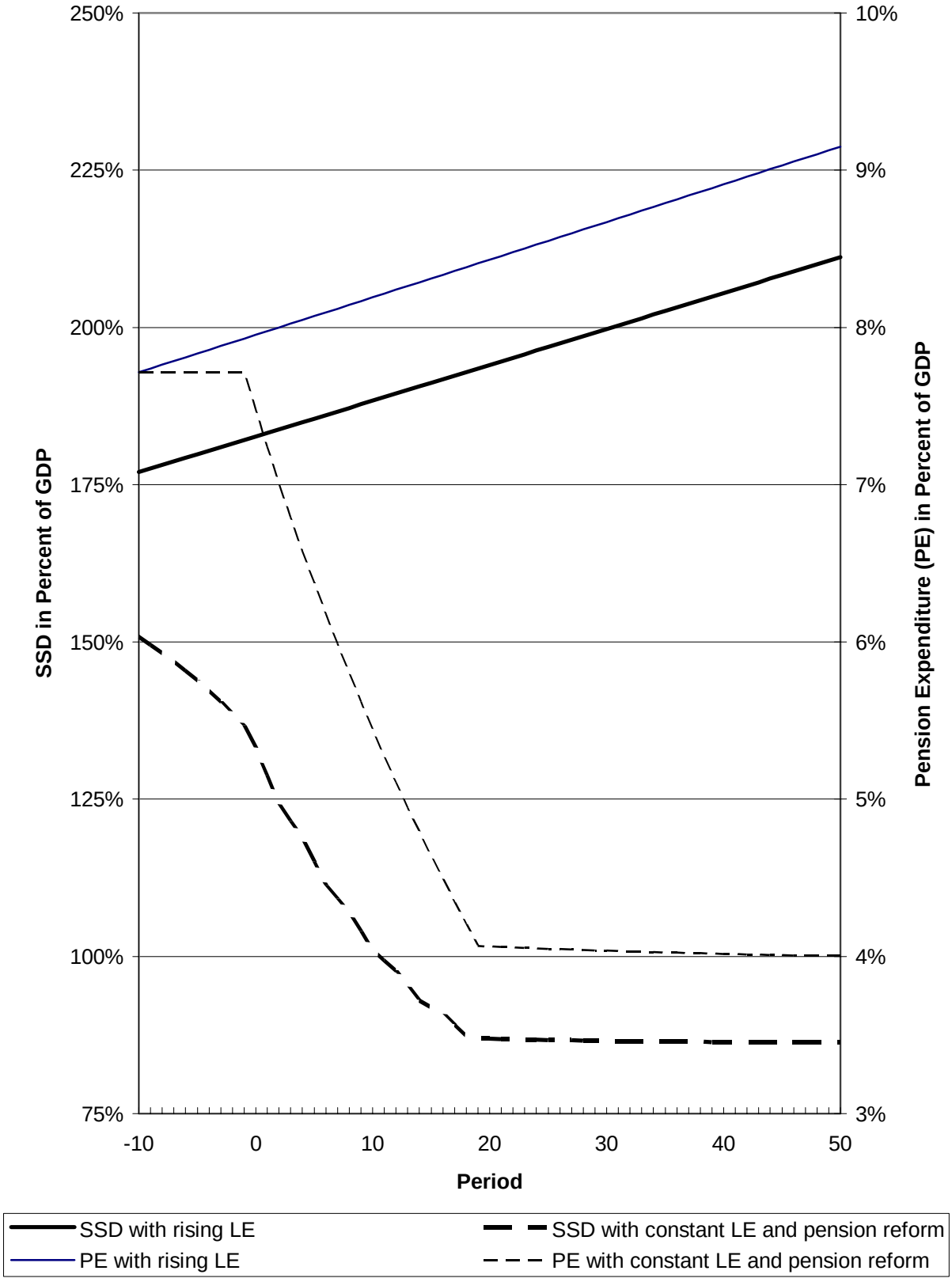


Figure 1b: Social Security Debt and Current Pension Expenditure



Both of the foregoing changes in policy parameters and their effects on the SSD give a first indication of the importance of introducing policy changes well in advance of a UF-FF shift if the transition costs are to be minimised. Figure 1a also indicates how the SSD increases with rising life expectancy. Here again, the SSD jumps immediately with the anticipated 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 variables — pension expenditures — are initially identical, differences in future life expectancy and policy setting have an immediate impact on the SSD. The initial difference amounts to almost 30 per cent of GDP.

The second strategy involves 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; fiscal and other considerations determine the distribution between them. Argentina and other Latin American countries have applied such an approach (Queisser, 1995), some eastern European reform countries (Latvia and Hungary) are preparing one, and Poland, Croatia and Slovenia are considering it (see Holzmann 1997a).

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

— It reduces proportionately the amount of implicit debt made explicit and can thus lead to fiscal manageability. While the repayment of, say, 200 per cent of GDP in debt appears difficult or even impossible, the repayment of half of this amount falls within the range of the Chilean pension reform.

— Basing retirement income on both an unfunded and a funded portion allows for risk diversification and may enhance welfare. One can argue 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 than one, a mixed financing mechanism reduces the overall income risk and provides positive welfare effects[12].

— Public and earnings-related pension schemes traditionally have a distributional and an annuity component. Their mingling and the lack of a clear contribution/benefit link causes the distortions inflicted by unfunded public schemes (see *e.g.* Schmidt-Hebbel, 1993). Separating these components into an unfunded, distribution-oriented tier and a truly earnings-related, funded tier can reduce the distortions importantly (World Bank, 1994).

The potential risks of a partial shift include the following:

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

— Unfunded and funded tiers have different rates of return. Temporarily lower rates of return in the funded tier may call forth political pressure for compensatory higher benefits under the unfunded tier; paradoxically, *higher* rates of return may also bring pressure for higher unfunded benefits from those less well covered by the second tier.

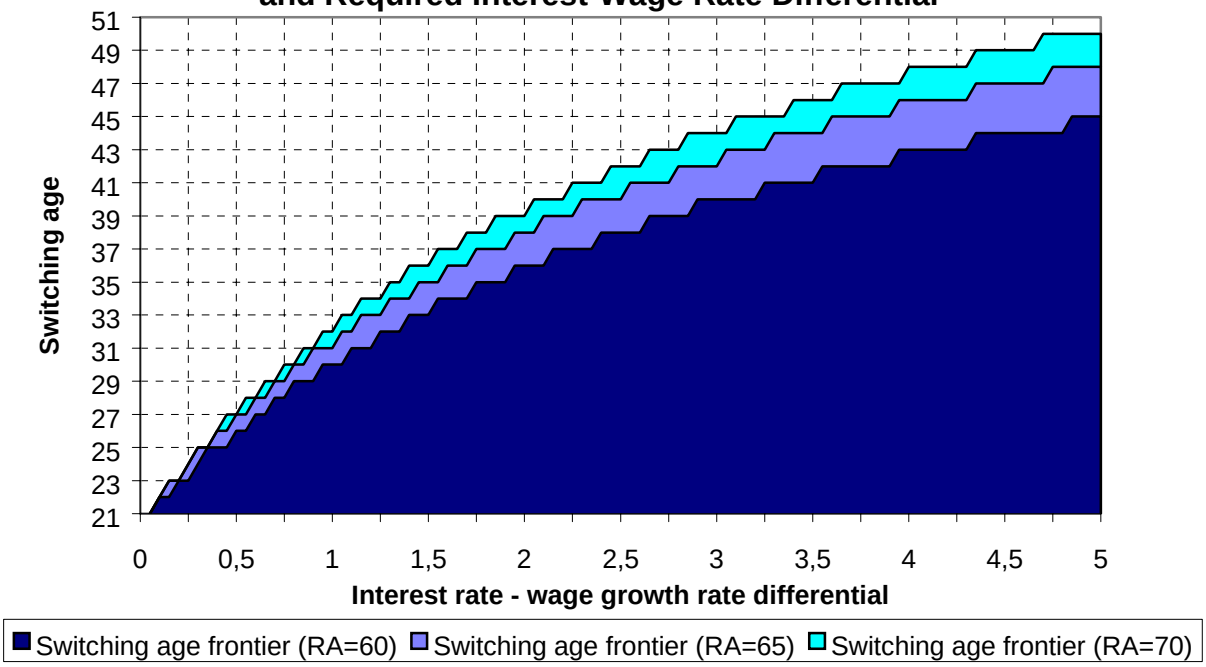
— The unfunded tier is much more exposed to population ageing and the problem of long-term financing this implies.

The third strategy applies an expenditure-minimising procedure to determine the compensation to individuals willing to switch to the funded scheme and forego the benefits of the unfunded one. From a political perspective, the switching decision should be left to the individual, but cash-flow and economic considerations require the approximate switching cohort to be known in advance. This requires knowledge of the individual/cohort decision process, which allows determination of expenditure-minimising compensation for all switchers. Setting the switching age exogenously (say, all below age 40) either does not conform with individual preferences and thus undermines support for the reform or does conform but is at least as expensive as the individual voluntary decision.

A 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 whether compensation for a major segment of the age cohorts is even required. If, despite lower contributions, a higher rate of return under the funded scheme allows a benefit level at least as high as remaining with the unfunded scheme, the individual has an incentive to switch to the new scheme without any compensation. Annex B 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 differential between the interest rate and the wage growth rate required under cetrain assumptions to induce a defined age cohort to switch to the funded scheme. The cohort consists of identical individuals with perfect foresight, which abstracts from uncertainty and risk aversion; survivor probabilities are known; the potential span of activity ranges from age 21 to 60, 65, or 70; and the time span of retirement runs from ages 61, 66, or 71 to 100. The results suggest that for reasonable rate differentials (between 1.5 and 3 percentage points) no compensation may be required for individuals in the age range of 33 and 44 (and below). The resulting savings, however, will likely be limited since the present value of future benefit claims of that age segment is modest.

Given the scope of existing pension commitments, most countries will have to apply all three strategies simultaneously in order to keep the resulting fiscal obligations manageable. This raises the question of an appropriate structure for the first, unfunded tier which could minimise the risks raised above. Variants of a micro-economically ingenious approach to structure

Figure 2: Switching Age without Compensation and Required Interest-Wage Rate Differential



this tier, going back to a suggestion by Buchanan (1968), were recently adopted in Sweden (see Kruse, 1997), Italy (see Porta and Saraceno, 1997) and Latvia (see Fox *et al.*, 1996), and the approach is under consideration in Poland. Under it, 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 savings account and the accumulated capital earns a "rate of return" equal to the growth of the wage bill on which contributions are collected. At retirement, the pension paid equals the accumulated capital (inclusive of the notional interest rate earnings) divided by the expected post-retirement life span of all persons of that age. The pension is price-indexed.

This approach has some particular advantages: (1) it provides an incentive for formal labour force participation since any contribution evasion leads to a lower benefit level; (2) it largely immunises the system from political tinkering, because 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, as any increase will automatically lead to lower pension benefits, giving rise to an incentive to retire later; and (5) the benefit structure may allow an easy integration with a funded, truly defined-contribution second tier.

The main problem of this approach is the reserve accumulation it requires against both temporary, adverse economic shocks and, most importantly, the ageing of the population. Because the system is unfunded but promises a rate of return based on past average wage growth, expected changes in beneficiary/contributor ratios require corresponding financial reserves to prevent future transfers from the state budget. While the calculation of a long term contribution rate to cover expenditures is technically relatively easy, the actual accumulation of reserves and the receipt of a market-based rate of return may be constrained by political pressure for an alternative use of these funds. Thus an adjusted version proposed by Boskin *et al.* (1988) may be more appropriate. In their scheme, the notional interest rate is set by actuaries, based on forecasts, to keep the system in balance over the projection period.

Speed of Transition, Timing of Reforms and Cash Flow Considerations

The decision on the age at which a switch to the funded scheme takes place determines the speed of transition. There are two extreme options: under the radical option, all commitments — to the entire labour force (including recent entrants) and to those already retired — are compensated. This makes the total SSD explicit in one stroke and cash flow requirements equal to the SSD must be financed on the markets. Under the minimal option, only new entrants to the labour market participate in the funded scheme. This reduces the cash flow requirements to the level of the operational deficit, which rises as expenditures remain for many years while contributions decrease continuously. The transition ends only when the last eligible person dies (after some 80 years). Most reforms will choose a switching age within the current working generation, say age 40, as a compromise between speeding the transition and cash flow limitations.

Figures 3 to 5 on the following pages demonstrate how debt stocks change in composition and show 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 frontloaded. Figures 3a through 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 zero and the switch

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

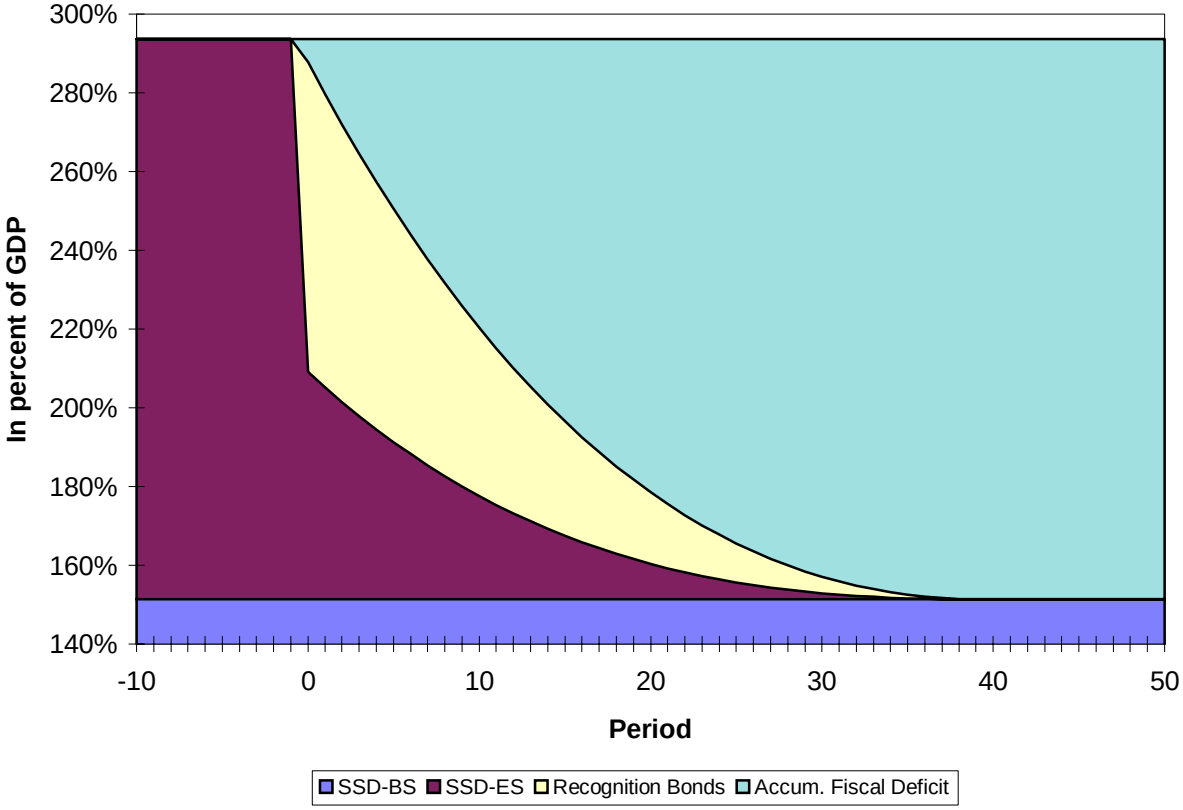


Figure 3.b: Cash Flow Requirements during Transition
(r=g=p=2%; switching till RA=60)

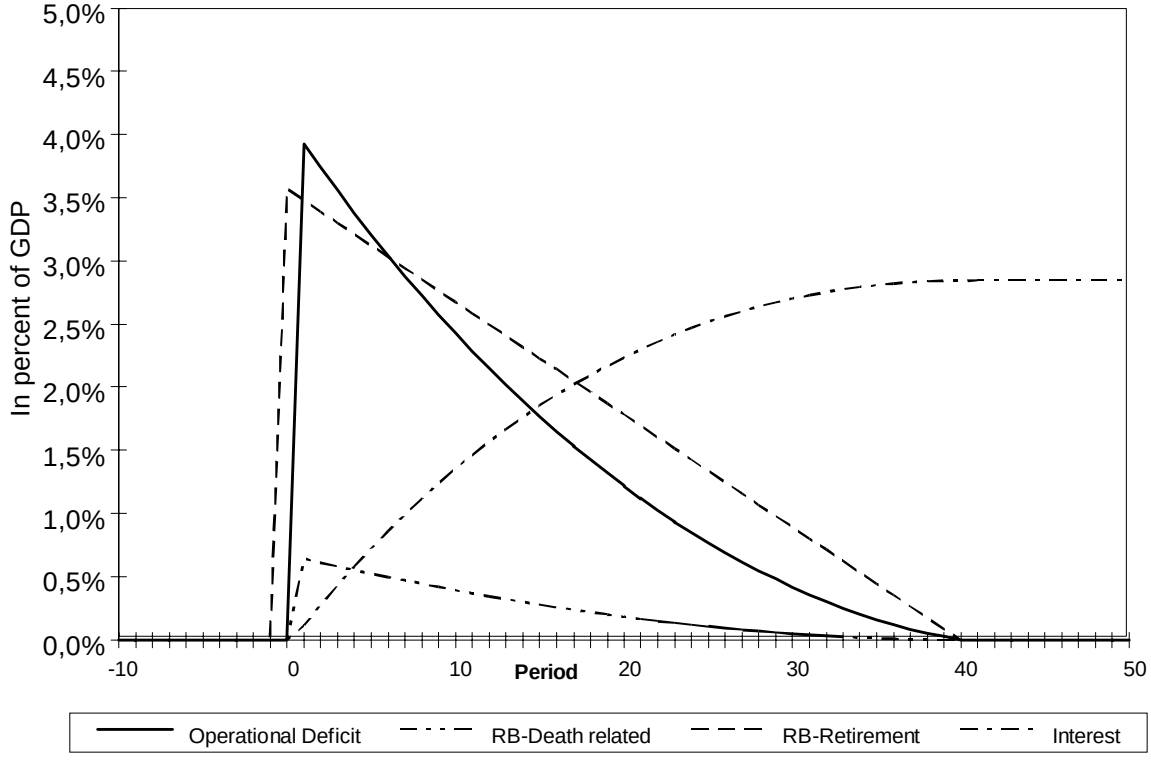


Figure 4.a: Total Public Pension Debt
(r=g=p=2%; new entrants only)

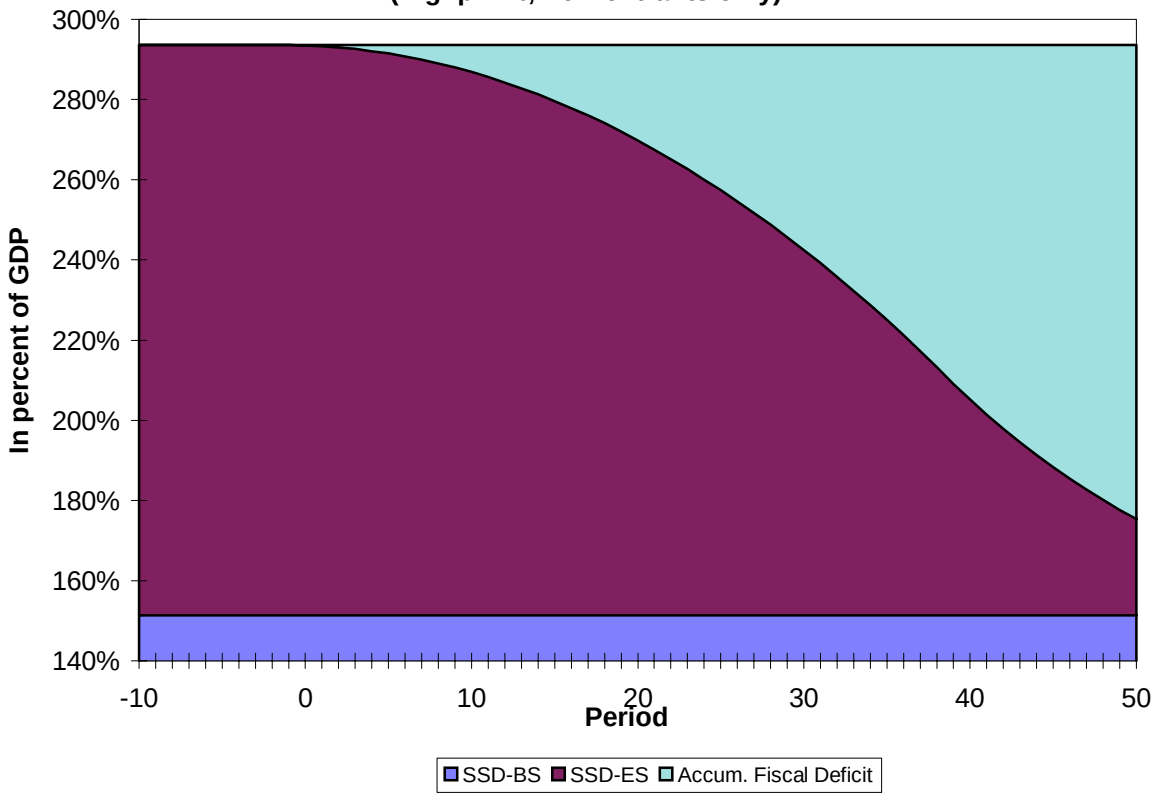


Figure 4.b: Cash Flow Requrements during Transition
(r=g=p=2%; new entrants only)

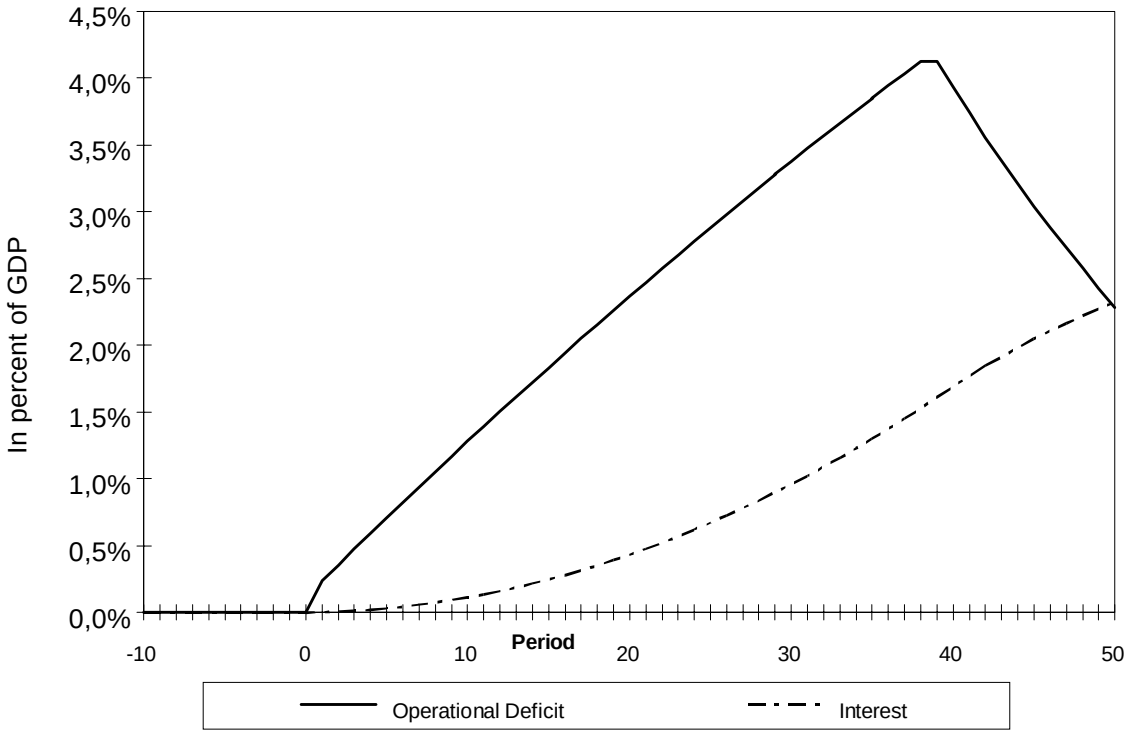


Figure 5.a: Total Public Pension Debt
(r=g=p=2%; switching below age 42)

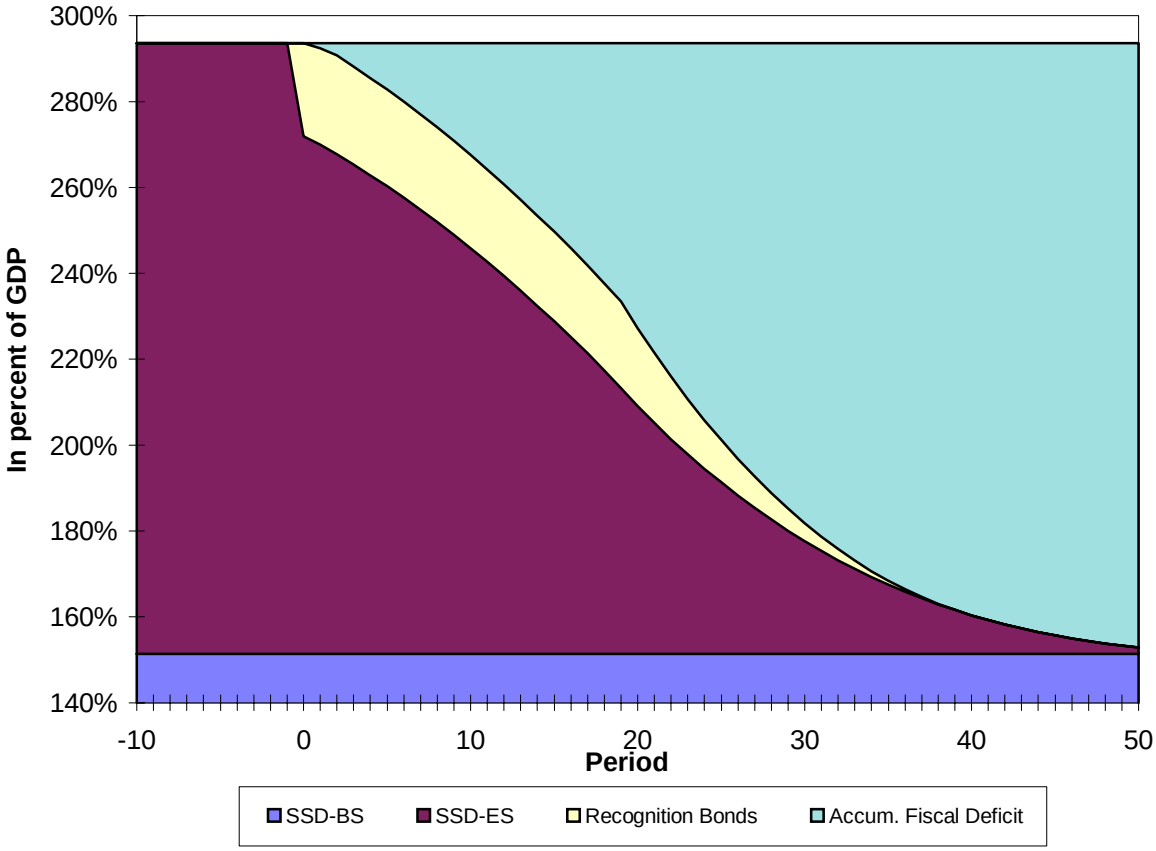
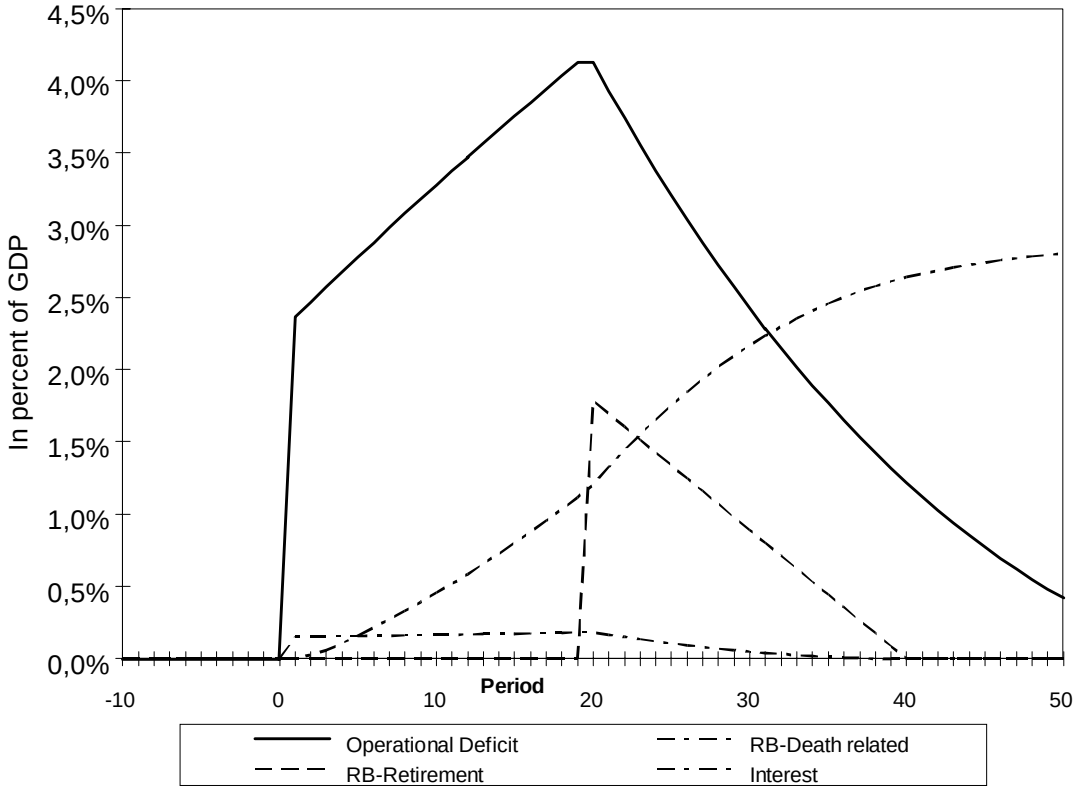


Figure 5.b: Cash Flow Requirements during Transition
(r=g=p=2%; switching below age 42)



in period one. Because the interest rate in this simulation is set equal to the growth rate, the overall debt level as a per cent of GDP remains unchanged; only the composition of debt becomes different[13]. The corresponding Figures 3b through 5b exhibit the cash flow requirements of those changes: the operational deficit, the compensation for foregone unfunded benefits (paid at retirement or to survivors if death occurs before retirement), and the interest on the now explicit fiscal debt .

In Figure 3 all workers below retirement age shift to the funded (earnings-related) scheme and receive compensation for their accrued pension rights with recognition bonds (RBs). These bonds earn the market rate of return (equal to the rate of discount) and mature at retirement (inclusive of the accumulated interest earnings). The affiliation to the basic scheme remains unchanged for all workers. As a result, almost two-thirds of the SSD of the earnings related scheme is exchanged against RBs. The overall amount of RBs decreases with the retirement of each cohort and the redemption of each bond (Figure 3a). The corresponding cash flow requirement (Figure 3b) consists of four elements: the operational deficit as the earnings-related system is left with no contributors and all retirees, the RBs disbursed to the retiring cohort in each year, the value of RBs to survivors of those workers who die before retirement, and the interest on the now explicit fiscal debt. All cash-flow requirements are assumed to be debt financed. The total cash flow requirement is extremely frontloaded 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 RBs are required. The change in the debt composition takes place between the SSD and accumulated deficits which consist of the operational deficits and interest payments only. The cash flow requirement is very backloaded and peaks after 40 years. The transition ends only after 80 years.

Figure 5 presents a medium scenario wherein only workers 41 years of age and below switch to the new system. Because their acquired rights under the unfunded scheme are relatively low, so is the amount of RBs issued for compensation; the RB “carrot” is slim and long. With this intermediate switching approach, the cash flow requirements are largely centred, peaking after 20 years.

Under the key assumption of the simulation — the interest rate r equals the growth rate g — no deficit in the economic sense emerges from the UF-FF shift because the liability position of government remains unchanged. In the more relevant case of r > g the *true transition deficit* equals the difference between r and g times the explicit SSD. A capitalisation of that true transition deficit would make the financial debt as a per cent of GDP grow without

bounds, violating the conventional solvency condition for government; thus it has to be financed by general revenue. It is the only deficit which matters economically when perfect foresight prevails.

The timing of the reforms has 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. Figures 6 and 7 highlight the importance of an early reform under the assumptions that the real interest rate (*i.e.* the discount rate and rate of return of the funded scheme) is five per cent, and that prices and real wages increase by 2 per cent per year (equal to the rate of return from the unfunded scheme as 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 (with an increase by one year every two years for computational reasons) and a reduction in the annual accrual rate from 1.5 per cent to 1 per cent over the same 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 concurrently with the shift. The switching decision by individuals, and hence the age cohorts concerned, are 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 retires at age 70).

In Figure 6a — the early reform scenario — the SSDs of both the basic and earnings-related schemes are almost halved at the time of the financing shift, and the SSD of the earnings-related scheme made explicit is a mere 42 per cent of GDP. The operational deficit (Figure 6b) is frontloaded and reaches a maximum of some two per cent of GDP after 30 years; the true transition deficit, which has to be financed by the budget to avoid an increase in financial debt, rises slowly from slightly below to above one per cent of GDP. The slight initial fluctuations arise from 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 decreases initially but slightly and remains constant once the reform is fully effective in period 20. The explicit SSD amounts to almost 82 per cent of GDP. The operational and true transition deficits also follow a higher path. The fluctuations in the latter arise from the discontinuous increase in the retirement age (one year every two calendar years); with the total debt constant, this reduces the budgetary financing requirement every second year.

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

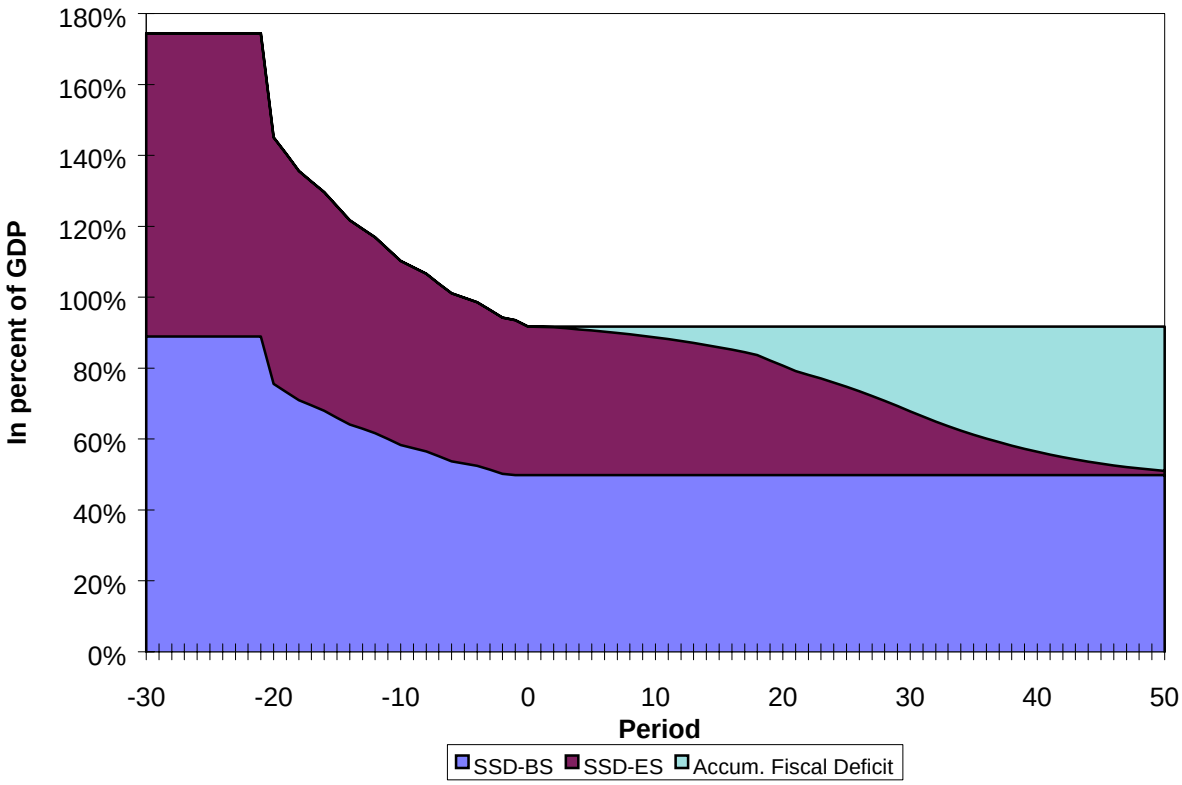


Figure 6.b: Cash Flow Requirements and True Transition Deficit
(r=5%; g=p=2%; unfunded benefit reform in period -20 to -

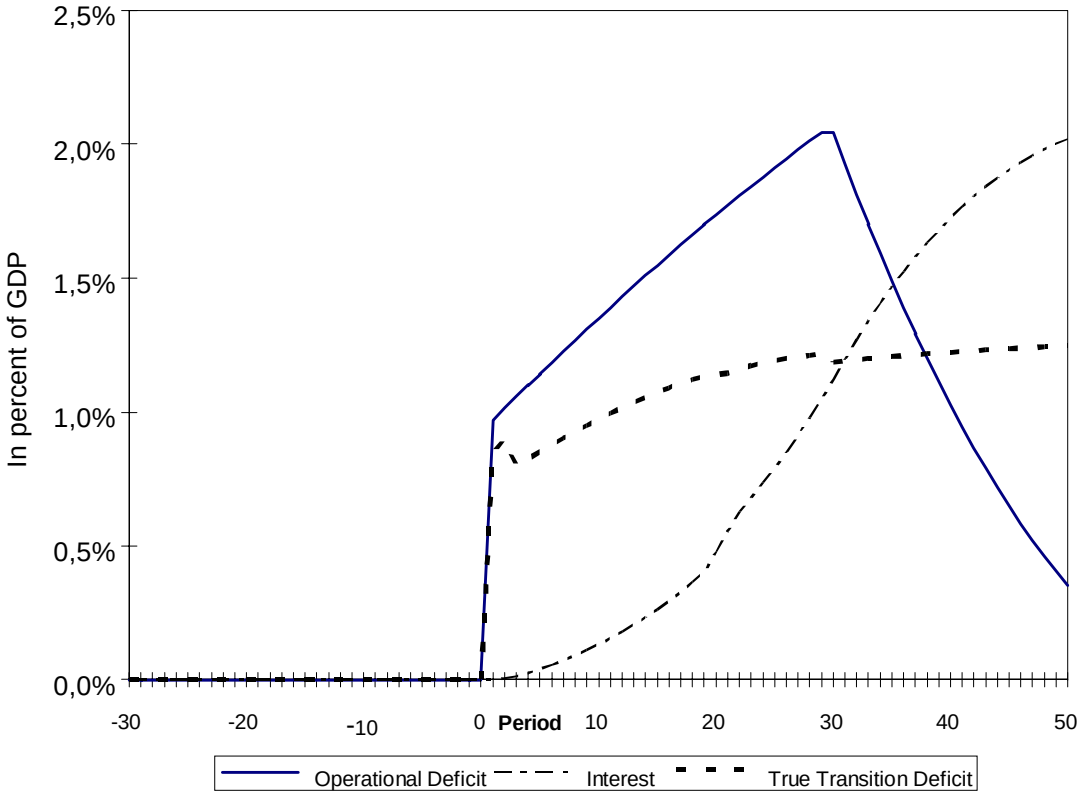


Figure 7.a: Total Public Pension Debt
(r=5%; g=p=2%; unfunded benefit reform in period 0 to 19)

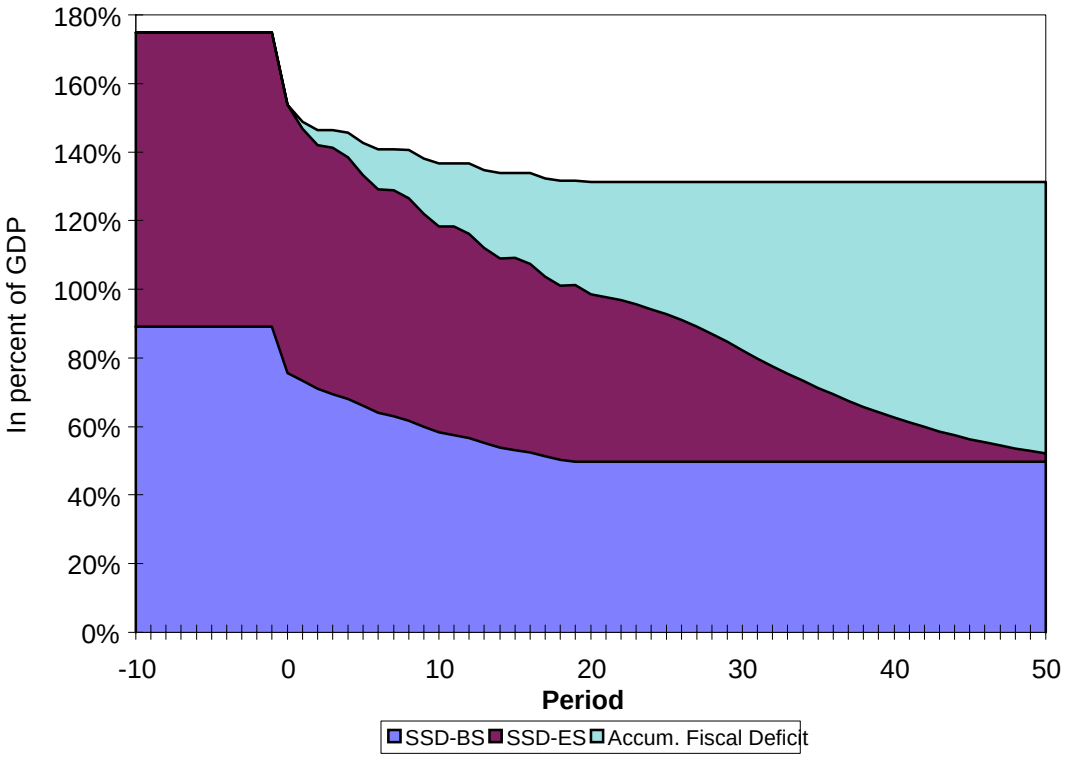
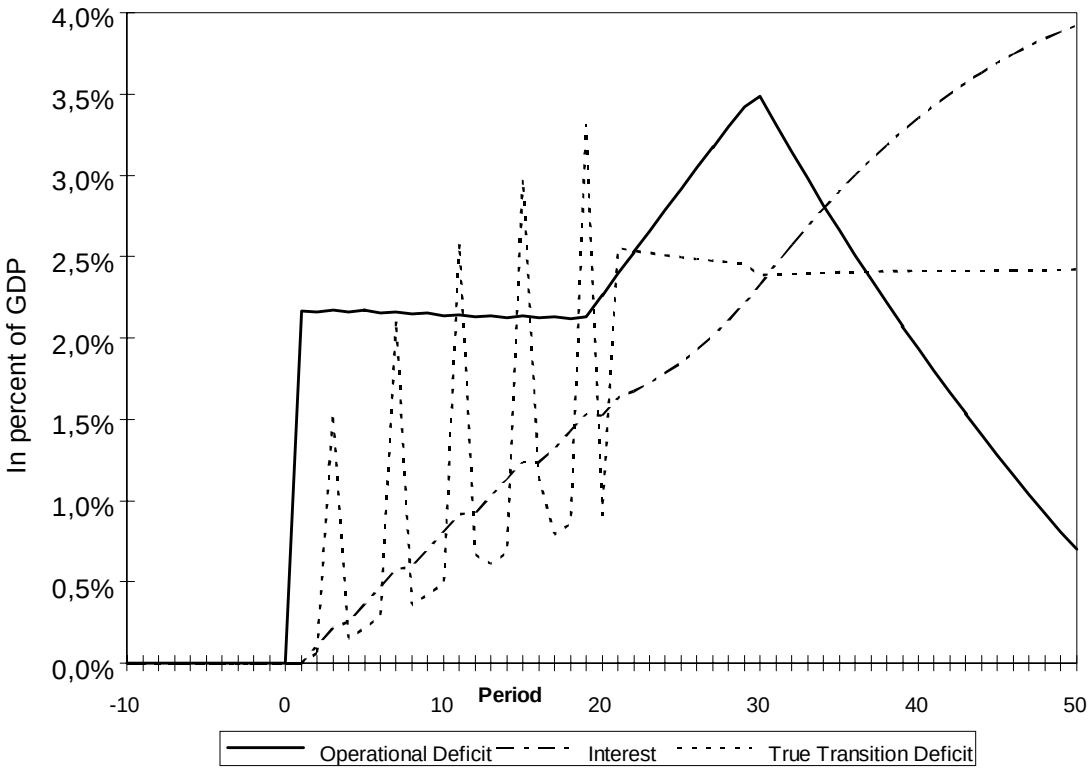


Figure 7.b: Cash Flow Requirements and True Transition Deficit
(r=5%; g=p=2%; unfunded benefit reform in period 0 to



Cash flow considerations also affect the timing of the disbursement of any required compensatory payments. The result in Figure 2 depended on the assumption of perfect foresight in the economy; but with uncertainty and risk aversion individuals may not be willing to switch unless some compensation is provided (as 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, although the financing of government debt instruments would be provided by the individuals receiving the compensation (or their financial intermediaries). An intermediate cash flow requirement arises 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 all switching cohorts and the bonds mature as each switching cohort retires. The minimum cash flow requirement occurs if the recognition bonds are annuitised at retirement (similar to the compensatory pension in the Argentinean reform). This restricts the cash flow requirement to the sum of the annuity payments and spreads it to the year when the last pensioner dies. The RB or annuity solution in fact equals a forced credit by the switching individuals.

Table 3. **Shifting from Unfunded to Funded Pensions: The Restructuring of SSD in Chile and Colombia**

	Chile (1981)		Colombia (1994)	
	Per cent of GDP	Per cent of Total	Per cent of GDP	Per cent of Total
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 of which:	126.0	100	83.6	100
Operational deficit[3]	99.9	79	69.2	83
Compensation amount[3]	26.1	21	14.4	17

Notes:
n.a.: not available
1. Calculated from accumulated deficits under alternative scenario simulations and the assumption of an interest rate equal to the economic growth rate.
2. Includes effects from higher contribution rates along with increased retirement age and changes in the benefit structure.
3. Calculated from the discounted flow projections under the interest rate assumption in Note one above.

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

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 generated predominantly by the operational deficit.

Transition and Financial Market Reactions

A temporary widening of the fiscal deficit resulting from a partial UF-FF shift and reflecting merely a redistribution of total debt between implicit and explicit liabilities should have little effect on the pure interest rate. It affects the capital stock and national saving only marginally; the saving inherent in the newly established funded provisions can meet any additional credit demand by government. The balance of payments also should feel no negative direct impact.

How the international financial markets react, and whether a change in the risk premium occurs in response to higher fiscal deficit and debt levels, however, remain unanswered questions. Because the total public debt remains unchanged, one would expect *a priori* that any risk premium would do the same. Yet financial markets may look only at the financial debt rather than the total debt as the element whose default probability a risk premium reflects. The result will depend on the markets' assessment of the default probabilities of both implicit and explicit debt, and their interaction.

If financial markets perceive that the government will never default on its pension obligations (*i.e.* introduce a reform of the unfunded tier which reduces its commitments to current retirees and the workforce), the risk of a default on the financial debt should increase with a rising SSD, because the set of policy options to repay that debt is reduced; there is less scope for tax increases, but still latitude 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 become convinced that the government will default on the pension commitment before defaulting on its financial obligations, the level of the SSD and thus any change should be inconsequential for the 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 markets consider default on both kinds of debt equally likely, the risk premium should be driven by the size of the total debt.

There is no empirical evidence on any of the three conjectures. The concentration of the drafters of the Maastricht treaty on the financial debt (and deficit) when formulating the fiscal criteria for participation in the European Monetary Union (EMU) starting in 1999 is consistent with the second conjecture, since it ignores important differences in SSD among the member countries (see Table 2)[14]. If this conjecture is correct and the European Union (EU) strictly controls only financial debts and deficits, this could constrain future reform attempts among those EU countries with already fragile fiscal conditions. It could also have important consequences for central and eastern European countries in their endeavour to join the EU in the near future. Many of them are preparing or planning for partial UF-FF shifts, but fear adverse financial market and/or EU reactions. Similar apprehensions concern the reaction of institutions like the International Monetary Fund to a reform-induced widening of fiscal deficits.

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 all future generations. Countries have generally rejected this reform option because they have ruled out either higher explicit debt levels or budgetary financing through contractionary fiscal policies. Nevertheless, the welfare economic criterion of a "Pareto-improving transition"—*i.e.* making at least one generation better off and no other worse off—implies a different assessment once economic externalities of the reform are taken into account. The fiscal issues of Pareto-improving financing of the debt conversion should include intergenerational redistribution, changes in the efficiency of taxation and macro-economic effects. This section outlines the main financing options, including the use of privatisation proceeds, under both neo-classic and endogenous growth conditions.

Debt And Budgetary Financing in a Neo-classic World

Whatever the transition path chosen, radical or minimal, a UF-FF shift will burden at least one generation unless the economic benefits generated by 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 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 (Homburg 1990).

The two well known fiscal alternatives to finance a transition — pure debt financing and pure budgetary financing — have 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 because higher revenues or lower expenditures are required to finance the true transition deficit resulting from a difference between the interest rate and the economic growth rate. Otherwise, as noted above, the explicit and thus total debt grow without bounds, in absolute terms and as a per cent of GDP. In industrialised countries, the interest and growth rate differences range between two and six per cent[15], which would give rise to a long-term true transition deficit of one to three per cent of GDP if SSD of only some 50 per cent of GDP (roughly a quarter of the total SSD) were to be made explicit and added to the financial debt. This permanent burden results from a transition 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. This 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 closure of the economy, and falls with the prevalence of voluntary intergenerational transfers (see, for example, Schmidt-Hebbel, 1993).

The costs of transition can fall or even disappear under both debt and budgetary financing if the new pension scheme exhibits lower negative externalities than the unreformed scheme. Negative externalities can arise from 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 this burden may be used to repay the implicit debt of an unfunded scheme within finite time (Homburg 1990). Since public pension schemes and the way they are financed definitely entail numerous distortions, a change in the funding mechanism may thus actually improve welfare — if the funded scheme is less distortionary than the unfunded one for individual saving decisions and labour supply. Such a result is not necessarily linked with the funding procedure but, assuming an elastic labour supply, typically relates to an inadequate benefit/contribution link in unfunded schemes. Public and earnings-related pension schemes traditionally have distributional and annuity components; their mingling and the lack of a clear contribution/benefit link produce the distortions (Schmidt-Hebbel, 1993 and World Bank, 1994). 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 tier (of a universal or assistance type) taking care of distributional and poverty considerations, and a fully earnings-related one financed by earmarked contributions only.

Theory remains unclear on whether such a separation always creates fewer distortions than a well-conceived, traditional social insurance scheme. The basic component will exist in any alternative system and distortions become the inevitable consequence of introducing distributional objectives. Forced saving always distorts labour supply unless assumptions about perfect credit markets allow individuals to borrow freely against their future labour and pension income. The remaining, potentially avoidable, distortions then become reduced to the effects of an alternative funding mechanism. These effects may exist, because a nondistortionary pension scheme requires actuarial neutrality and that 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; see Breyer and Straub, 1993 and Perraudin and Pujol, 1995). Put differently, a pension system will 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[16].

Simulation studies with OLG-models along the lines of Auerbach-Kotlikoff (1987) suggest comparatively small welfare gains from the elimination of labour market distortions. A model calibrated on the German pension system exhibits welfare gains of some nine per cent of life-time resources to future generations if the transition generation is *not* compensated. With compensation, the gains to future generations are reduced to about two per cent (Raffelhüschen 1993). Simulations by Kotlikoff (1995) provide higher gains to future generations of 4.5 per cent (while compensating the transition generation), assuming that the benefit-tax linkage is low, the initial tax structure features a progressive income tax, and a consumption tax is used to finance the transition. When these assumptions are reversed — *i.e.* when the initial tax structure is a proportionate income tax, the tax-benefit linkage is strong and income taxes finance the transition — and when the transition generation is fully compensated, future generations suffer a 3.1 per cent welfare loss.

The traditional OLG-models highlight the critical assumptions for a Pareto-improving transition in a neoclassic 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 necessarily the case, especially in an open economy. Furthermore, the net efficiency gain declines with the incidence of worker-consumption myopia.

In a closed economy, the results depend on the particular structure of preferences. Simulations indicate that for particular parameter combinations a shift between wage and income taxation produces efficiency gains

predominantly, but not always (Auerbach and Kotlikoff, 1987). 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 will likely drop further. With capital much more mobile than labour, the effective taxation of capital income falls or even disappears; 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 change not the tax incidence and the distortionary effects but only the way taxes are levied.

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

Summing up, under a traditional neoclassic setting, the financing of a UF-FF shift becomes technically feasible but difficult to justify in economic terms. The small long-term welfare gains can occur only at the expense of the transition generation unless net efficiency gains come from a corresponding shift in the mode of taxation; the likelihood of such gains is small. Thus additional positive economic effects are required to justify such a shift in welfare terms and provide the necessary fiscal financing. They can come from the impact on economic growth.

Debt and Budgetary Financing with Endogenous Growth

Positive externalities leading to a higher growth rate than otherwise can appear along four main avenues in a UF-FF shift:

— A higher employment level;

— A higher national saving rate;

— A higher rate of capital accumulation; and

— A higher rate of technical progress.

The second and third effects, identical in a closed economy, can diverge in an open one. All four or a subset can interact and strengthen each other.

The central economic benefit claimed to result from a UF-FF shift lies in its impact on financial markets, which in turn positively influences capital formation, saving and economic growth[17]. Improved financial markets may result in higher productivity, leading to a temporary rise in technical progress — and embedding those considerations in endogenous growth theory may lead to permanently higher growth than otherwise would be the case. Enhanced economic resources may then allow for a Pareto-improving repayment of the SSD made explicit.

The channels through which the economic effects occur and their empirical magnitude both have importance for the links among pension reform, financial market development and economic growth. Our understanding of these links remains weak and their modelling in its infancy.

The basic claims for the impact of pension funds on financial markets assert that the demand for specific financial market instruments (with regard to risk, liquidity and maturity), their spread to existing market intermediaries such as banks and insurance companies, and the potentially competitive creation of pension funds make financial markets broader and deeper, more liquid and more competitive. A casual comparison between financial markets in countries with strong and weak traditions in funded pension arrangements (say, the anglo-saxon countries versus most countries of continental Europe) supports such a view, but so far modelling and empirical data have provided little substantiation (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[18]. Against the background of neoclassical growth theory, however, these studies argued only for temporary efficiency gains. More recent developments in growth theory allow for level as well as growth-path effects. 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 ones (Bencivenga and Smith, 1991, Levine, 1991, Bencivenga *et al.* 1996). Alternatively, financial markets promote the acquisition and dissemination of information, allowing for better allocation of resources and risk (*e.g.* Diamond, 1984, and Greenwood and Jovanovic, 1990). Finally, financial markets permit increased specialisation, a shift away from less productive technologies (Cooley and Smith, 1993, Saint-Paul, 1992).

All these models cover key aspects of financial markets and their impact on real activity, providing important analytical insight on issues raised by the literature for decades. Yet they all fall short of providing a comprehensive framework for the different effects of financial markets and for empirically testable relationships. This still awaits future work. Some recent empirical papers demonstrate links among financial variables, financial sector reform

and economic growth and efficiency (*e.g.* Levine and Zervos, 1996; Johnston and Pazarbasioglu, 1995), but their econometric specifications relate only weakly to any underlying theoretical model.

To introduce potential growth effects of financial market developments simply in an EG-model, one can propose the following structure, borrowing from Villanueva (1993):[19]

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

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

The saving ratio s (*i.e*. the investment ratio in a closed economy) is positively related to variables measuring the depth, liquidity, and maturity of financial markets, summarised in the parameter *k.* Other variables which may influence the domestic saving rate are public saving behaviour or tax regulations. The change in technical progress dT/dt depends not only 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. The term $\alpha(k, ...)$ depends on the financial market variable *k* and 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.[20]

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

[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[21]. 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 pattern *(i.e.* $\partial c^*/\partial s = 0$*)* is that both the steady-state growth rate and the 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 $\alpha(k,...)k^*$.

The difference between the old and new growth paths — $2\alpha(k,...)k^*$ — may be used to finance the transition, *i.e.* to repay the implicit debt without burdening the transition 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[22]. One approach could be to pay wages (and pensions) to individuals according to the old growth path till the growth differential allows repayment of the implicit debt. Since in a competitive setting the marginal product of each worker increases at the same rate as his efficiency, $g^*(k^*)-n$, capturing the full growth differential requires lump-sum taxation to ensure Pareto indifference for the transition generation until the social security debt is repaid.

Repayment of the public debt, however, requires additional fiscal considerations. New resources resulting from higher growth can be captured by the government in a non-distortionary manner only with lump-sum taxation. In this case, all additional resources (compared to the benchmark of no pension reform) could be used to repay the SSD in a Pareto-efficient way. With distortionary taxation, the empirically relevant case, essentially constant tax rates on an enhanced tax base will capture only part of the larger economic resources, if an increase in tax-related distortions can be prevented. Thus, to maximise consumption utility (through consumption smoothing) while minimising tax distortion (through tax smoothing) would speak in favour of temporarily widening the reform-induced fiscal deficit, with gradual repayment in the years thereafter.

The Use of Privatisation Assets

EU countries (such as Austria, France and Italy) with strong traditions of large public sectors, and even more the former centrally planned economies, have important government assets (public enterprises, land, etc.). In principle, those assets can help to finance a UF-FF shift. In economic terms, government assets (GA) are exchanged against government liabilities (SSD). Because selling those assets on large scale often proves difficult, especially in the emerging market economies of eastern Europe, various proposals have arisen to swap the GA against SSD. Compared to a free

distribution of assets to the population *via* vouchers, as done in countries such as the Czech Republic, Bulgaria, Poland and Russia, the net asset position of government would remain unchanged, whereas with free distribution the net position deteriorates and requires compensation *via* increased taxes. While such a swap is easy in accounting terms, it poses important problems for intergenerational equity, liquidity and corporate governance, and the scope of the swap is likely to be limited.

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. Uncertain figures for eastern Europe suggest a wide potential range of some three to 70 per cent of social security debt which could be compensated for by government assets (Holzmann, 1994). Empirical data on Hungary and Poland indicate an actual ratio in the lower part of the range, around five to ten per cent. 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 per cent of GDP and ten per cent of privatisable assets). The Polish privatisation plan originally envisaged a transfer of 20 per cent of government assets to the Social Security Fund(s). Under the latest plan, 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 per cent of GDP) or an estimated SSD of around PLN 900 billion (about 380 per cent of GDP). Thus only five per cent or less of the SSD could be swapped. Estimates of similar magnitude apply to some Latin American reform countries. To cofinance the Colombian pension reform, for example, Schmidt-Hebbel (1995) quotes a figure of ten per cent of GDP in privatisation revenue; this compares to a long-term financing requirement (the SSD made explicit) of 83.6 per cent of GDP.

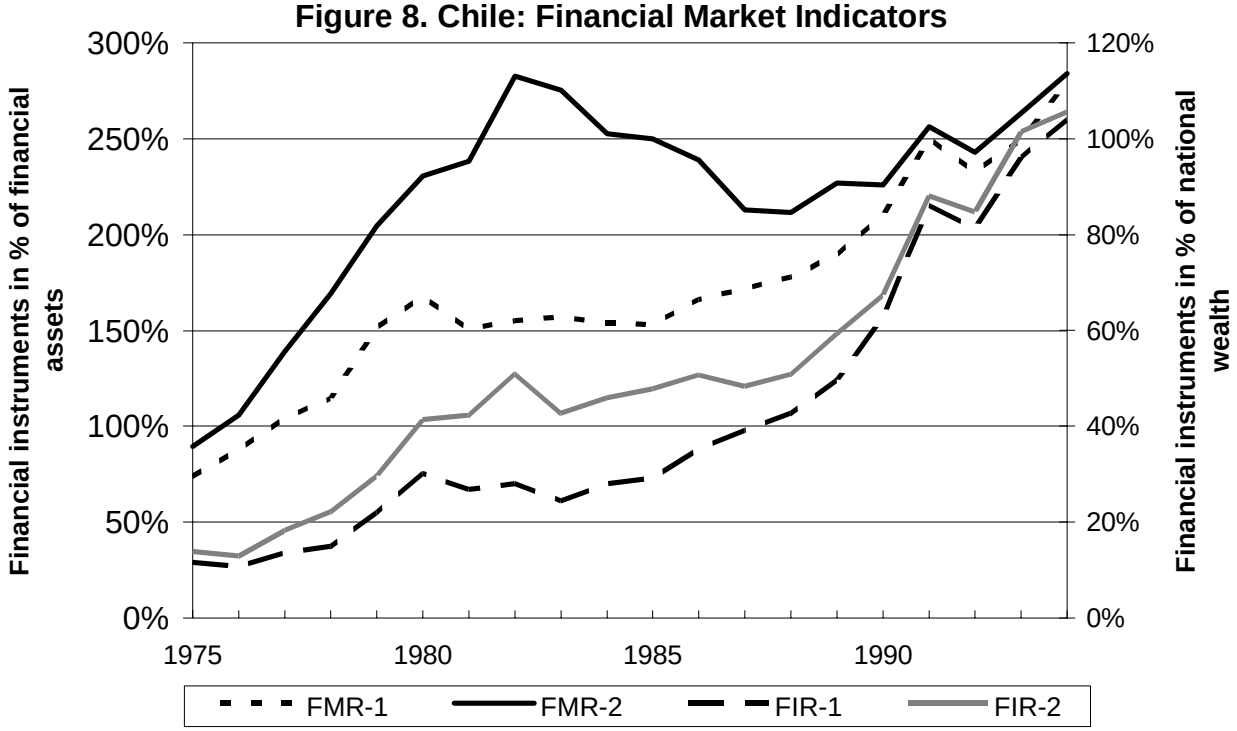
V. Financing the Transition: The Chilean Experience

Chile's pension reform of 1981[23] has received wide international attention; many domestic and foreign observers give it a key role in the country's excellent economic performance since the mid-1980s (see Table 4). If confirmed empirically, that experience could serve as an example of a Pareto-improving transition. Yet the claimed links among the UF-FF shift, financial market developments, capital formation and saving, and economic growth have had little empirical investigation. This section reports pertinent findings by the author which are presented comprehensively in Holzmann (1996). The results, consistent with the hypothesis that the links exist, also highlight the role of Chile's restrictive fiscal policies.

Pension Reform and Financial Market Developments

A key claim about the effects of the Chilean pension reform concerns its contribution to the development of the financial sector (see, for example, IMF, 1995). The general hypothesis holds that the rising investment needs of the pension funds, the instruments thereby created, and the competitive

Figure 8. Chile: Financial Market Indicators



nature of the privately managed pension funds made the financial markets deeper, more liquid, competitive and efficient. This in turn contributed to higher saving, capital accumulation and economic efficiency (*i.e.* technical progress) and thus economic growth. The first step to test the hypothesis constructed various indicators of financial market development (FMIs)[24]; the second investigated statistically the impact of the development of pension fund assets (AFP) on those indicators; and the third involved econometric tests of the impact of the FMIs on total factor productivity and capital stock accumulation (for details see Holzmann, 1996).

Table 4. **Chile: Macro-economic Indicators and Pension Fund Performance, 1970-1995**

Year	Macro-economic Indicators					Pension Fund Asset (AFP) Performance			
	Real GDP Growth	CPI Inflation	Unemployment Rate	Real Exchange Rate[1]	Private Saving Rate	Real Rate of Return	AFP as Per Cent of GDP	AFP as Per Cent of Market Assets	
								Enterprise Bonds	Shares
1970	2.1	34.9	5.7	48.5	8.9				
1971	9.0	22.1	3.9	45.2	11.8				
1972	-1.2	163.3	3.3	41.9	12.2				
1973	-5.6	508.4	5.0	62.7	7.7				
1974	1.0	375.9	9.5	95.0	17.6				
1975	-13.3	340.7	14.9	123.8	-0.6				
1976	3.2	174.3	12.7	111.4	9.0				
1977	8.3	63.5	11.8	100.0	6.7				
1978	7.8	30.3	14.2	119.3	7.7				
1979	7.1	38.9	13.6	122.9	6.1				
1980	7.7	31.2	10.4	106.5	6.5				
1981	6.7	9.5	11.3	92.6	2.7	21.3	0.9	0.4	0.0
1982	-13.4	20.7	19.6	103.3	4.1	28.8	3.6	0.9	0.0
1983	-3.5	23.1	14.6	124.0	7.2	21.3	6.4	8.4	0.0
1984	6.1	23.0	13.9	129.6	4.9	3.5	8.6	10.2	0.0
1985	3.5	26.4	12.0	159.2	8.7	13.4	10.6	7.7	0.0
1986	5.6	17.4	8.8	175.1	10.7	12.3	12.7	11.1	2.0
1987	6.6	21.5	7.9	182.7	15.2	5.4	14.2	27.1	3.2
1988	7.3	12.7	6.3	194.7	17.2	6.4	15.1	46.0	4.2
1989	9.9	21.4	5.3	190.2	16.5	6.9	17.7	47.5	4.8
1990	3.3	27.3	5.7	197.4	19.4	11.5	24.3	58.2	5.5
1991	7.3	18.7	5.3	186.3	19.9	29.7	30.4	60.8	8.3
1992	11.0	12.7	4.4	165.4	19.4	3.1	30.6	61.0	10.1
1993	6.3	12.2	4.5	168.9	19.2	16.2	37.3	56.7	57.2
1994	4.2	8.9	5.9	160.5	20.7	18.2	41.1	57.2	10.6
1995	8.5	8.2	4.7	156.9	20.8	-2.5	38.9	n.a.	n.a.

Units: Real GDP growth in per cent per year; Inflation in per cent per year (Dec.-Dec.); Unemployment in percent (Oct.-Dec.); The real exchange rate is an index with 1977 = 100; Private saving as per cent of GDP; Rate of return on AFP in per cent.

Note: 1. An increase in the real exchange rate indicates a real depreciation of the domestic currency.

Sources: Central Bank of Chile *Monthly Bulletin* and Superintendancy of AFP *Statistical Bulletin.*

Essentially all the FMIs investigated (see note 24) exhibit a strong upward movement after the banking crisis of 1981/83 (Figure 8). The correlations of AFP and FMIs, and of AFP shares in total traded shares and FMIs, are very strong with coefficients in simple regressions close to one and R^2 values of 0.9 and above. A strong correlation also holds for monthly data between the turnover in asset trade (bonds, shares, etc.) and the level of assets held (end of month) by the pension funds (a proxy for unavailable pension fund turnover data), 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 ($r = 0.65$); this corresponds to the period when pension funds were restricted to holding 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. These findings support 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 analysis is consistent with the claim that pension fund activities enhanced efficiency and risk allocation.[25] With the gradual relaxation of regulations for pension fund investments, their portfolios have become more diversified, providing important financing instruments for the private sector. Various econometric evidence suggests that pension funds operate efficiently and the selected portfolio, given the restrictions on asset investments which were only gradually lifted, lies 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 establishes only consistency with the claims.

Financial Market Developments and Economic Growth

The limited number of available observations (1975 to 1994) for an econometric test of the impact of FMIs on technical progress and capital accumulation calls for a rather simple specification, with few explanatory variables. Total factor productivity (TFP), the residual in the growth accounting equation, measures technical progress and the change in capital stock, expressed as "K%", quantifies capital accumulation. The unemployment rate (UER) and its change (ΔUER) are proxies to capture strong cyclical effects early in the period, measuring income expectations and their change. The lagged FMI-variables (with an Almon-type lag structure)[26] are normalised to the respective sample averages of one to allow for a direct interpretation of the coefficients. Tables 5 and 6 present the results.

The estimates of the impact of FMI on total factor productivity (TFP) begin with the basic specification, using lagged TFP and the unemployment rate to capture catch-up and cyclical effects, but omitting FMI variables for the moment; this leads to a very satisfying statistical fit (Equation 1in Table 5). Adding the financial market indicators (Equations Two through Five) improves the overall fit, yielding for the lagged FMI variables coefficients significant at the five per cent level and below while reducing the significance of the constant. The estimated parameter values prove robust for different specifications and time periods (not shown), and the lagged impact of financial market indicators (compared to including contemporaneous effects, which prove insignificant statistically) gives confidence in the causality. Taken at face value, the results would suggest that financial market developments have strong effects on TFP. Using the (long-run) point estimates and assuming an equilibrium unemployment rate of 5 per cent, exogenous technical progress would amount to some one per cent, to which technical progress generated by financial market developments adds another percentage point, yielding a long-term annual TFP of around two per cent. The estimated FMI effect likely proxies others that may be highly correlated with financial market developments, such as reductions in exchange rate restrictions and increasing openness of the economy. Data restrictions prevent the separation of these effects.

For FMIs and capital formation, the tests suggest that the change in capital stock follows an adjustment process (the lagged variable enters very significantly), influenced by cyclical effects or expectations about future income developments as measured by the unemployment rate (Table 6). Entering the lagged FMI variables leads to an improvement in the equation fit and to coefficients consistent in sign and significant at the five per cent level and below. Again, taking the (long-run) point estimates for the FIR/FMR variables at face value, the long-term increase in capital stock is over five per cent, reduced by one percentage point due to the assumed long-term unemployment rate but increased with the enhanced financial markets by 0.5 to 1.0 percentage points, or one-eighth to one-fourth of its “natural” level. This result hints at sizeable effects on capital stock formation from financial market development, effects which are additive to the effects of TFP on growth.

Putting the low and high parameter estimates for the FMI effects on total factor productivity and capital accumulation into a growth accounting equation that includes a crude estimate for labour market effects[27] provides a first indication of the possible overall growth effects of the pension reform (Table Seven). The result suggests that the reform may have increased the growth rate by one to three percentage points per year. If this were permanent, it would allow Chile to repay the social security debt made explicit (around 100 per cent of GDP) in 33 to 100 years, without burdening the transition

Figure 9. Chile: Fiscal Stance, 1970-95

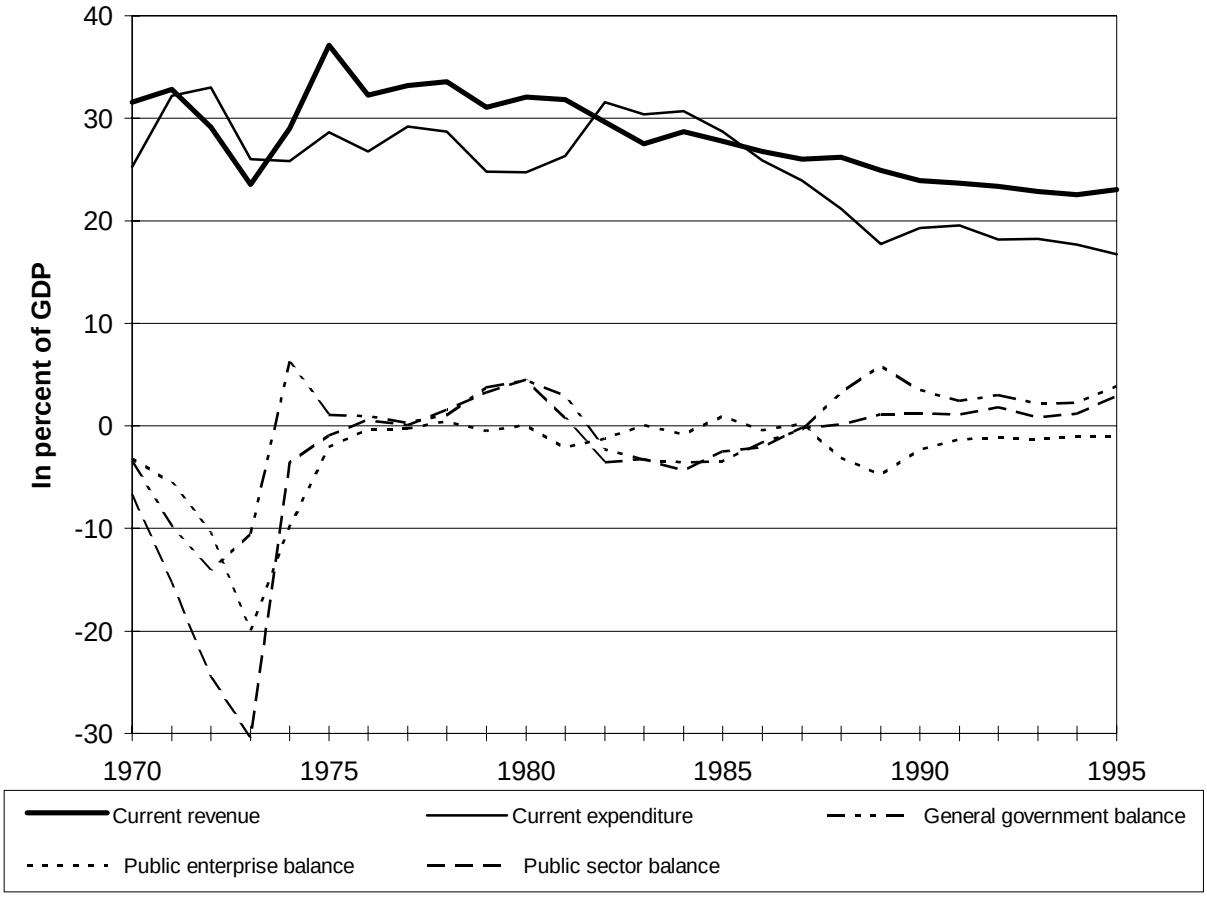


Table 5: **Chile: Total Factor Productivity and Financial Market Developments**

Endogenous variable: TFP	Constant	TFP(-1)	Unemployment Rate (EUR)	ΔUER(-2)	FMI(-1)	
EQ(1)	0.055	-0.125	-0.566	-0.569		R^2 = 0.871
	(4.38)	(1.66)	(4.77)	(4.42)		DW = 1.77
EQ(2)	0.025	-0.175	-0.374	-0.679	0.013	R^2_c = 0.916
FMI_{-1}=ΔFIR1	(1.47)	(1.72)	(2.87)	(5.73)	(2.32)	DW = 1.48
EQ(3)	0.0349	-0.132	-0.462	-0.703	0.010	R^2_c = 0.908
FMI_{-1}=ΔFIR2	(2.28)	(1.53)	(3.96)	(5.34)	(2.02)	DW = 1.75
EQ(4)	0.042	-0.260	-0.509	-0.541	0.012	R^2_c = 0.964
FMI_{-1}=ΔFMR1	(5.54)	(3.69)	(7.67)	(7.58)	(5.01)	DW = 2.48.
EQ(5)	0.055	-0.119	-0.613	-0.645	0.005	R^2_c = 0.926
FMI_{-1}=ΔFMR2	(5.48)	(1.86)	(6.38)	(6.07)	(2.70)	DW = 2.43

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

generation — if the government can capture all the additional economic resources in a non-distortionary manner, and if 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 100 to 300 years. Given the cash-flow requirements of the transition (operational deficit and redemption of recognition bonds) of some five per cent of GDP, but additional budgetary revenue (at constant revenue share of one-third) of only one-third of one per cent to one per cent of GDP, this would suggest a transitory rise in the explicit fiscal debt. Yet the data suggest otherwise.

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
FMI_{-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
FMI_{-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
FMI_{-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
FMI_{-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.

Table 7. **Chile: The Impact of Pension Reform on the Economic Growth Rate**
(In per cent)

	Low Estimate	High Estimate
Through TFP[1]	0.4	1.1
Through Capital Formation[2]	0.5	0.6
Through the Labour Market[3]	0.0	1.1
Total	1.0	2.9

Notes:

1. Implied long-run parameter estimates for FMI variable in EQ(2) and EQ(5), Table Five.
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: the difference between employment and population growth of 1.7 per cent per year during 1980-1994, times labour elasticity of 0. 65.

Source: Author's own calculations based on Tables 5 and 6.

Pension Reform and the Fiscal Stance

The cash flow requirements amounting to some five per cent of GDP a year are financed essentially from budgetary resources. Figure 9 highlights the contribution of public saving to support the transition from an unfunded to a funded pension scheme. The difference between current general government revenue and expenditure in the Figure measures public saving, which turned negative only during the initial years of transition (1982-85) before the pre-reform rate of public saving of around five per cent of GDP re-established itself. With the share of current revenue declining as a per cent of GDP due to various tax reforms and tax rate cuts, program reforms and expenditure cuts strengthened the fiscal stance (see Larrain, 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 also reacts to the form of fiscal retrenchment — higher taxes or lower expenditure. The private saving rate responds positively and significantly to a fall in general government current expenditure (Masson *et al.* 1995). That feature dominates in Chilean budgetary policy and may thus have strengthened the rise in private saving[28].

Overall, the Chilean experience suggests that pension reform has a positive and sizeable impact on economic growth, allowing in principle a Pareto-improving transition with additional economic resources that permit repaying in the long run the social security debt made explicit. Nevertheless, the Chilean government decided to repay that debt earlier through fiscal retrenchment, thus burdening the transition generation. This very tight fiscal stance may also have contributed to Chile's outstanding economic performance by crowding-in private investment and lending higher credibility to the overall economic reform programme both in Chile and abroad.

VI. CONCLUDING REMARKS

The transition from an unfunded to a funded pension scheme creates a formidable task for fiscal policy. Liabilities to the current generation of retirees and workers in unfunded pension provisions constitute a huge, hidden public debt. Making this implicit social security debt fully explicit and thus reversing the initial redistribution towards the current generation quite likely lies beyond most countries' political, economic and fiscal capacities. Hence, a transition requires various simultaneous steps including *(i)* benefit reform of the unfunded scheme, reducing the implicit debt; *(ii)* a redesign of the basic tier that remains unfunded to minimise distortions on factor markets; *(iii)* a clear design of the timing, the form and the fiscal flows involved in making debt explicit; and *(iv)* a careful calculation of the compensation necessary to render voluntary but cost effective the switching decision by individual workers.

Theoretical considerations and the Chilean experience strongly suggest the feasibility and potential Pareto improvement of such an approach. The shift can contribute importantly to financial market development, which in turn heavily stimulates total productivity, capital accumulation, labour market performance and thus economic growth. This can generate enhanced economic resources which allow repayment of the debt made explicit. Nevertheless, negative financial market reactions to a higher explicit fiscal debt as well as macro-economic considerations may warrant a more contractionary fiscal stance from the very beginning. The Chilean example suggests that this requires major reforms of other public expenditure and revenue programs.

Expectations about the potential benefits of a reform, together with the inability to reform the unfunded scheme along conventional lines, have motivated many countries in Latin America and eastern Europe to initiate a partial-shift approach. A two-tier mandatory pension scheme, consisting of a reformed and reduced unfunded tier and a newly introduced funded tier, currently constitutes the chosen design in many of those countries. Yet the fiscal requirements for such a shift require more thought and effort. If successful, these reform approaches could stimulate and invigorate the reform discussion in other parts of the world.

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.), the financial market requirements (including regulatory and supervisory needs), the economic impact (such as the change in incorporate governance), or distributional effects. Even a cursory exposition of those issues is beyond its scope. For a critical review of alternative approaches to reform the public pension scheme against the background of countries' recent 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. For an alternative terminology on pension liabilities taken from the US context and further considerations, see Kane and Palacios (1997).

7. 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 value of further liabilities resulting from future contributions and the present value of future contributions cancel out.

8. Overall pension expenditures in most OECD countries are much higher and national estimates of the (net) social security debt arrive at values which are up to 50 per cent above the ones presented (see Franco, 1995).

9. The upper estimate of this multiple can be cross-checked under the assumptions of wage growth equal to the interest rate and a constant demographic structure. With, on average, some 10 to 20 years of retirement for individuals, the accrued obligation amounts to 5 to 10 times the annual expenditure. In addition, the accrued obligation with regard to current working generations has 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 the 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.

10. The view that adjusting an unfunded pension scheme downward represents partial default 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 coping with an intertemporal budget constraint (and temporal imbalances between revenue and expenditure). This view is well taken. Things get more complicated, however, when individuals pay specific contributions and expect future specific benefits in exchange. In such a setting one may claim that property rights are established (indeed, in some European countries pension rights have such status in constitutional court rulings). Then the dividing line between property rights established through the purchase of government bonds and the payment of pension contributions becomes thin or disappears. While in the case of bonds, the partial nonrepayment of principle (and interest) is generally considered a partial default, the imposition of an inflation tax or changes in the tax treatment of interest revenue may not be; economically, however, they are equivalent. The same dichotomy emerges in the case of pension benefits—say, between a direct cut in benefits and a reduction in benefit indexation. Some argue that when contributions are too low to buy future high benefits, individuals should rationally have expected a later adjustment in initially promised benefits; 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 cannot deliver and hence adjusts its commitments downward (i.e. partially defaults).

11. The model has been calibrated to reflect economies with comprehensive two-tier pension systems consisting of a basic tier and an earnings-related tier. Under the baseline assumption, the life-expectancy (LE) is 70 years, the basic tier amounts to 20 per cent of the average wage, the accrual rate in the earnings-related tier is 1.5 per cent per annum, and the retirement age is 60. This results in an average replacement rate of some 50 per cent (net of contribution payments), a contribution rate on net wages of some 30 per cent, and an expenditure share of some 9 per cent of GDP. The baseline scenario implies an SSD of some 163 per cent of GDP, with a real interest/real growth rate differential of three percentage points. Reducing this gap to two percentage points increases the SSD by some 30 per cent of GDP. For the specific model approach and basic model features, see Annex A.

12. 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, ed. (1988).

13. 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 as a per cent of GDP unchanged.

14. 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: a "sustainable government financial position" deemed necessary for participation in EMU is checked by observing how the public deficit and public debt, both measured in percent of GDP, stand relative to official reference values of 3 per cent and 60 per cent. Contrary to the monetary criteria, the fiscal criteria not only are entry conditions for joining EMU, but also are 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).

15. Feldstein (1996) calculates for the United States 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 per cent, and the annual rate of growth of real wages and salaries (the implicit rate of return of the unfunded scheme), averaging 2.6 per cent. This estimate is biased upward compared to the differential between the long-term government bond interest rate and the economic growth rate. Still, his very conservative risk adjustment yields a difference in these terms of 3.8 per cent.

16. 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 rate differentials provides an indication of the size of the implicit tax. For a replacement rate of 50 per cent, the required contribution rate of an unfunded scheme is some 22 per cent under standard survival probabilities, a potential working age of 21 to 65, and a potential retirement age of 66 to 100. With such a contribution rate, an individual could achieve a replacement rate of 108 per cent with a rate differential of 2 percentage points, and a replacement rate of 160 per cent with a rate differential of 3 percentage points. This correspond to implicit taxes of 54 per cent and 69 per cent respectively (calculated as the replacement rate for the funded minus the replacement rate of the unfunded scheme divided by that of the funded one).

17. In the labour market, 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).

18. See, for example, Goldsmith (1969), McKinnon (1973) and Shaw (1973).

19. 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:*

    $N = TL$; and

    the capital coefficient:

    $k = K/N$.

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

20. Since the model features an external effect, the solution of the social planner's problem will not necessarily coincide with the competitive equilibrium in a decentralised economy. In the latter, each agent will take as given K/L, the economy-wide ratio of capital per head, thus ignoring the effect of the 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. If the social planner chooses a savings rate below the one in the decentralised solution, his choice will become binding and the outcome for centralised and decentralised economies 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 decentralised solution will prevail. The following considers the social planner's solution, implicitly assuming that government sets the saving rate below the one derived in the decentralised economy.

21. 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^{*}.

22. 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.

23. 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).

24. 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.

25. The mispricing indicators measure the actual performance of financial assets compared to a reference performance based on alternative model calculations. If pension fund activities improve the performance of the finance market the mispricing should decrease with enhanced fund activities. The simple correlation coefficients between the mispricing and pension fund indicators prove to have correct signs, are statistically significant at the five per cent error level, and range between -0.27 and -0.52.

26. 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, $\Delta FMI(2,2)_t = \Delta FMI_t + 4\Delta FMI_{t-1} + 9\Delta FMI_{t-2}$.

27. The impact of pension reform on labour market performance was not investigated. Since 1980 the growth rate of the labour force has been 1.7 percentage points per year above the growth rate of the working population, the value taken for deriving the high-growth estimate.

28. 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).

ANNEX A

The Simulation Model

The OLG model along the lines of Auerbach-Kotlikoff has become an established, widely used instrument for investigating the impact and effects of pension reform on the economy (see, for example, Arrau, 1991, Arrau and Schmidt-Hebbel, 1993, Cifuentes and Valdes-Prieto, 1994, Schmidt-Hebbel, 1993 and 1995, Perraudin and Pujol, 1994, Kenc and Perraudin, 1996). Such models provide important insights into intertemporal economic interactions, but they also have severe limitations. First, in their current structure they allow only for one control variable, consumption. This excludes investigation of other decision processes, such as switching between funded and unfunded schemes. Second, the models are based on a deterministic life span (*e.g.* 75 years). Nondeterministic specifications 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. Third, the current OLG-models do not allow investigation of the effects of aging on the SSD and the transition costs. Fourth, this type of model is a very cumbersome and time consuming instrument for investigating different options for pension reform.

For these reasons, this paper applies a somewhat different model type, which may be described as an overlapping cohort model in an open economy (*i.e.*, it assumes 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. Highly parameterised, it allows 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 thus permits analysis of a wide range of reform options and their fiscal implications. Its drawback, that of any of spreadsheet-based model, is the long calculation time for each simulation.

ANNEX B

Individual Switching Decisions and Compensation

To derive the compensatory amount 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 an age cohort **A** compares the present value of expected lifetime resources LTR at retirement age **RA** under the unfunded and funded schemes:

(B1) $LTRU(A)_{RA} <> LTRF(A)_{RA}$

If the present value of life-time resources under the funded scheme exceeds that of the unfunded one, 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 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.

$$(B2)\quad LTRU(A)_{RA} = \left[\sum_{a=21}^{A} w_a (1- c^{ub}_a - c^{ue}_a) (1+r)^{A-a}\right] S(A, RA) (1+r)^{RA-A}$$

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

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

$$(B3)\quad LTRF(A)_{RA} = \sum_{a=21}^{A} [w_a (1 - c^{ub}_a - c^{ue}_a) (1+r)^{A-a}] \, S(A, RA) \, (1+r)^{RA-A}$$

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

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

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

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) schemes, respectively; **r** the interest rate (held constant for simplicity); **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 ease of notation, the retirement age **RA** is the last year of activity.

Because the net wage until the decision age A — the first term in equations (B2) and (B3) — is the same under both options, it cancels 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:

$$(B4)\quad \sum_{a=RA+1}^{100} b^{ue}_a \, S(A, a) \, (1+r)^{RA-a} - \sum_{a=A+1}^{RA} w_a \, c^{ue}_a \, S(A, a) \, (1+r)^{RA-a}$$

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

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

For equal contribution rates under the unfunded and funded scheme the terms for the contribution payment cancel out and (B4) can be rewritten as:

$$(B5) \qquad CP(A)_{RA} > \sum_{a=RA+1}^{100} (b^{ue}_{a} - b^{fe}_{a})\, S(A, a)\, (1+r)^{RA-a}$$

where b^{ue}_{a} is the unfunded benefit after full contributions (depending on the internal rate of return of an unfunded scheme), and b^{fe}_{a} is the funded benefit with the reduced contributions after the switching age (depending on the interest rate r).

From equation (B5), the impact of a higher interest rate on lowering the compensatory amount can be deduced immediately. First, it obviously increases the discount factor. Second and more important, 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 them. Despite a shorter contribution span under 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 contributions 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 at the time of the switch can be zero.

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