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# The Hungarian Pension System in Transition

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by

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## **Abstract**

After discussing the evolution of the policy dialogue in Hungary, the paper broadly describes the reform of the pay-as-you-go public pension system and its partial privatization as legislated in July 1997. Through a combination of a debt and tax financed transition, the first partial pension privatization in Central Europe is shown to generate increased national savings while placing the pension system on a more sustainable course. The potential positive impact on savings was diminished by politically-motivated compromises. Outstanding issues include problematic features of the “second pillar” and the reemergence of pay-as-you-go deficits in the long run. This suggests that further reforms, such as raising the retirement age beyond 62, will eventually be required.





## **I. Introduction**

The Hungarian public pension system is a defined benefit scheme financed on a pay-as-you-go (PAYG) basis that has reached a high degree of maturation. Like PAYG schemes in many aging countries, the Hungarian pension system is characterized by high system dependency ratios, large expenditures relative to GDP, high contribution rates, and a precarious financial situation. In addition to the inevitable impact of demographic aging, the deterioration of pension finances in Hungary is also strongly related to policies prevailing under the socialist regime, such as a low retirement age, and to certain strategies followed during the transition to a market economy, such as the liberal use of disability pensions to ease transitional unemployment.

Despite very high payroll taxes and reductions in the average pension through manipulation of various indexation parameters, earmarked revenues have not covered expenditures in recent years. Expenditure pressures will intensify after the turn of the century, when dependency ratios are projected to increase significantly. Meanwhile, the scope for keeping these expenditures under control through ad-hoc adjustments to indexation parameters is narrowing. Explosive deficits could come sooner, if the high payroll tax rates and the diminishing confidence in the public PAYG scheme continue to drive economic activity into the informal sector, further eroding the tax base. A shrinking tax base and growing pension expenditures would result in either larger General Government deficits or higher payroll taxes. Neither outcome would be acceptable, given the Government's efforts to correct the large fiscal disequilibria of the early 1990s (7-8 percent to GDP), and to reduce the extremely high payroll tax rates, which constitute more than 40 percent of labor costs, defined as gross wages plus employer contributions.

The challenge for Hungary is to design and implement a pension reform capable of restoring long-run financial viability and reducing economic distortions while protecting the most vulnerable groups during the transition. In May 1996, the Hungarian Government announced its intention to take on this challenge by introducing a multipillar system in Hungary. The draft legislation was submitted to Parliament in May 1997, after one year of intense technical work and

discussions with the major social partners. The law was passed by Parliament in July 1997 and full implementation will begin during the first half of 1998. With this timetable, Hungary will be the first former socialist country to implement such a systemic change.

This paper examines the recent evolution of the Hungarian pension system and the reform proposal passed by the Hungarian Parliament in the summer of 1997. The paper is structured as follows: The next section identifies the problems of the current PAYG system and presents long-run deficit projections in the absence of reform. The third section briefly examines the policy discussion surrounding the reform effort. The fourth section describes the reform program and presents an assessment of its medium and long-run economic impact. The fifth section concludes and identifies preliminary lessons for other transforming socialist countries.

## **II. Performance of the Pension System in the Post War Period**

### *The Maturation of the PAYG System*

Hungary's PAYG system matured rapidly during the post-war period, as coverage expanded and the retirement age was reduced from its pre-war levels of 65/60 to 60/55 for men and women, respectively.<sup>1</sup> Table 1 shows this maturation as reflected in the rapid increase of the system dependency ratio (the ratio of pensioners to workers), which surpassed the old age dependency ratio (the ratio of persons aged 60 and above to those aged 20-59) in the mid-1970s. The growing difference between the two ratios was partly due to the low retirement age of women, who comprised an increasing proportion of the pensioner population, and whose life expectancy at retirement rose from 20 to 23 years over the last three decades. Benefit levels also rose, driven both

by longer average contribution periods, as well as more generous benefits and more permissive eligibility rules. These developments, typical of PAYG schemes around the world, led to a steadily increasing ratio of pension spending to GDP (Figure 1).

**Table 1**  
**Maturation of the Hungarian Pension System, 1950-1995**

Year	Ratio of Pensioners to Employed (in %)	Ratio of Pensioners to Pension Age Population <sup>1/</sup> (in %)	Ratio of Persons aged 60+ to those aged 20-59 (in %)	Ratio of Average Pension to Average Net Wage (in %)
1950	12.9	39	21.2	21.5
1955	-	38	-	24.9
1960	15.2	43	25.9	32.4
1965	-	59	-	32.3
1970	26.4	56	32.2	34.4
1975	-	71	-	42.2
1980	35.8	83	30.6	55.5
1985	40.8	93	-	56.2
1990	46.1	105	35.9	66.1
1995	74.8	130	36.0	61.0

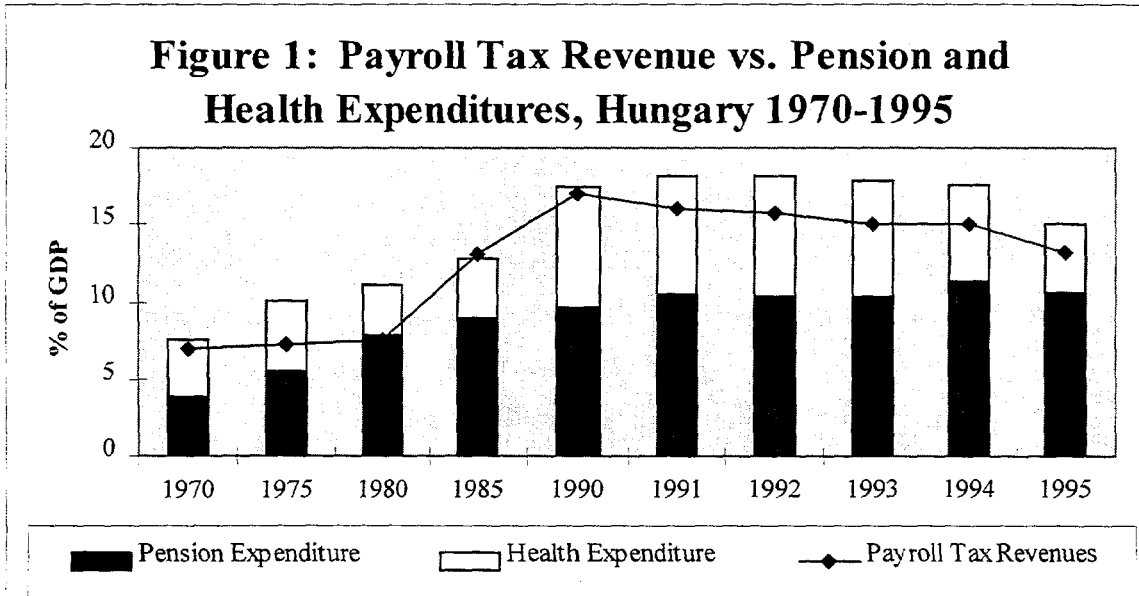
Notes: 1/ Pension age population refers to women over age 55 and men over 60.

Sources: Bod (1995); Pension Insurance Fund (1996); Mitchell (1992).

<sup>1</sup> According to Szalai (1991), the retirement age was reduced in 1944 but the war ended before the change took effect. However, the new Social Security Act retained the lower age limits.

It is difficult to assess the balance of the pension system during the post war period, as payroll tax revenues financed both pension and health expenditures, without any clear distinction between the two classes of expenditures within the overall social insurance budget. In the first two decades after the war there were years when revenues exceeded expenditures, even though payroll taxes were lower at that time. Between 1970s and 1983, payroll tax revenues were not sufficient to cover outlays on both health and pensions (Figure 1), suggesting that the PAYG system started experiencing deficits during that period. Payroll taxes were increased in the latter half of the 1980s allowing the social insurance budget to generate a surplus equivalent to 1 percent of GDP in 1989. Deficits returned in the early 1990s, however, as the pressures on the PAYG system increased again, with the start of Hungary's economic transformation.

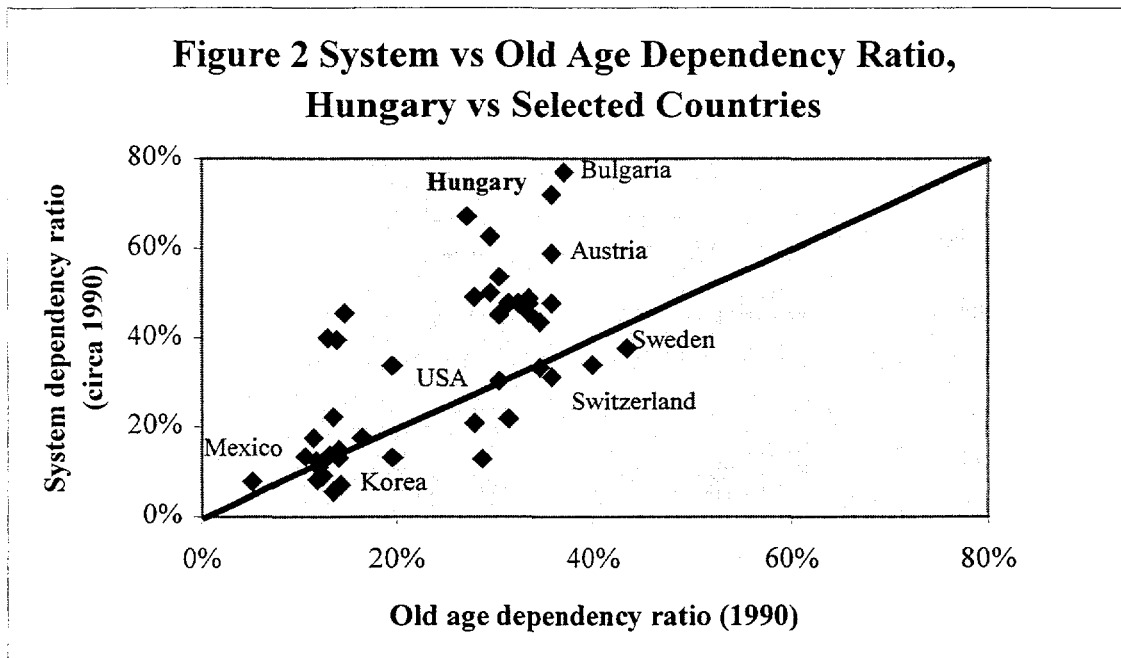
**Figure 1: Payroll Tax Revenue vs. Pension and Health Expenditures, Hungary 1970-1995**



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*Pension Finances during the Transition to a Market Economy*

As in many former socialist countries, pressure on Hungarian pension finances took the form of a dramatic increase in the system dependency ratio between 1991 and 1995. This increase occurred despite a temporary pause in the demographic aging process, as indicated by the stability of the old age dependency ratio between 1990 and 1995 (Table 1). By 1995, the relationship between the old age dependency ratio and the system dependency ratio was among the most skewed in the world (Figure 2). Therefore, recent pressures on the pension system are not directly related to population aging, but to policies prevailing during Hungary's transition towards a market economy.



Sources: World Bank (1994); Pension Insurance Fund (1996).

Specifically, the increase in the system dependency ratio was due to: (i) a reduction in labor force participation (which fell from 85 to 76 percent between 1990 and 1994), (ii) increased unemployment (which rose from nearly zero in 1990 to around 10 percent in 1994), and (iii) an

increase in the rate of new early retirement and disability claims<sup>2</sup> The abuse of the disability system was of particular importance, because it affected both the numerator and the denominator in the ratio. From 1985 to 1990, the rate of new disability claims in the non-agricultural sector averaged approximately 85 per ten thousand covered workers, whereas in 1995 this ratio had jumped to 160.

The exact impact of these shocks to the finances of the PAYG system is difficult to assess, despite the separation of the Pension and Health Insurance Funds (PIF and HIF, respectively) in 1992. This difficulty is due to the shift of certain pension spending outside the PIF budget (e.g., disability pensions for younger workers were shifted to the HIF and agricultural pensions were shifted to the State budget), a convoluted web of transfers between the central budget, the HIF and the PIF, and certain special revenue items in the PIF budget. The PIF itself has experienced deficits of around 0.3 percent of GDP since its creation despite charging payroll tax rates of 30.5 percent on gross wages.<sup>3</sup>

The overall deficit of the PAYG pension system (defined as the difference between all pension expenditures and contribution revenues) is significantly larger. As shown in Table 2, covering all pension expenditures in 1992 (including under-age disability pensions and agriculture pensions) would have required a notional contribution rate of 35.5 percent, or roughly 5 percentage points higher than the rate charged by the PIF. However, the revenues generated from this high notional contribution rate would have fallen short of covering total pension expenditures by approximately 1.5 percent of GDP between 1994 and 1996.

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<sup>2</sup> See OECD (1995) for a discussion of special early retirement programs between 1990 and 1993.

<sup>3</sup> The total tax on gross wages for health and pensions was 54 percent for most of the period. When the PIF and the HIF were established, the 54 percent rate was split in two parts--a rate of 30.5 (24.5/6 employer/employee) percent to finance the PIF and a rate of 23.5 percent (19.5/4 employer/employee) to finance the HIF. Adding the contributions to unemployment insurance payroll taxes represented 60 percent of the gross wage or more than 40 percent of labor costs, defined as gross wage plus employer contributions--among the highest in the world.

**Table 2 Public Pension Finances in Hungary during the Transition**

	1991	1992	1993	1994	1995	1996
	<i>Percentage of GDP</i>					
Contribution Revenues <sup>1</sup>	11.0%	10.4%	10.1%	9.7%	8.9%	8.5%
of which PIF budget	n.a.	8.9%	8.7%	8.3%	7.6%	7.3%
Pension Spending <sup>2</sup>	10.5%	10.4%	10.4%	11.4%	10.5%	9.7%
of which, PIF budget	n.a.	8.6%	8.5%	8.8%	8.0%	7.4%
of which, HIF budget	n.a.	1.2%	1.3%	1.3%	1.2%	1.2%
of which, Central budget	n.a.	0.6%	0.6%	1.3%	1.3%	1.1%
Notional Pay-as-you-go balance	0.5%	0.0%	-0.3%	-1.7%	-1.6%	-1.2%

Notes:

1/ Payroll tax considered here is 35.5% which is the rate required to generate contribution revenues sufficient to cover all pension spending in 1992. Intragovernmental transfers on behalf of the unemployed and soldiers are ignored as are payments of penalties etc. The overall payroll tax for health and pensions was 53% in 1990/1991.

This was raised to 54% (44% employer/ 10% employee) in April of 1992.

2/ Expenditures do not include administrative costs.

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0 The financial performance of Hungary's pension system can be examined further by decomposing the ratios of revenues and expenditures to GDP into several components as shown in equations (1) and (2):

$(1) \frac{\text{Revenues}}{\text{GDP}} = \alpha * \frac{\text{Covered Wage Bill}}{\text{Wage Bill}} * \frac{\text{Wage Bill}}{\text{Labor Income}} * \frac{\text{Labor Income}}{\text{GDP}}$
$(2) \frac{\text{Expenditures}}{\text{GDP}} = \frac{\text{Pensioners}}{\text{Employed}} * \frac{\text{Average Pension}}{\text{Average Gross Wage}} * \text{Real Average Gross Wage} * \frac{\text{Employment}}{\text{Real GDP}}$

In equation (1),  $\alpha$  is the notional contribution rate that would have balanced all pension expenditures and contribution revenues in 1992, the year when the PIF was created. The covered wage bill is the share of the wage bill which is effectively captured to finance pension expenditures, whereas labor income is defined as the wage bill, social security contributions paid by the employer, and the labor share of mixed income (mostly self-employed individuals), all taken from national accounts data. GDP is measured at market prices. Equation (1) highlights the major components of

the base of the payroll tax, and thus enables the identification of the possible sources of erosion of the tax base.

Equation (2) enables the examination of the evolution of pension expenditures, relative to the size of the economy. Thus, for instance, an increase in the ratio of pensioners to employed workers (the system dependency ratio) increases the ratio of pension expenditures to GDP, but this effect can be offset by a commensurate decrease in the ratio of employed workers to real GDP (an increase in labor productivity). Likewise, an increase in the ratio of the average pension to the average gross wage (a measure of the average replacement ratio) increases the ratio of pensions to GDP, but that can be offset by a reduction in the real average gross wage. Note that the average gross wage was constructed dividing the total wage bill by total employment, whereas the real average gross wage was constructed dividing the average gross wage by the GDP deflator. These two variables close the accounting identity in (2), although they differ from the more familiar average wage reported by the Central Statistical Office (CSO).

The components of the two accounting identities (1) and (2) were estimated for the 1991-96 period, which is the period for which consistent national accounts data were available. Total revenues were calculated using a contribution rate of 35.5 percent, which is the rate that would have balanced the PAYG system in 1992 (Table 2). Total expenditures include pension spending by the PIF, the HIF and the State budget. This construction provides a comprehensive view of pension revenues and expenditures at all levels of Government, and makes it possible to compare a consistent definition of pension spending through time.

The results, shown in Tables 3.a and 3.b, reveal several interesting trends. First, contribution revenues declined significantly as a share of GDP between 1991 and 1996. Table 3.a shows that this decline cannot be attributed only to problems in collecting contributions from formal sector employees, as the ratio of the covered wage bill to the wage bill was rather stable during the

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<sup>4</sup> The covered wage bill was estimated from information on contribution revenues and the contribution rate.

<sup>5</sup> This variable is estimated assuming that the labor share of mixed income is equal to the labor share of GDP excluding mixed income.



first half of the 1990s (until the decline in 1996). The absolute level of this indicator does, however, signal persistent problems with the contribution base, given that approximately one fourth of the wage bill seems to be untouched by the payroll tax. Most of the untaxed wage bill was due to arrears, exemptions of certain non-monetary forms of compensation and specific types of income, as well as the taxable earnings ceiling on employee contributions.

The second component is a rough proxy for the proportion of total labor income generated by employees of private firms in the formal sector and public sector employees. This ratio has fallen steadily, as shown in Table 3.a. The decline in the formal sector wage bill relative to total labor income can be largely explained by a shift of many workers to self-employment status, motivated in good part by attempts to minimize tax liabilities. While self-employed workers have to pay payroll taxes just like other workers, they also tend to underreport their income.

**Table 3a Decomposition of Pension Revenues in Hungary during the Transition**

	<i>Percentage of GDP</i>						
	1991	1992	1993	1994	1995	1996	1996/91
Contribution Revenues/GDP	11.0%	10.4%	10.1%	9.7%	8.9%	8.4%	76.2%
Covered Wage Bill / Wage Bill	75.6%	75.2%	75.3%	77.0%	78.0%	73.1%	96.7%
Wage Bill / Total Labor Income	66.5%	63.2%	61.9%	62.2%	58.2%	58.3%	87.6%
Total Labor Income / GDP	61.4%	61.8%	60.9%	57.1%	55.1%	55.3%	90.1%
Payroll tax rate considered	35.5%	35.5%	35.5%	35.5%	35.5%	35.5%	
<i>Memo:</i>							
Wage Bill / GDP	40.8%	39.1%	37.7%	35.5%	32.1%	32.2%	
Covered Wage Bill / GDP	30.9%	29.4%	28.4%	27.3%	25.1%	23.5%	76.2%

Table 3a also shows that the revenue decline was due to the overall contraction of the labor share of GDP which fell from 61.4 to 56.7 percent of GDP over the period. This decline was in good part due to falling labor force participation rates, which in turn was the product of increasing student enrollment ratios, disability, early retirement and fewer working pensioners. Another factor was unemployment which rose from a rate of 0.3 to 14 percent between 1990 and 1993 before

leveling off at 10 percent in 1995.<sup>6</sup> In addition, the sharp decline in 1995 was largely due to restrictive wage policies introduced by the Government in the March 1995 stabilization program--real average wages fell by more than 10 percent during that year.

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This steady decline in revenues was not matched by a similar fall on the expenditure side, however. The relative stability of the expenditure ratio was due neither to favorable demographic patterns nor to reforms of the pension system. On the contrary, despite favorable demographics, the system dependency ratio was allowed to increase precipitously during the period, as proposals to raise the retirement age and tighten disability requirements were largely ignored. As shown in Table 3.b, the jump in the system dependency ratio would have increased the ratio of pension expenditures to GDP by nearly 60 percent between 1991 and 1996, had it not been offset by other factors. This offset did occur however, as indicated by the decline in the replacement ratio, and in the ratio of employment to real GDP (i.e., the increase in labor productivity). During 1995, the real average wage also declined sharply, contributing to the decline in the ratio of expenditures to GDP.

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**Table 3b Decomposition of Public Pension Expenditures in Hungary during the Transition**  
Percentage of GDP

	1991	1992	1993	1994	1995	1996	1996/91
Pension Expenditures / GDP	10.5%	10.4%	10.4%	11.4%	10.5%	9.7%	92.3%
System Dependency Ratio	49.5%	58.5%	66.7%	71.8%	74.8%	78.1%	157.8%
Replacement Ratio (SNA)	52.2%	45.5%	41.3%	44.8%	43.7%	37.9%	72.7%
Wage Bill / GDP	40.8%	39.1%	37.7%	35.5%	32.1%	32.9%	80.5%
<i>Breakdown of Wage Bill/GDP:</i>							
Real Average Wages	191.8	196.7	207.6	211.5	199.6	209.5	109.2%
Employment / Real GDP	2.13	1.99	1.82	1.68	1.61	1.57	73.7%
<i>Memo:</i>							
Replacement Ratio (CSO)	64.4%	58.0%	57.4%	60.8%	61.0%	57.9%	89.8%

<sup>6</sup> The growth of the informal sector during this period (estimated to have reached 30 percent of GDP) may have also reduced total measured GDP and the labor share, as informal activities tend to have a high labor component.

The reduction in the average replacement ratio was largely due to the manipulation of three key indexation parameters in the determination of pension benefits. First, the lack of full actualization of past wage history in the benefit formula resulted in an erosion of real entry pensions.<sup>7</sup> Second, the brackets or bend points in the redistributive benefit formula were not fully adjusted for wage growth, leading to a “reverse bracket creeping” effect. These two factors resulted in a sharp drop of entry level pensions, both in real terms and in relation to the average wage in the economy. Third, less than full indexation of pensions to gross wages also contributed to the reduction in the ratio of the average pension to the average gross wage. During this period, pensions were indexed to movements in the expected net average wage during the upcoming calendar year. As it happened, the average pension failed to fully adjust to changes in net wages, ex-post, and fell even more relative to gross wages during the same period, because of the increase in average personal income tax rates.

The decline in the ratio of employment to real GDP also helped stabilize the pension spending ratio, as shown in Table 3.b. From another angle, although the system dependency ratio increased by more than 50 percent between 1991 and 1996, the impact of such an increase was partly mitigated by the 35 percent gain in labor productivity (real GDP per employed worker) during the same period. Finally, although the increase in the real average gross wage exerted upward pressure on the spending ratio in some years, its sharp drop in 1995 contributed significantly to its decline in that year.

The fundamental role played by the manipulation of indexation parameters in maintaining the balance of the pension system is an important finding. It reveals the system’s dependence on high rates of inflation and *ad hoc* opaque indexation rules which have been perceived as arbitrary and unfair by the Hungarian public.<sup>8</sup> Whereas the scope for continued manipulation of indexation parameters in this opaque fashion seems to be narrowing, further sharp increases in labor productivity are also unlikely, as most of the shedding of excess labor has already taken place.

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<sup>7</sup> The annual wage history since 1988 is taken into account for the determination of new pensions, but wages are only revalued to take into account wage growth up until two years before retirement. Interestingly, this also seems to be the practice in the United States.

Therefore, in order to control expenditures, the Government needed to introduce more fundamental reforms to the pension system.

*The Future of the PAYG Scheme in the Absence of Reforms*

As mentioned before, pension finances deteriorated significantly during the early 1990s, despite favorable demographic developments. Along with the rest of Europe, Hungary will experience rapid population aging in the next few decades, putting further stress on the PAYG system. Under current policies, this demographic pressure will lead to a situation in which one worker will have to support one pensioner by the year 2035. Therefore, it is essential to assess the potential impact of such a deterioration in fundamentals on the finances of the Hungarian pension system. This assessment was made through the use of an actuarial model developed as part of the reform (described in more detail in Appendix 1).

The main economic and demographic assumptions underlying the actuarial projections are shown in Table 4. Official Government projections of the main economic variables are used for the first three years (1997-99). After 1999, GDP and wage growth are consistent with convergence with Austrian per capita income levels around 2030, assuming Austrian real GDP growth rates of approximately 1.5 percent p.a.<sup>9</sup> Real wages are projected to grow in line with increases in productivity, implying a stable labor share in GDP, and real wages growing slightly faster than GDP (due to the projected decline in the working age population). Inflation is assumed to drop rapidly and then to stabilize at about 3 percent p.a. after the year 2000, reflecting convergence with Western European rates of inflation. The unemployment rate is assumed to fall very gradually and to stabilize at around 6 percent by the end of the projection period. While the baseline demographic projections (elaborated by Háblicsek (1995)) imply a significant increase in the old age dependency ratio, the actual number of contributors to the pension system is determined by demographics as well as labor force participation rates. The latter are assumed to remain roughly constant after 1995 given that an exogenous recovery in formal sector participation rates is rather improbable in the

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<sup>8</sup> For a description of these arbitrary effects, see Kalmanne et. al., (1996) and Simonovits (1997).

absence of a well-designed package of reforms (including, *inter alia*, a higher retirement age, disability reform, lower payroll taxes).

**Table 4 Summary of Economic and Demographic Assumptions for  
Baseline Pension Projections, Hungary 1997-2050**

Period	1997-1999	2000-2030	2031-2050
<i>Average Annual Rates (in %), Unless Otherwise Indicated</i>			
<b>Economic Assumptions<sup>1</sup></b>			
Real GDP Growth	3.5	3.6	2.6
Real Wage Growth	3.3	4.0	3.3
Inflation Rate	13.8	3.0	2.5
Unemployment Rate	10.4	7.6	6.9
<b>Demographic Assumptions</b>			
Population Growth	-0.23	-0.31	-0.41
o/w Working Age (20-59)	0.09	-0.47	-0.84
o/w over 60	-0.22	0.58	0.77
Labor Force Growth	-0.06	-0.44	-0.81
Growth of Pensioner Population	0.32	0.25	0.31
Life Expectancy (men) <sup>2</sup>	64.9	69.2	74.5
Life Expectancy (women) <sup>2</sup>	74.9	77.6	82.5

<sup>1</sup> Official Government Projections through 1999

<sup>2</sup> Years at birth

Projected pension expenditures include old age, disability and survivors pensions.<sup>10</sup> Projected revenues include contributions from employed workers (the sum of employer and employee contributions), and those made by the Government on behalf of the unemployed, while excluding late payments, collection of arrears and other non-recurrent items. The base year is 1995 and the model is calibrated to exactly match actual expenditures in 1996. Furthermore, the baseline contribution rate used in the projections - 35.5 percent, is chosen in such a way as to generate contribution revenues sufficient to cover 1996 expenditures as defined here.

Under these demographic and economic assumptions, and in the absence of reforms, the Hungarian PAYG system would generate growing deficits, as shown in Figure 3.a. The deficits

<sup>9</sup> The GDP growth rates in Table 4 are lower than those experienced by Hungary between 1950 and 1989 when growth averaged more than 4 percent p.a. (Augustinovic 1993).

would increase to around 2 percent by the end of next decade, and would be close to 6 percent of GDP in 2050, the end of the projection period. This result is essentially due to the assumption of a declining rate of inflation, and to adverse demographic trends. The decline in the rate of inflation assumed for the 1997-2005 period implies increasing real average pension benefits because of the backward indexation rule, and also increasing real entry pension benefits, because of the smaller inflation-related losses built into the benefit formula. The decline in inflation dominates the results in this first period -- if inflation remained constant at the 1996 levels, the deficit in 2005 would be around 1 percent of GDP lower than projected.

Whereas the decline in inflation and consequent increase in expenditures is the major cause of the early deficits, demographic factors dominate the results after 2005. The projected fluctuations in the deficits as a share of GDP closely mirror the old age and system dependency ratios, as shown in Figure 3.b. Both ratios increase between 2005 and 2017, followed by a ten year period of stability, followed by another increase. The dramatic increase in the old age dependency ratio is from about 35 to 65 percent, while pensioners eventually outnumber contributors by about 20 percent. Note that the pension deficits would probably be larger than those presented in Figure 3.a., as the simulations assume that there would be no further erosion of the payroll tax base, either via outright informality or underreporting of earnings.

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<sup>10</sup> Expenditures exclude items covered under the central budget and administrative costs. Including administrative costs would add 1-2 percent to total expenditures.

Figure 3a Deficits in the Public Pension Scheme  
in the Absence of Reform, 1996-2050

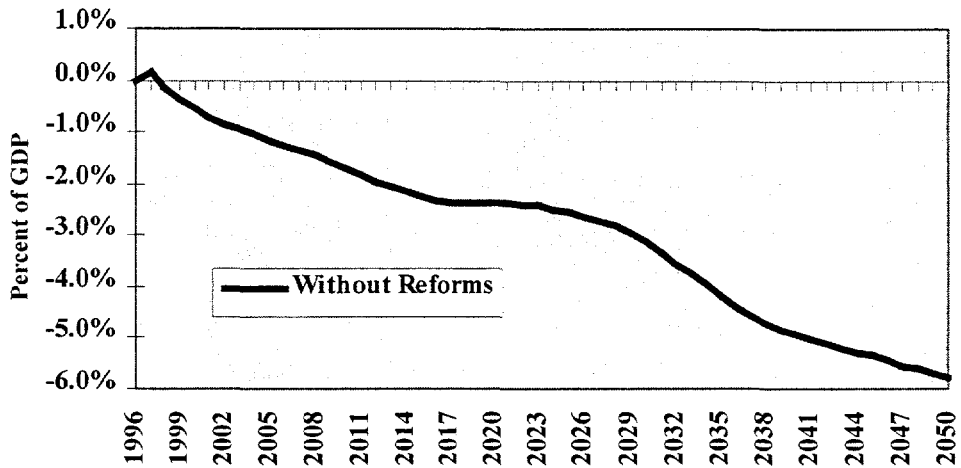
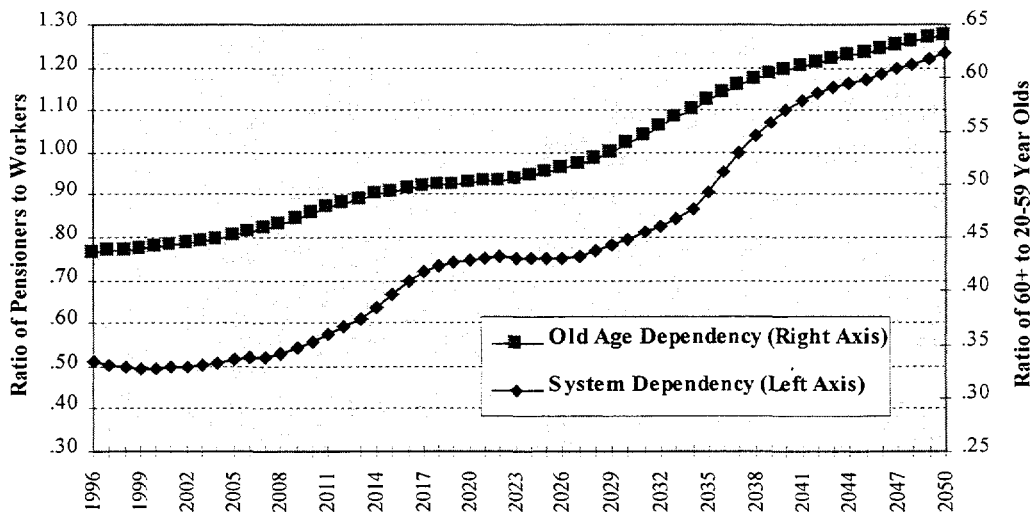


Figure 3b Old Age vs System Dependency Ratio in  
Absence of Reforms, 1996-2050



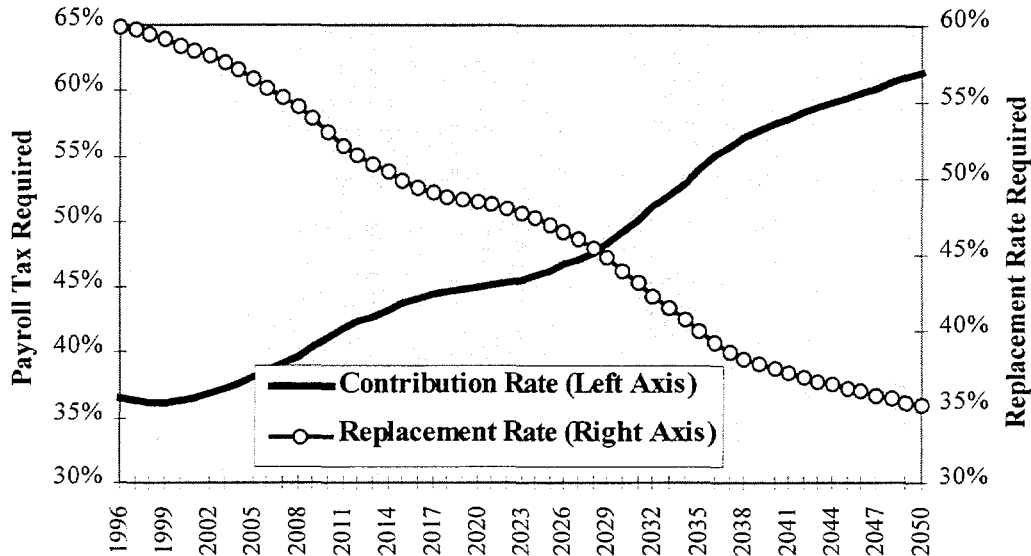
These pension deficits could be avoided by raising contribution rates or reducing benefits. In order to illustrate, Figure 3.b shows how these indicators would have to change if the system were to be balanced. Clearly the type of contribution rates shown here would trigger even greater labor market distortions than already exist, and such a proposal would be antithetical to the Government's current intentions to reduce labor costs. At the same time, the massive cuts in the average replacement rate required to balance the system could not be achieved without social unrest and increased poverty. In short, Figure 3a and 3b suggest that the system would either fail to keep current pension promises or would do great harm to Hungary's economic performance.<sup>11</sup> The absence of reforms would also imply a massive burden on future generations, irrespective of whether the future imbalances were financed by higher contributions, lower replacement ratios, or general taxes.

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<sup>11</sup> It is very unlikely that private savings would increase so as to offset the increase in pension deficits. On the contrary, private savings could actually decline in the long-run, due also to the aging of the population. See Auerbach et al (1989) for an analysis of four OECD countries, and Borsch-Supan (1985) for an analysis of the German case.



**Figure 3c Payroll Tax or Replacement Rate  
Required to Eliminate Deficits, 1996-2050**



### III. The Quest for Pension Reform in Hungary

The pressures on expenditures resulting from Hungary's economic transformation, the problems in revenue collection caused by excessive contribution rates, and the awareness of adverse demographic trends, led to a progressive recognition that the pension system had to be reformed. Reaching agreement on the best strategy for reform has proven difficult, however. There was consensus among different agencies and scholars on some important issues such as the need to increase the retirement age, to tighten eligibility criteria (particularly for disability pensions), and to reduce contribution rates, but there was little agreement on anything else.

The most controversial and debated issue was whether the pension reform should focus on improving the PAYG, combined with tax incentives for the voluntary, third pillar, or whether

Hungary should also make an effort to introduce a mandatory second pillar. Other issues included the degree of income redistribution inside the pension system, and the system of indexation of pensions in progress. The debate frequently became populist, plagued by appeals for Hungary to avoid schemes that destroyed solidarity among generations, and to adopt an “European model”, revealing a lack of knowledge or recognition of the variety of pension systems in Europe, especially the existence of large funded systems in a number of countries such as Switzerland, the Netherlands, Denmark, Ireland, and the UK.

The debate proceeded until the spring of 1996, when the Government finally decided to move ahead with a comprehensive pension reform, combining several changes in the PAYG and the introduction of a mandatory, fully-funded second pillar. This decision was reflected in a joint proposal of the Ministry of Welfare and the Ministry of Finance, outlining the main elements of the reform, and was presented to the Hungarian Parliament in the summer of 1996. The proposal indicated a program of preparatory technical work, and the creation of a 30-member working group to carry it out. The proposal also included a timetable of legislative work, whereby the new law would be submitted to Parliament by the end of the year, with expectation of adoption by Parliament a few months later. The Parliament endorsed the main elements of the proposal, while requesting more details before the submission of final draft legislation.

The factors that led the Government to commit to a multipillar system in mid 1996 are not entirely clear. Trade unions seemed divided or undecided, and the general public followed the debate at a certain distance. The non-profit pension funds in the incipient third pillar were ambivalent. Clearly, some government officials and Parliamentarians realized the growing crisis of credibility faced by the PAYG scheme and considered the multipillar solution as the one most likely to produce permanent results. According to several Hungarian policymakers, the individual measures required to keep pension finances under control - such as changing indexation - were more palatable in the context of a fundamental reform package. This view stemmed from an

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<sup>12</sup> The paper adopts the terminology proposed by the World Bank (*Averting the Old Age Crisis*, 1994), whereby the first pillar refers to a PAYG, publicly-managed pillar, the second pillar is mandatory, fully-funded, and privately-managed, and the third pillar is voluntary, also fully-funded and privately-managed.

awareness of the public's growing frustration with the kind of temporary, ad hoc adjustments which had been used in recent years.

The draft legislation was submitted to Parliament in May of 1997, more than one year after the decision had been reached and six months later than the original target deadline. Throughout this period, the Pension Insurance Fund (PIF) remained opposed, attacking the reform in public debates with officials of the Ministries of Finance and Welfare and frequent interviews in the press. The PIF argued that the proposed changes to the PAYG would hurt pensioners and that the private component of the multipillar scheme would be too risky. Another concern, shared by some members of Parliament, was the possible adverse economic impact of the so-called transition deficit, the deficit caused by the loss of revenues to the second pillar.

During the last quarter of 1996 and the first few months of 1997, a series of public meetings were held with trade unions, employer representatives, pensioners, academics, students, and many smaller groups (for example, one group represented families with many children) to discuss the pension reform. These debates seemed to have increased the general public's awareness of pension issues and the prospects of a systemic reform. According to one survey (TARKI 1997), more than sixty percent of the public had some information on the pension reform in November 1996. The same survey found that younger, educated Hungarians were more likely to favor the multipillar system while persons over 60 were more likely to disapprove of it. A follow-up survey in May 1997 showed 80 percent were aware of the reform and that the percentage which saw it as a positive step rose from 38 to 53 percent.

As a result of these public debates, the Government made some concessions, and the original draft legislation was modified. Anticipating the description of the pension reform (provided in the next section), the most important changes to the original proposal were: (i) the reduction in the contribution rate to the second pillar from 10 to 8 percentage points with a commensurate increase in the size of the remaining first pillar; (ii) the delay in the introduction of the combined wage/price indexation until 2001; (iii) the increase in the number of service years credited to women bearing children; (iv) the possibility for university students to buy service years; and (v) new

guarantees for the overall replacement rate which would be received by pensioners in the mixed system. Several further modifications were made after the legislation was brought before Parliament. Most important amongst them were: (vi) the postponement of the introduction of the new benefit formula and taxation regime until 2013, (vii) an increase in widow's benefits for working women, (viii) the elimination of age restrictions with regard to the voluntary opt-out, and (ix) and a slight increase in the value of the guarantee in the second pillar.

Although most of the changes above tended to weaken the savings effect of the reform package, during Parliamentary debate there were also a few changes which improved fiscal sustainability. The most important of these was the modification to the retirement age schedule after 2009, which raised the number of years needed for early retirement from 33 to 37 and the earliest age of retirement from 57 to 59. The fact that the period of Parliamentary debate did not involve more dramatic changes reflects the fact that most of the compromises had already been made, first between the MoW and MoF positions, and later between the Government and the special interest groups.<sup>13</sup>

The time and effort devoted to this political process delayed much of the work required to implement the system according to the original target date of January 1, 1998. By October, regulatory decrees had been issued and the licensing of private pension funds had begun. At the same time, an extensive information campaign was just getting under way. While the work in these areas will have to be intense, the most difficult aspect of implementation may be the creation of the new information technology and infrastructure which are needed to drive the system. With elections coming in late Spring, the Government will have to make a special effort to ensure that this historic reform gets off to a smooth start during the first quarter of 1998.

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<sup>13</sup> The average age of Parliamentarians in Hungary is around 50. The average age of "yes" voters was approximately 48 compared to an average age of 57 for "no" voters. Available data show that even after taking into account party affiliations, older Parliamentarians were more likely to vote against the reform than younger members.

#### IV. The Hungarian Pension Reform

##### *A General Description*

The Government submitted a proposal to Parliament which would have given workers under the age of 47 the choice to stay in a reformed PAYG or to switch to a new, multipillar pension system in 1998. New entrants in the labor force would automatically belong in the mixed system. After challenges in the Constitutional Court however, the arbitrary cutoff line was dropped and the final legislation allowed all workers the choice to move to the mixed system. However, guarantees within the new system were provided only to workers who participated in the second pillar for at least 15 years (see below). The Government's information campaign also strongly advises older workers not to switch to the new scheme.

The mixed system will be mandatory for new entrants in the labor force as of July 1, 1998. Workers who have already acquired pension rights under the current system (and those who enter the labor market through July 1998) will have the option to stay in the reformed PAYG, or to switch to the new system. This choice will be available during the last quarter of 1997 and the second pillar will begin to receive contributions in January 1998. Workers will be given two years to exercise their right to switch to the new system--until August 31, 1999. Workers who initially opt for the new system will be able to return to the reformed PAYG until September 2000. After that date, workers will be permanently affiliated either with the reformed PAYG or with the new system.<sup>14</sup>

The reformed PAYG ("modernized" PAYG, in the Hungarian jargon) would include a higher normal retirement age of 62 for both men and women, changes in the benefit formula designed to gradually eliminate some of the redistributive elements in the formula, a new tax regime and a shift from net wage indexation to a combination price/wage indexation formula (50 percent

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<sup>14</sup> The decision to switch to the mixed system could be exercised beginning in September 1997 and by the time of writing several thousand people had already done so. The first contributions to the second pillar will only begin to flow however, in January 1998.

net wages, 50 percent consumer prices). The new legislation includes detailed transition tables for the retirement age increase and corresponding early retirement penalties and a new set of accrual rates which apply to gross rather than net wage history. The retirement age begins to rise immediately but only reaches its new final state in the year 2009. The new indexation mechanism is fully implemented by 2001 while the new benefit formula and tax regime is in place by 2013. The minimum pension would be indexed in the same way as other pensions resulting in a gradual reduction in its value relative to the average wage. In its place, a social assistance program would emerge.

Many of the changes reflected the Government's position that redistribution should be removed from the pension scheme. This was based on the desire to tighten the link between contributions and benefits in order to improve compliance and, in the view of some of the reformers, the insurance characteristics in the system. The final outcome in terms of intragenerational redistribution and fiscal impact of shifting redistribution out of the public pension scheme will depend on various factors, such as how pensions are actually taxed in the future, the contribution structure and the extent to which social assistance replaces the current redistribution.

The essential difference between the multipillar pension system and the reformed PAYG scheme is that the former includes a mandatory second pillar which replaces a portion of the PAYG scheme. Workers who decide to stay in the reformed PAYG will continue having 30 percent of their gross wages channeled to the PAYG--the statutory rates will be 21 percent from the employer and 9 percent from the employee. Workers who switch to the new system will have 22 percent of their gross wages channeled to the PAYG and 8 percent channeled to their second pillar accounts--the statutory rates will be 21 percent from the employer (channeled to the PAYG), and 9 percent from the employee (of which 1 percent to the PAYG and 8 percent to the second pillar).<sup>15</sup>

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<sup>15</sup> This contribution rate structure follows a two year transitional period. For those who switch to the new system, the employee contribution to the second pillar will be 6 percent in 1998, 7 percent in 1999 and 8 percent from 2000 onward. The overall contribution rate would remain unchanged as employer rates are reduced.

The first pillar of the multipillar system would apply the same rules as the reformed PAYG, including higher retirement age and minimum years of service and indexation arrangements. The benefit formula is scaled down in proportion with the size of the contribution rates. Therefore, a full career average income worker opting for the new system could expect a replacement ratio in the first pillar amounting to about 45 percent of the net average wage, equivalent to an annual accrual rate of 1.22 percent.<sup>16</sup> This accrual rate is roughly 74 percent of the 1.65 accrual rate which applies for those workers who remain in the reformed PAYG scheme. This corresponds to the ratio of the contribution rate to the PAYG paid by workers who switch to the multipillar scheme to the contribution rate paid by workers who do not switch, namely 22/30. For those who switched to the new scheme, the 1.22 accrual rate applied for both past and future years of participation in the system, implying that anyone who switched would be effectively forfeiting approximately one quarter of their acquired rights in the process.

The mandatory contributions to the second pillar would be placed in pension funds legally structured along the lines of the existing third pillar--mutual benefit funds managed exclusively by their members. This is a Hungarian construction, differing from the trusts in the Anglo-Saxon countries (whose boards either consists of employer appointees, or have a split representation, as in Australia), or the Swiss foundations (whose boards contain employer and employee representatives in equal proportions). The third pillar funds in Hungary frequently contain representatives from the companies or financial institutions that participated in the organization of the funds, but only to the extent that they are also members of the plan. The potential legal links between funds and the "sponsoring" institution (through the board members) seem weaker in Hungary than in Switzerland or the Anglo-Saxon countries insofar as ensuring accountability and appropriate incentives for prudent management.

The concern that the third pillar construction was not sufficiently robust to serve as the basis for the second pillar, led the Government to introduce some safeguards, including mandatory internal reserves equal to at least 0.5 percent of the stock of individual accounts, a 0.3 percent

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<sup>16</sup> Workers who became disabled during the accumulation period would have the choice of remaining in the mixed system or transferring their second pillar balances back to the public scheme. In the latter case,

contribution to a Guarantee Fund, and restrictions on internal asset management. Internal asset management would be allowed only if the pension fund was able to accumulate an additional layer of reserves by a prescribed date. Otherwise, pension funds will have to hire external asset managers. Pension funds would be responsible for the selection of the asset manager, the administration of the accounts, and for negotiating annuities with insurance companies for their members. Funds with at least 25,000 members were allowed to provide annuities themselves and the Supervisor could allow smaller funds to do so as well if they maintained appropriate reserves. Workers would choose their fund and would be allowed to switch one year after the start of the reform and twice a year thereafter. Workers who participated in the multipillar system but failed to choose a pension fund would be assigned to county level public entities created especially for this purpose. However, they would still be allowed to choose a private fund later.

The original proposal offered limited guarantees on second pillar accounts, but was modified in reaction to public debates. What emerged were two layers of protection which may present administrative and supervisory problems in the future. First, individuals participating in the second pillar will be entitled to annuities which are not less than 25 percent of the value of the first pillar pension. This guarantee is equivalent to around 93 percent of the pension which would have been received if the worker had remained in the pure PAYG scheme, and applies to workers with at least 15 years of participation in the new system. Because of the short accumulation period, the guarantee could be triggered for workers in their mid-forties who switch to the new scheme, although the amount required to meet this guarantee should not be significant. Aside from the creation of a contingent liability, the use of an individual guarantee may add to administrative costs, especially if the guarantee is frequently monitored by actuaries. Also, it is still not clear whether the newly created Guarantee Fund would have sufficient resources to cover the implied liabilities, or how the behavior of market participants may be affected by the very existence of the guarantee.

In addition, there is a type of relative rate of return guarantee loosely connected with the individual guarantee which provides the Supervisory authority with wide discretion toward setting the range of investment returns in a given period. In contrast to the relative rate of return guarantees

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they would receive full disability benefits, just as someone who remained in the PAYG system.



in Chile and Argentina, which are stated through transparent formulas, and attempt to protect individuals against poorly performing funds rather than general capital market risks,<sup>17</sup> the Hungarian law does not set objective reference points for the performance of the sector. This design introduces an element of uncertainty in the market by allowing a great deal of discretion for the Supervisor.<sup>18</sup>

### *Switching Strategies*

In the original Government proposal, workers below the age of 40 would have been forced to join the mixed system, while older workers would have been required to stay in the reformed PAYG scheme. As the reform effort progressed, however, it became apparent that a mandatory cut-off age would spark a constitutional battle over accrued rights and prove too costly to implement. These problems led the Government to make the reform mandatory only for new entrants to the labor market and voluntary for anyone with a contribution history under the old scheme. The Government decided early in the process to recognize accrued rights by granting compensatory pensions, as in the case of Argentina, and not by recognition bonds, as in the case of Chile, Peru and Colombia.

The rights earned under the old scheme would be recognized by applying the accrual rates of the new first pillar. Obviously, these rates are lower than those implied by the current formula, a policy made possible by the voluntary nature of the switching process. Younger workers would still choose the new scheme, because the compounded returns to second pillar accounts would result in higher pensions in the new scheme under reasonable assumptions. Therefore, the valuation of past contributions in the context of a voluntary switch allowed the Government a certain measure of control over the speed of the transition and the size of early transition deficits, as well as a reduction

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<sup>17</sup> See Iglesias and Acuna (1992), Superintendency of AFPs (1996), Vittas and Iglesias (1992), Vittas (1995 and 1996) and Rofman (1995 and 1996) for descriptions of guarantees in the Chilean and Argentine systems.

<sup>18</sup> At the time of writing, the Supervisory Agency was considering setting the reference return equal to the average return of a basket of long-term Government securities, and constructing an asymmetric band around the reference return--a minimum return 10 percent below the reference return, and a maximum return 30 percent above the reference return.

in the implicit debt. Based on reasonable assumptions, workers below ages 35-40 would find it attractive to switch under the accrued rights valuation chosen. Appendix 2 presents a more detailed examination of the switching decision.

The Government chose to target age cohorts younger than its original cut-off age of 40 after examining recent experiences in the UK and Argentina.<sup>19</sup> In both cases, the number of workers opting for the funded scheme was greater than anticipated, suggesting that the incentives were greater than necessary. This helped convince the Government that a conservative approach to the valuation of acquire rights was the correct strategy. By targeting a slightly lower age cohort, the Government expects to avoid a situation in which large numbers of older workers switch to the new scheme. At the same time, the Government recognized that part of the excess switching, especially in the UK, was due to “overselling”, whereby an aggressive sales force convinced some older workers to switch when it may not have been to their advantage. The UK experience suggested that strong supervision and good public information would be required during the transition. The Government is now mounting a public information campaign in the months leading up to implementation which includes local, interactive computer terminals and Internet Web sites, the first of which became accessible in June 1997.

#### *Transition Strategies*

The diversion of an 8 percent contribution rate from the PAYG to private, second pillar accounts, implies a loss of revenues for the PAYG scheme. This revenue loss is likely to amount to .8-1.3 percent of GDP in the early years of the reform, depending on the number of workers opting for the new system. This figure would increase over time, due to coverage expansion in the new system, and would increase the public deficit in the absence of offsetting measures. The increase in the deficit would be roughly equivalent to the increase in private savings, implying unchanged national savings, abstracting from interest rate effects or other effects on private savings. The

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<sup>19</sup> See Disney and Whitehouse (1992) and Whitehouse (1995) for an analysis of the opt-out experience in the United Kingdom, and Rofman (ibid) for a description of the Argentine experience. Whitehouse (1996) provides a switching analysis for Hungary. Holzmann (1997) presents a general framework.

reform would be primarily debt-financed, involving a replacement of explicit for implicit debt. The potential growth effects of this strategy would be very limited, and the burden of the transition would be shifted entirely to future generations (replicating the pattern of intergenerational distribution of the PAYG). In addition, the sharp increase in the official public deficit and in the explicit public debt could create complications for a country already making efforts to reduce its deficits and heavy debt burden -- the total public deficit has been reduced from more than 8 percent of GDP to around 4 percent of GDP in the last two years, and the consolidated public debt in 1997 amounted to 70 percent of GDP.<sup>20</sup>

Pure debt-financing of the transition was rejected by the Government, however, which viewed the reform as an opportunity to generate higher national savings and growth rates, and is aware that this objective implies more reliance on tax-financing (or expenditure reduction). At the same time, the Government was pressed to present a strategy that would not imply an excessive burden on few cohorts. Whereas debt-finance would imply transferring the burden to future generations, a pure tax-finance strategy would imply a heavier burden on the current generation. A reform which struck an intergenerational balance was required.

The pension reform package which was passed by Parliament relies on relatively more debt-financing in the first years of the reform, followed by relatively more tax-financing in the next decade. This strategy would be implemented through a set of reforms in the PAYG that would gradually offset the deterioration due to demographic trends and produce some surpluses in the PAYG (before considering the effects of the opt out). These include the increase in retirement age, change in tax regime and the change in indexation rules. As shown in the next section, as these

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<sup>20</sup> It is not clear to what extent financial markets already factor in public pension liabilities which are not reported in official statistics, although it is interesting to note that Hungary's credit rating improved in the months which followed passage of the pension reform legislation. While there is evidence that unfunded pension liabilities are reflected in the market's valuation of private firms, (Bulow, Morck, and Summers (1987)) this line of research has not been extended to the public sector. If the market fully recognizes the existence of these liabilities, the "transitional deficit" should not affect the government's cost of borrowing. There is growing awareness of the existence and magnitude of public pension liabilities, particularly in the context of the recent debate over European Monetary Union. Recent studies have quantified the pension debt for OECD (IMF (1995)), (OECD (1994)) and non-OECD countries (Kane and Palacios (1996)).

policies are implemented, the reform should produce a gradual increase in national savings over the next decade. The distribution of the burden across cohorts would also be more evenly distributed. This strategy resembles hypothetical simulations of transitions with mixed financing found in the academic literature.<sup>21</sup>

*Simulating the Fiscal Impact of the Multipillar Reform: The PAYG Reforms*

It is useful to present the simulations of the reform in two stages. First, the impact of the various measures designed to improve the balance of the PAYG can be progressively assessed, and contrasted with the “no reform” scenario. Second, the direct fiscal impact of the introduction of the second pillar can be examined, in combination with reforms of the PAYG. The macroeconomic assumptions used are the same as those described in Table 4 with the exception of a slightly higher growth rate of the labor force in the scenarios which include an increase in the retirement age.

The reforms of the PAYG scheme include a complex set of changes to the benefit formula. One important change is a shift from a net to a gross wage assessment base in 2013. The shift to gross wages as the base for calculating new pensions is accompanied by the introduction of an EET tax treatment where contributions and investment returns on private pension savings are exempt from the personal income tax while benefits are subject to taxation, albeit with a tax credit. Based on conservative assumptions regarding taxation of benefits, the combined impact of these changes is neutral with respect to the average net pension in the system. In other words, these changes do not affect the deficits projected in Figure 3a above.

However, the introduction of a 25 percent tax credit for employee contributions, (which is meant to approximate the exemption provided in an EET environment) has an immediate impact. The loss in personal income tax (PIT) revenues is roughly 0.4 percent of GDP every year. This

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<sup>21</sup> Kotlikoff (1995) simulates a reform involving full debt-finance in the first five years of the transition, and tax-finance thereafter. Such a strategy would not diminish the lifetime utility of current cohorts and would increase the lifetime utility of future cohorts. It should be noted that the model utilized (the Auerbach-Kotlikoff model) is a model of exogenous growth that may underestimate the growth effects of the reform, and the impact of higher growth on the welfare of current and future generations. Corsetti and Schmidt-Hebbel (1995) examine the possible growth effects of a pension reform under an endogenous growth model.

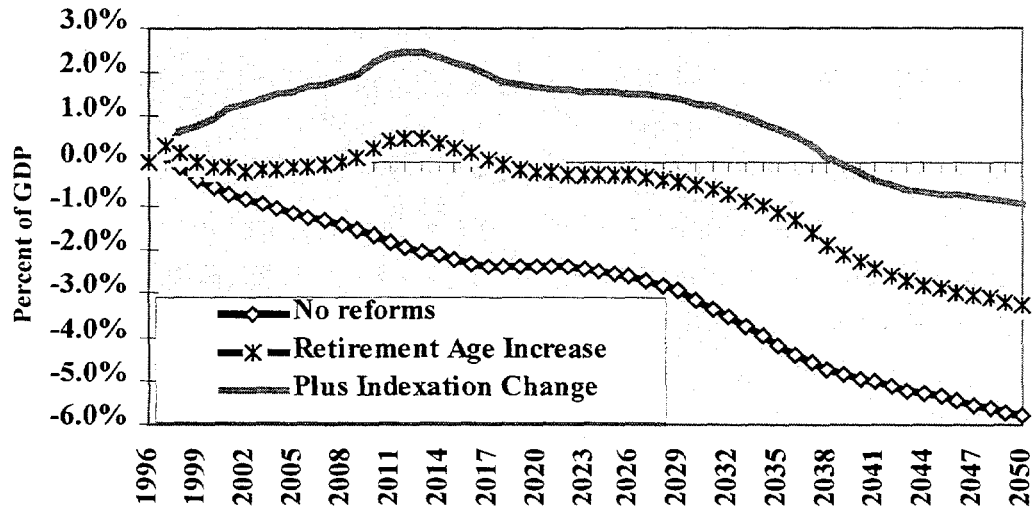
measure was clearly part of the overall pension reform package and would have led, *ceteris paribus*, to a higher deficit. However, the loss of approximately 0.4 percent of GDP was absorbed into the overall budgetary plan and offset with reductions in other public expenditures. In light of this policy, the effect is not incorporated into the projection results.

The changes in the benefit formula and the tax treatment have little or no impact on the fiscal situation. In contrast, the two most important reform measures, the increase in the retirement age and the shift toward mixed indexation, have a major impact as shown in Figure 4 below. The deficit reduction generated by the gradual increase of the retirement age is the distance between the bottom and the middle lines (with asterisks). This is due partly to the increase in the statutory normal and early retirement ages over time and partly to the increase in the number of years required to take early retirement. After 2008, the minimum number of years required to retire at age 59 rises to 37, although penalties are applied. Meanwhile, retirement at age 62 without any penalty is possible only after 40 years of contributions (or equivalent credits) in the system. While it is difficult to predict retirement behavior in the face of the new penalties or the average number of contribution years future new pensioners will have accumulated, reasonable assumptions suggest an increase in the effective retirement age for men and women of roughly 2 and 5 years respectively. The longer working period raises pensions given the positive accrual rate schedule but the higher pension is received for fewer years and some individuals continue to contribute to the scheme. The net effect is an average annual reduction in future deficits of about 1.5 percent of GDP.

While the retirement age increase has an important impact, it is only when the new indexation method is added to the reform package that the balance of the PAYG moves into an extended period of surplus. Figure 4 shows the impact of the original indexation proposal in which pensions in progress were to be indexed to an evenly weighted average of price and wage growth beginning in 1998. The top line shows how these surpluses peak in 2013. After this, the baby boom cohorts whose retirement was delayed by the last increase in the retirement age begin to retire. Later, deficits reemerge when a second demographic shock hits the PAYG scheme around 2035. With an increase in life expectancy of two years per decade assumed, the retirement age increase to 62 is not sufficient to offset the demographic developments and to maintain a constant

retirement duration in the very long run. It must be stressed that the savings generated by the indexation measure rely on the growth of real wages.

**Figure 4 Deficits in Public Pension Scheme with Original Reform Package, 1996-2050**

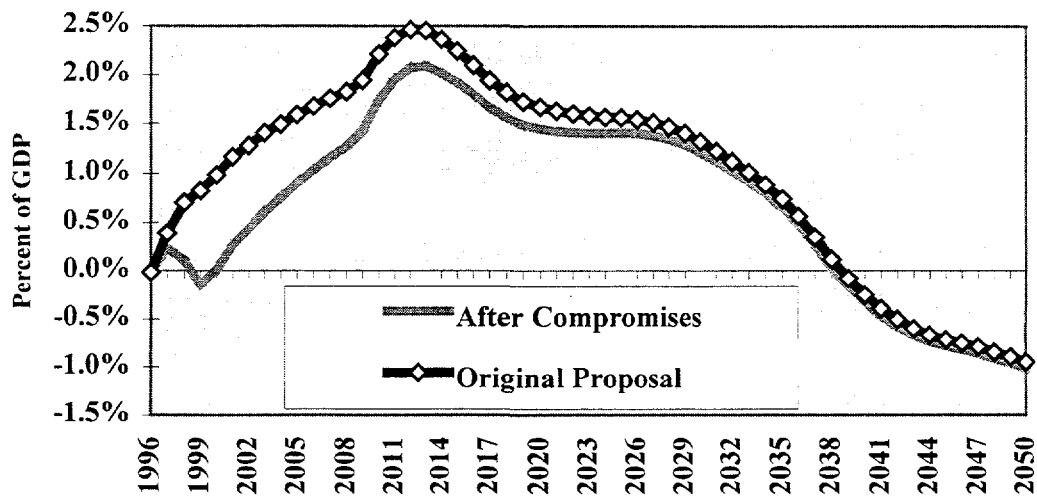


The top line in Figure 4 can be interpreted as the surplus which would have been created by the original reform package. However, as noted earlier, the original Government proposal was modified in several ways which led to a reduction in savings, especially in the short run. Figure 5 shows the effect of the two most costly compromises, namely, the increase in widow's benefits and the delay of the indexation change. Previously, survivors (mostly women) who had acquired their own pensions were not eligible for survivor pensions unless they forfeited their own retirement pensions. After the reform, survivors would receive would receive 20 percent of their spouse's pension in addition to their own pension. Moreover, the increase was retroactively applied resulting in a sudden jump of around 20 percent in the pensions of most widows.

Even more important however, was the compromise on the indexation of pensions in 1998-2000 negotiated between the Government and major interest groups and slightly modified in

Parliament. Rather than the savings which would have resulted in the original proposal, the compromise indexed 1998 and 1999 pensions by net wage growth in 1997 and 1998 respectively. Assuming that inflation declines as expected, this backward indexation locked in large real pension increases in these years.

**Figure 5 Deficits in Public Pension Scheme After Final Changes, 1996-2050**



The impact of those two measures amounts to between 0.5-1.0 percent of GDP during the first years of the transition. In present value terms, the reduction in the implicit pension debt was about 15 percent of GDP less than it would have been if the original package had been achieved. It should be noted that the decision to was made in response to pressures to compensate for the decline in real pensions in the two years preceding the reform, and implies a large increase (6 percent) in real average pensions at the beginning of 1998, just five months before Parliamentary elections. The pattern is reminiscent of the earlier increase in 1994 average pensions just prior to the last major elections (see Table 2 above). In other words, it is difficult to assess the causal relationship between

the overall reform package and the real pension increases of 1998-1999.<sup>22</sup> Whatever the case, it is clear that the political compromises focused on the very short term and that the discount rate for political calculations was high.

The final PAYG reform measures as shown in Figure 5 provide the starting point for the analysis of the introduction of the second pillar. To this point, the package results in a significant improvement in the finances of the PAYG during the next decade, followed by a gradual erosion of the surpluses at the end of the following decade. The pension system would record deficits again at the end of the projection period, and the elimination of these deficits would require further reforms of the PAYG, such as a further increase in retirement age (say to 65 years as in most OECD countries) or the adoption of price indexation. Nevertheless, the reform measures achieved a significant reduction in future deficits and the implicit pension debt. In fact, the reforms produced small but significant surpluses.

Despite the presence of these surpluses, the Government never gave serious consideration to a reform package limited to improving the PAYG scheme, as it saw four serious shortcomings in such a solution: First, the accumulation of surpluses in the PAYG would provide for an easy opportunity to reverse the reforms through politically-motivated benefit increases. Second, it would have created a new role for the public pension fund as an asset manager. There was little reason either from historical Hungarian or international experience to believe that such an arrangement would lead to efficient investment allocation or good corporate governance. Third, this solution was unlikely to contribute to the type of capital market development which a multipillar package was capable of generating. Finally, the promise of higher returns in the private scheme, even after taking into account higher administrative costs, helped offset the benefit reductions in the PAYG scheme and simultaneously diversified the workers' risk in the long-run. This positive aspect of the overall package was instrumental in generating support, especially among younger voters. In view of these and other perceived advantages, the new system was designed to divert the savings

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<sup>22</sup> The indexation parameters for 1998 and 1999 were chosen very deliberately and were the result of many hours of negotiation including during the 13 hour meeting of the Interest Reconciliation Council just prior to Parliamentary submission.



generated by the reform to a competitive and privately-managed pension funds referred to as the second pillar.

*Simulating the Fiscal Impact of the Multipillar Reform: Introducing the Second Pillar*

The simulations of the second part of the reform assume that all workers under age 35 will voluntarily choose to divert part of their contributions to a privately managed funded component, and that workers entering the labor market after mid-1998 will be required to do so. Conservatively, it is assumed that from the 8 percentage point contribution to the second pillar, roughly 7 percent will remain after administrative costs to generate retirement income. The real rate of return on second pillar accounts is assumed to be 1.5 percent above real wage growth in the long run, an assumption consistent with the performance of private pension funds with balanced portfolios in OECD countries (Davis (1995)), with actuarial guidelines for private funds in the US and the UK, and with the dynamic efficiency condition.<sup>23</sup> The 1.5 per cent differential may actually be too low, considering the higher returns earned by private pension funds in OECD countries in the 1980s and the 1990s and the lower capital/labor ratio in Hungary, relative to the OECD average. The interest rate used during the annuity period is equivalent to the no-risk yield on government debt which in turn is assumed to equal the growth rate of wages. All of these assumptions, along with the parameters of the PAYG scheme and accrued rights valuation, are consistent with a voluntary opt-out for workers in their mid-thirties (see Appendix 2).

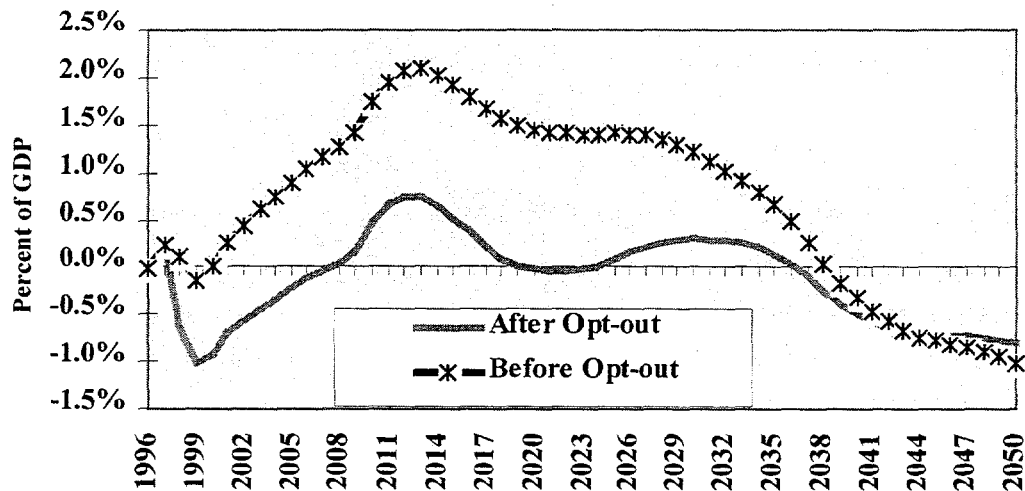
The analysis of the full reform scenario begins with an assessment of the impact of the opt out on the PAYG balance. Figure 6 confirms the obvious fact that allowing workers to divert contributions to the second pillar implies an immediate loss of revenues. This loss during the first five years of the reform is approximately 1 percent of GDP, taking into account that the switching process would take place gradually throughout 1998. The PAYG deficit would tend to increase in

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<sup>23</sup> The dynamic efficiency condition is usually derived in the absence of risk (see, e.g., Blanchard and Fischer (1992) and Barro and Sala-i-Martin (1995)), whereas the return on private funds contain a risk premium. However, see Feldstein (1995a and 1995b) for an analysis of the US case which considers risk factors. See also Kocherlakota (1996) for an analysis of how much risk is contained in the equity premium.

the following years, as the revenue loss caused by the gradual expansion of coverage in the new system increased. However, the measures described above would more than offset the revenue losses caused by the opt out, allowing a reduction in the deficit. The improvement continues even after the onset of the first demographic shock around 2009, because of the final tightening of the retirement rules which occurs in that year. The deficits increase however, when the large cohorts whose retirement is postponed begin to retire in 2013.

**Figure 6 Deficits in Public Pension Scheme Before and After Opt-out, 1996-2050**



The growing deficits peak around 2022 and then fall significantly as the first cohorts to receive first pillar benefits in the new system retire (i.e., those aged 35 in 1998). Note also that the difference between the PAYG balances with and without the opt out increases until about the same time and narrows thereafter. By 2043, the PAYG deficit with the multipillar system is actually smaller than the PAYG deficit had the multipillar scheme not been introduced. These results are driven by two factors. First, the replacement ratio in the first pillar of the new system is about three fourths of the replacement ratio in the reformed PAYG. Thus, the imbalance between replacement

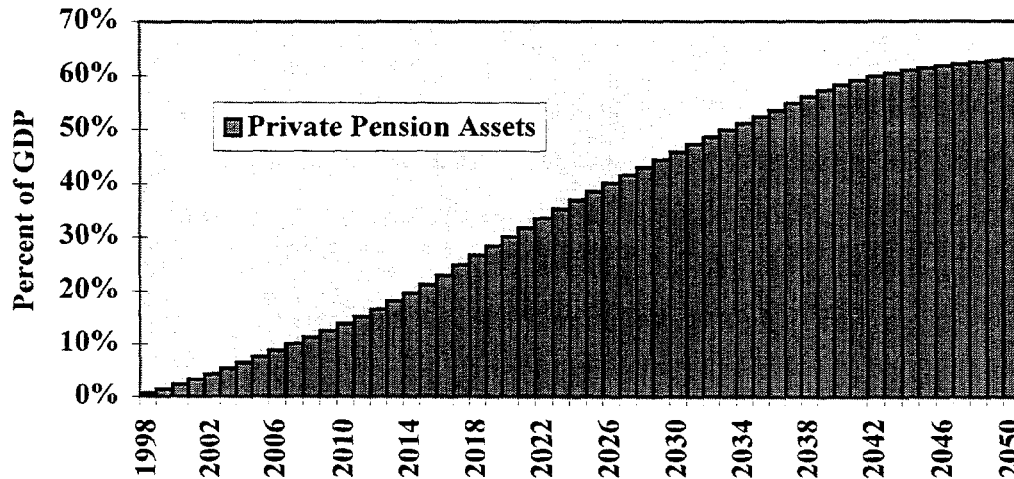
ratios and contributions created by the opt out starts to taper off after the cohorts in the mixed system begin to retire. Second, the reform involves reduction of about 1/4 in the accrued rights of workers who opt for the new system. As a result, the valuation for the years of contribution under the old system are lower than what would have been generated by the old benefit formula.

Although the opt out would generate deficits in the PAYG, they would be accompanied by an increase in flows to private pension fund accounts. As shown below in Figure 7, the accumulated pool of long term savings would grow very rapidly during the first twenty years of the system, given that few participants would become eligible for second pillar benefits and the balances would be compounding over time. After 2019, however, the rate of growth of the second pillar would be tempered by the gradual outflow of annuity payments. Nevertheless, the accumulation of assets reaches an impressive 50 percent of GDP by the year 2030, a figure comparable to Chile and the U.S. today and somewhat lower than the UK and Switzerland. The new private pension sector is likely to play an important role in developing financial markets and facilitating investment finance, with positive effects on growth.<sup>24</sup>

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<sup>24</sup> See Levine and Zervos (1996) for a cross-country analysis and Holzmann (1996) for an analysis of the Chilean case.

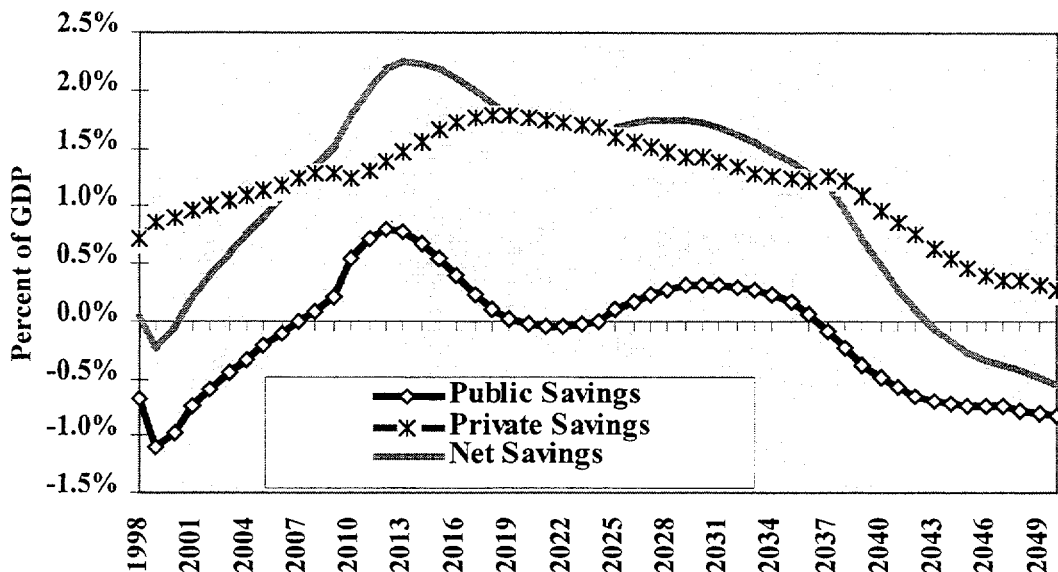
**Figure 7 Accumulation of Assets in Hungarian Private Pension System, 1998-2050**



The most important positive impact of the reform on economic growth, however, will depend on the path of national savings, as the capital market effect really becomes powerful if it is combined with an increase in national savings. The increase in total savings generated within the pension system is obtained combining the public and private pension savings flows, as shown in Figure 8. In the absence of other changes in private savings or in the public deficit<sup>25</sup>, national savings would increase in line with the savings generated in the PAYG, shown in the top line of Figure 6. Total pension savings would decline after 2013, following the increase in the PAYG deficits, but would increase again after 2020, when the first cohorts in the new system begin to retire. The contribution of the pension system to national savings would decline significantly at the end of the projection period, as the scheme matured, but returns on the stock of private pension assets would make this a gradual process.

<sup>25</sup> The Government intends to offset part of the loss of revenues during the first years of the transition by transferring resources to the PAYG while maintaining the primary surplus constant (at 2 percent of GDP). To the extent that this occurs, the transition would be more tax-financed, and the savings from the reform will be greater than those shown in Figure 9.

**Figure 8 Savings in the Hungarian Multipillar Pension System, 1998-2050**



The final impact of demographic aging would cause net pension savings to become negative during the final decade of the projection period. If long-run economic growth was increased by the reform or rates of return to the pension funds exceeded our conservative assumptions, the pension system could continue to generate savings throughout the period. However, the decline in pension savings due to population aging is inevitable if no further action is taken. One obvious measure, given the projected increase in life expectancy, is to further increase the retirement age to maintain the ratio of working to retirement years. A shift to pure price indexation is another measure that would offset the impact of aging and improve the savings performance.

The ultimate impact of the reform on national savings would depend on the reaction of private savings to some of the individual measures of the reform, as well as on the initial growth effects of the reform. The actuarial model cannot estimate these effects, but it is possible to identify some of the changes that might occur. The increase in retirement age could induce some decline in

private savings, whereas the change in indexation would imply a decrease in expected retirement income, inducing some increase in private savings.<sup>26</sup> The expectation of higher returns on the 8 percent contribution diverted to the second pillar could have a positive or negative effect on private savings, depending on the relative sizes of the income and substitution effects. The net impact of these three factors on private savings is, therefore, ambiguous, and would in any case be dampened by the existence of liquidity constraints. On the whole, there is good reason to believe that the reform package would increase national savings by at least the amounts shown in the simulations<sup>27</sup>

## V. Tentative Conclusions and Lessons for Other Transforming Economies

Hungary is finalizing preparations for a comprehensive pension reform, and will soon become the first Central European country to implement a multipillar system. The reform takes place in the context of a disappointing growth performance. Hungary has registered modest growth rates of around 2 percent p.a. since 1993, whereas the other three Visegrad countries and Slovenia have recorded growth rates above 4 percent per year during the same period. The main explanation for this poor performance probably lies in the fiscal and current account disequilibria that Hungary faced at the start of its recovery--around 8 and 9 percent of GDP, respectively, in 1993 and 1994. Whereas the other Visegrad countries and Slovenia have been able to consolidate the recovery of investment and output, Hungary had to undergo a drastic stabilization program in 1995 and 1996. This program was successful in reducing the fiscal and current account deficits to below 4 percent of GDP, in reducing the ratio of public debt to GDP (at around 85 percent), and averting a balance of payments crisis, but also dampened the output recovery.

Although output growth is expected to recover in 1997, only a sustained savings effort above current levels (around 20 percent of GDP) can place the Hungarian economy on a strong growth trajectory in the medium term. The reform being finalized includes measures to improve the PAYG system as well as the introduction of a mandatory second pillar. The PAYG measures

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<sup>26</sup> For a review of these effects, see Kotlikoff (1989).

<sup>27</sup> If the reform enhances growth, there could be some additional endogenous increases in private savings (Serven, Schmidt-Hebbel and Solimano (1994)).

include an increase in the normal retirement age to 62 (up from 60 for men and 55 for women), an increase in the minimum years of service for early retirement, and a change in the indexation regime (from net wage indexation to a “Swiss” formula involving wages and prices with equal weights). If fully implemented, these measures would generate some increase in national savings, foster the development of capital markets, and reduce the distortions in labor markets. These results would contribute to an improvement in Hungary’s growth performance, although it is admittedly difficult to quantify their impact.<sup>28</sup>

Political compromises have weakened the original reform concept and it could be argued that the Hungarian reform does not go far enough in raising national savings and in reducing distortionary payroll taxes. Although these may be valid criticisms, it should be noted that the improvement relative to the no reform scenario is still very significant--the reform would succeed in transforming pension deficits averaging around 3 percent of GDP into pension surpluses of more than 1.5 percent of GDP (public and private balances combined) by the end of the next decade, while promoting the development of capital markets. If the increased rate of return to contributions in second pillar accounts reduced the perceived tax for forced retirement savings, this, along with concurrent reductions in the income and other social insurance taxes (such as contributions to health care) could reduce the rate of tax evasion and the informalization of the economy. If growth performance responds favorably to the reform, and the real return on diversified private pension funds proves higher than GDP growth--in line with the experience of most OECD countries--future pensioners would be able to enjoy higher real benefits than they would have in the PAYG system. The simulations presented here, which include none of these positive effects, may understate the benefits of the reform.

In order to generate a greater increase in savings and allow a greater reduction in contribution rates, the reform would require more budgetary support and more efforts to replace the

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<sup>28</sup> Sachs and Werner (1996) utilize an endogenous growth framework to argue that the adoption of multipillar systems would help Central European countries converge more rapidly to the income levels of Western Europe, but do not provide direct estimates of this factor. Levine and Zervos (ibid) provide evidence that long run growth is positively affected by capital market liquidity, but it is difficult to establish a quantitative relation between pension reform and capital market liquidity.

payroll tax with other taxes. The Government has recently indicated that it will offset transitional pension deficits to the extent necessary to maintain its path toward meeting EU accession criteria. If this decision is effectively implemented, it will imply more tax financing of the transition and a greater increase in national savings in the early stages of the reform. Further efforts that would allow a reduction in contribution rates have been rejected for the moment, however. A straight switch from wage to price indexation has been ruled out of the moment and the recourse to other taxes also seems difficult, as rates are high across the spectrum of taxes (e.g., VAT rates of 25 percent and a top personal income tax rate of 42 percent), and efforts are already being made to broaden tax bases and reduce tax rates.

Another constraint relates to the social objectives of the reform and the impact of reforms to the public scheme. While intergenerational smoothing can be achieved to a certain extent through mixed tax and debt-financing strategies, intragenerational redistribution presents a more complex policy challenge and is beyond the scope of this paper. In order for the reform package as a whole to have a neutral impact across income groups, the new first pillar of the mixed system would need to be more redistributive than the old scheme, since the second pillar minimizes redistribution. The Hungarian reformers opted instead to reduce the redistributive components in both the old PAYG scheme and the new first pillar of the multipillar scheme. As a result, most of intragenerational redistribution will be provided by a means-tested minimum income guarantee under a new social assistance program.

The Hungarian decision to shift intragenerational redistribution outside the traditional PAYG scheme but to retain a significant role for the public pension scheme effectively resulted in a four-pillar system: a “zero” pillar consisting of a means-tested income guarantee for the old, financed from general taxes; a first pillar, consisting of an earnings-related PAYG, financed entirely from contributions; a second pillar, mandatory, private and fully-funded; and a voluntary pillar. When compared to other multipillar systems around the world (e.g., Argentina, Australia, Chile, Switzerland), this construction is unique in its reliance on an earnings-related PAYG scheme to smooth lifetime consumption for workers’ with relatively high incomes.



The decision to eliminate the redistributive formula within the pension system was driven by the reformers' desire to reverse the decline in the covered wage bill which was responsible for the majority of the deterioration in pension finances during the early 1990s. Government officials believed that evasion and underreporting of earnings were linked to the public perception of an arbitrary relationship between contribution payments and benefits. The shift from the net to gross wage formula and the elimination of the degressive benefit formula which provided lower replacement rates to higher income workers were measures intended to restore the credibility of the insurance principle in the scheme and thereby discourage the growth of the informal sector.

Arguably, the elimination of intragenerational redistribution and the creation of a strong link between benefits and contributions could have been achieved through the complete privatization of the earnings-related portion of the system. This option was never seriously contemplated, however, and the decision to retain a dominant PAYG component in the new Hungarian system (almost 3/4 of the total contribution) reflected at least three themes in the pension reform debate. First, was the concern that greater reliance on a private, fully-funded component would imply excessive exposure of workers and pensioners to capital market risk. A second influential argument was related to the question of the transition deficit. The concern was that accounting language involved in converting what was previously implicit pension obligations into explicit ones could lead to confusion and even a negative reaction in the financial markets. Finally, there was the recurrent claim that the sense of solidarity between generations would be lost if the PAYG scheme was eliminated or relegated to a simple redistributive role.

The final reform was shaped by these and other concerns which are likely to transcend the Hungarian context and apply to other countries with similar initial conditions. The Hungarian case illustrates, however, that a multipillar transition can be designed in the context of an existing mature PAYG scheme with a large implicit pension debt. In fact, anecdotal evidence suggests that the reforms of the PAYG scheme may be more palatable if introduced in the context of a more comprehensive reform package including the introduction of a second pillar.

In Central Europe, Croatia, Poland and Slovenia are also considering fundamental pension reform. These countries are also making efforts to catch up with Western Europe, while facing adverse demographic trends and pressures in their pension systems. Payroll tax rates are very high, albeit lower than Hungary's, and pension expenditures are also large (more than 14 percent of GDP in Poland and Slovenia). Passage of the Hungarian pension reform by Parliament has demonstrated the political and economic feasibility of this type of reform in Central Europe. The other countries enjoy a more favorable macroeconomic situation than Hungary, including lower fiscal deficits and lower marginal rates of taxation across the tax spectrum. For this reason, they should face fewer constraints in designing a pension reform of the type that Hungary is implementing. However, these advantages could be short-lived, if the situation is allowed to deteriorate, pushing payroll taxes and deficits higher and leading to the problems of evasion that Hungary faces today. A pension reform which reduces spending in the PAYG scheme and introduces a second pillar could allow these countries to address the aging problem while accelerating growth, enabling them to converge more quickly to Western European income levels.

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## Annex 1: Description of the Hungarian Pension Reform Model<sup>29</sup>

### I. Background

The Hungarian Pension Reform Model (HPRM) is an Excel-based program. Unlike typical spreadsheet models, the HPRM does not rely upon cell-based formulas to perform mathematical and actuarial calculations. Instead, the model's calculations are performed using the Visual Basic (a programming language) component of Excel. The spreadsheet pages of the model are used solely for storing input and output. When the model is executed, the Visual Basic computer program reads the data stored in the model's input spreadsheets, performs a series of calculations, and then prints the results to the model's output spreadsheets.

One of the additional features of the HPRM is a partially integrated individual *lifepath model*. This model allows the user to estimate the impact of the reform on individuals depending on age, gender, career path, unemployment history, income level and mortality expectations, in addition to the macroeconomic assumptions which impact both individuals and the overall finances of the system. The lifepath model was extended, translated and repackaged by Attila Kassai at the Hungarian Ministry of Finance. The improved version is user-friendly and leads an individual worker through the simulation, prompting him or her to input his wage history, age and other relevant questions. A prototype of this model can now be found on the Internet (only in Hungarian) at [www.meh.hu/pm/nyugdij/elet.html](http://www.meh.hu/pm/nyugdij/elet.html).

The model consists of two main components: 1) a pension fund projection module, which is used to project the revenues and the expenditures of both the PAYG system and the proposed private pillar, and 2) an individual module, which is used among other things, to estimate the fraction of the workforce that will join the mixed system in 1998. The second module has also been used to estimate the future pension of different types of individuals. The first module estimates fiscal impacts and is driven by *averages*. For example, to calculate an entry pension, the aggregate module uses the wage history of an average individual.

### II. The Fiscal or Aggregate Module

The aggregate module consists of three main components: 1) a demographic projection subroutine, 2) an expenditure projection subroutine, and 3) a revenue projection subroutine. These three components are positioned within a "year loop" which cycles from the baseline year to a user-designated final year.

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<sup>29</sup> The model was created during 1996 by J. Patrick Wiese, Actuarial Solutions Ltd, based on an original version by Rita Ban, a Hungarian actuary working for the Pension Reform Working Group. Please send further inquiries to [JPWiese@aol.com](mailto:JPWiese@aol.com).

### **Demographic Subroutine**

When the aggregate module is executed, the demographic subroutine reads data which describes the demographics of present-day Hungary. These data include population counts by age and sex, mortality rates by age and sex, and fertility rates by age.

During each cycle of the year loop, the model reads user-inputted assumptions that are used to adjust the mortality rates and fertility rates from their present-day levels to estimated future levels.

For example, the present-day total fertility rate in Hungary is about 1.5. If the user enters a TFR of 2.0 for the year 2015, then the model will calculate births for the year 2015 by adjusting the present-day age-specific fertility rates upwards by 33 percent (2.0/1.5). After adjusting the mortality and fertility rates, the rates are applied to the population projected for the previous year, thereby generating a population estimate, for each age and sex, for the current year in the projection cycle.

Alternatively, it is possible to project the population externally (outside of the model) and import the projected population counts into one of the model's input files. To use this method, the user simply flips a toggle switch, which instructs the model to read the population count file instead of using the projection process described above.

### **Expenditure Subroutine**

Before the projection process begins, the expenditure subroutine reads data that describes the present-day state of the pension system. This data includes the number of pensioners and average pensions by age, sex, and type of pension; the benefit formulas used to calculate entry pensions, and the retirement criteria (eligibility requirements based on age and length of service). The counts of pensioners (by age, sex, and type of pension) are divided by age/sex specific population data, generating "prevalence rates", which indicate the fraction of people at a particular age and sex who receive a particular type of pension. This data is used as the starting point from which the expenditure projection process is launched.

During each cycle of the year loop, the expenditure subroutine is executed after the demographic subroutine has completed the population projection. The expenditure subroutine then performs the following sequence of steps:

- a. The prevalence rates for the stock of pensions in the prior year are advanced. For example, if in year "x" the prevalence rate for old age pensions for men aged 60 is 70 percent, this rate is moved forward to age 61 in year "x+1".
- b. The entry rate for new pension awards is computed for each age, sex, and type of pension. An entry rate is defined as the number of new pensioners divided by the population. Continuing the example above for the cohort at age 61, the model might calculate an entry rate for this cohort of 15 percent. Therefore, the fraction of the cohort receiving old age pensions would



- increase from 70 percent (the rate in the prior year), to 85 percent (the stock rate in the prior year plus the entry rate in the current year).
- c. Pensions awarded in prior years are indexed. In our example, if the cohort of 60-year-olds in year “x” received an average pension of 100 units, and if the indexation percentage were 5 percent, the average pension for this cohort in year “x+1” would be 105 units (100 increased by 5 percent).
  - d. Pensions for new pensioners are calculated using benefit formulas. In our example, the 15 percent flow of new pensioners might receive an average entry pension of 110 units based on their length of service, wage history, and the benefit formula.
  - e. For each age, sex, and type of pension, a new average pension is calculated by merging the average pension of the stock of pensioners with the average pension of the flow of new pensioners. In our example, the new average pension would equal  $70/85 * 105$  units plus  $15/85 * 110$  units
  - f. Finally, for each age, sex, and type of pension, expenditures are calculated by multiplying the average pension by the prevalence rate by the population. In our example, the expenditures would equal 105.9 units (the average pension) multiplied by 85 percent (the portion of the cohort receiving an old age pension), multiplied by the population of men of age 61. Total expenditures are calculated by summing together the expenditures of all cohorts.

This projection process could be described as a **flow** system. Pensioners are tracked from entry (award) to exit (death). When an entry occurs, a benefit formula is executed, and a pension is awarded based on this formula. After the initial award, the pension is indexed in each subsequent year. This is the only reliable method for simulating the impact of indexation and changes in benefit formulas.

The challenge in implementing this method lies in predicting the entry rates and the entry pensions. In the Hungary model, the method used to calculate entry rates varies by benefit.

For the old age benefit, entry rates are calculated by comparing a projected length of service distribution with the retirement criteria. The length of service distribution can be projected using any of three different methods, controlled by a toggle switch. The service distribution can be tied to historical economic activity rates, or severed from economic activity and defined strictly as a function of age.

For survivor benefits, entry rates are based on mortality rates and marriage rates. There are basically two situations in which a survivor pension can be awarded in Hungary’s pension system. In the first case, a pensioner dies, leaving behind a spouse who lacks an own-right pension. In this case, the spouse is automatically entitled to a survivor’s pension. In the second case, a pensioner dies, leaving behind a spouse who is already receiving an own-right pension. In this case, the spouse may or may not be eligible for a survivor’s pension. Because these situations differ with respect to their impact on the pension system, the model uses a different entry rate projection system for each.

For disability benefits, entry rates are based on the present-day observed entry rates obtained from recent data. During the projection cycle, these rates are adjusted to account for anticipated changes in the disability program. For example, the baseline scenario assumes a slight decrease in the rate of new disability claims over the next fifteen years.

### **The Revenue Subroutine**

During each year in the projection cycle, after the model has run the demographic and the expenditure subroutines, the revenue subroutine is executed. To calculate revenues, the model executes the following equation for each age and sex: revenue = working age population \* labor-force participation rate \* (1-unemployment rate) \* wage \* tax rate. The working age population is calculated in the demographic subroutine. The working age population, the labor force rate, and the unemployment rate are sex-specific, and the wage is age/sex specific.

Projecting the work force near the retirement age is a complex task. The labor force participation rate of age groups near the retirement age is heavily influenced by the structure of the retirement system. Current data for Hungary reveals that Hungarians tend to retire as soon as they have met the retirement eligibility criteria. For this reason, labor force participation rates near the retirement age are, in essence, a function of the eligibility criteria of the retirement system. To model this relationship for cohorts approaching retirement age, the model modifies the equation in the preceding paragraph by applying the participation rates to the non-beneficiary population, rather than the total population count of a cohort. This allows the model to automatically estimate the change in the labor force induced by a retirement age increase. Without this feature, the user would be forced to manually adjust the labor force participation rates when modeling a retirement increase, which would be a rather awkward approach.

The model does not attempt to show the impact of increasing the effective retirement age on unemployment rates. Such an analysis is complex since it is clear that there is not perfect substitutability between older and younger workers and that lower deficits and greater participation of experienced workers would have beneficial, if indirect effects on the labor market. The most acceptable approach would be to consider several intermediate outcomes and test the sensitivity of the results.

### **Modeling A Multi-Pillar System**

The model can be used to project the operation of either a pure PAYG system, in which all revenues are channelled into the PAYG system (and all benefits are PAYG or debt financed), or a multi-pillar system, in which the PAYG benefits are reduced and a portion of the contributions are diverted to private pension accounts used to finance "second pillar" pensions.

When running in multi-pillar mode, the user must specify an implementation year for the new system, and the user must also fill out an "opt-out matrix". In Hungary, the implementation year for the new system is tentatively set for 1998, so this is the year used during the runs by

Hungarian officials. During this year, Hungarian workers will have the option of either joining the new system or remaining in the old system. It is expected that most young workers will opt for the new system, and most older workers will remain in the old system. In the opt-out matrix, the user can enter his/her estimates of the percentage of each age/sex cohort expected to enter the new system. Note that this matrix can also be used to model a mandatory switch to a new system. For example, to model a mandatory switch for all workers under the age of 40, the user would enter 100 percent in each age/sex cell for ages less than 40.

When the aggregate module is executed in multi-pillar mode, the PAYG system is projected as described in the preceding paragraphs until the projection cycle reaches the implementation year for the new system. At this point, the model splits the universe of workers into two pieces: those expected to join the new system, and those expected to remain in the old. This split is based on the user-specified opt-out matrix.

For members of the new system, a portion of the contributions are diverted into second pillar accounts. In the model, these accounts are age/sex specific, i.e. each age/sex cohort has its own account, which contains the contributions and the interest earned by that cohort. Administrative costs for each account are also taken into consideration explicitly.

When members of the new system begin to retire, the model activates a new set of PAYG benefit formulas. These formulas are first pillar formulas, and are not as generous as the “single-pillar” benefit formulas applied to retirees from the old system. These formulas are used to calculate the first pillar PAYG entry pensions. The model also calculates the second pillar privately financed entry pension for each person retiring from the new system. This calculation is performed using actuarial mathematics. The model expresses each age/sex cohort’s retirement account on a per retiree basis, and then converts this sum into an annuity using projected interest rates and mortality rates.

#### **IV. The Individual Model**

As described in section III, the HPRM consists of two main modules, an aggregate module and an individual module. The individual module complements the aggregate. The individual model’s main function is to project the single-pillar pension and the multi-pillar pension that particular types of Hungarian workers can expect if they either remain in the current system or join the new system. Given a particular set of economic assumptions, second pillar contribution rates, second pillar administrative costs, and PAYG benefit formulas, the individual module can be used to estimate answers to the following questions:

- a. What fraction of the working age population will switch to the new the system?
- b. Will the switching decision be sensitive to income-level, sex, and years of service?
- c. What is the “cutoff” age at which it makes more sense to join the new system? Does this age vary by sex?

- d. What replacement rates will be generated by the new system? If the expected replacement rate in the new system is high for today's young workers, can the first pillar benefit PAYG benefit formula be reduced in order to generate future savings in the PAYG system?

The individual module and the aggregate module share the same sets of inputs. They both read the same economic and demographic assumptions. They both read the same benefit formulas and second pillar administrative costs. For this reason, the results of the individual module are in harmony with those generated by the aggregate.

The results of the individual module can be fed into the aggregate module's opt-out matrix. After using the individual module to analyze the switching decision, the user can develop a good sense for the switching decision process. He can then enter a set of opt-out rates in the aggregate module, which are used by the aggregate module to split the universe of workers into a segment expected to join the new system, and a segment expected to remain in the old system. Of course, in a voluntary framework, the outcome cannot be perfectly anticipated.

## **Annex 2: Analysis of the Opt-Out or Switching Decision**

The Government originally considered implementing the pension reform through the introduction of a mandatory cut-off age of 40 years. The switching or opt-out analysis suggested, however, that a voluntary opt-out was likely avoid legal problems and reduce the implicit pension debt and transition deficits. This analysis is described below.

### **General Switching Analysis**

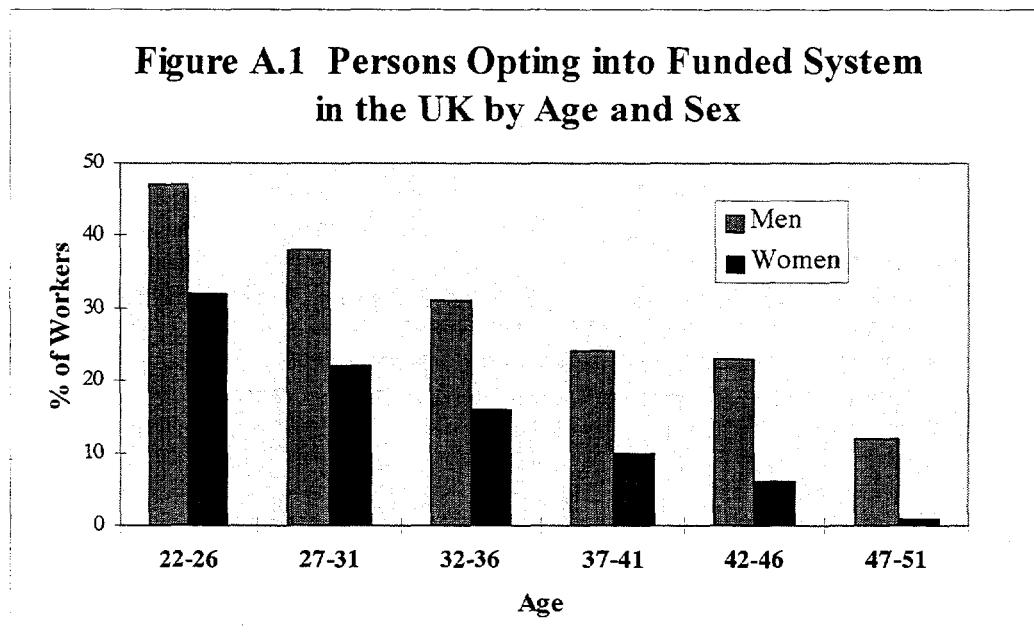
Other things constant, younger workers stand to gain when they are allowed to divert their contributions from a defined benefit to a defined contribution pension. This is due to the nature of the defined benefit scheme which provides a higher implicit rate of return to contributions to workers approaching retirement than to younger workers even where there is immediate vesting. For one contribution, a young worker in a DB scheme accrues the same right as an older worker yet the present value of the marginal benefit is much smaller for the younger worker. Conversely, a contribution from a younger worker to a DC scheme will have a much greater impact on the future pension benefit, as it grows with compound interest, than in the case of an older worker. The advantage of the DC over the DB scheme for a younger worker increases geometrically by age because of this compounding effect.

This effect may be magnified during a multipillar reform if the risk adjusted rate of return anticipated in the alternative DC scheme is higher than the implicit return in the public DB scheme. This condition will often hold in a mature PAYG environment when the rate of return is constrained by the growth in the wage bill. In this case, the incentive for younger workers will be greater, the greater the advantage of the net rate of return to private investment over the growth of the wage bill.

While both theory and empirical evidence suggest that the rate of return to capital should be greater than the implicit return on PAYG, there is not much evidence regarding the relative riskiness of the two alternatives. Volatility in the funded scheme will depend on the riskiness of the investment choices which are allowed in the second pillar regime as well as any guarantees which may be operative. (Some guarantees, such as a relative rate of return guarantee, would limit volatility across pension funds rather than for the sector as a whole.) On the other hand, the PAYG promise may also be correctly perceived as being susceptible to a range of political/fiscal pressures especially in PAYG schemes which are clearly not sustainable in the long run. In short, it is very difficult to assess the relative riskiness of public and private sector pension provision. The switching process itself is likely to provide evidence of the perceived political risk inherent in the public PAYG system.

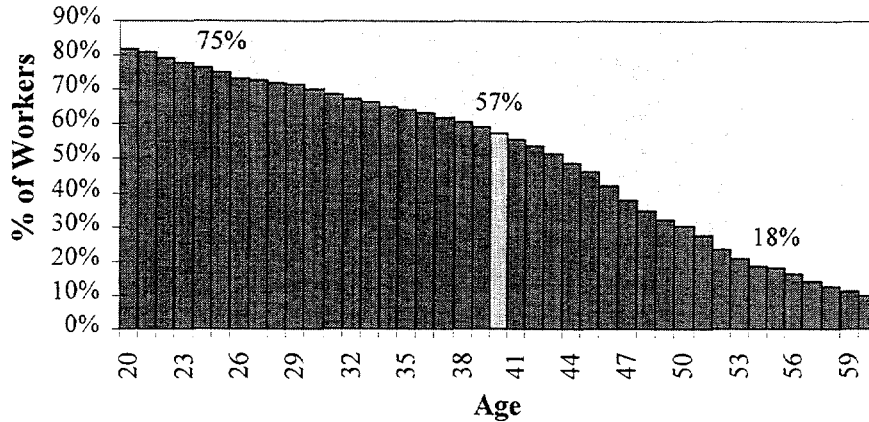
### International Experience

The implication of the last section is that age should be an important determinant in the switching process. Indeed, the outcome in countries which have allowed such a voluntary switch has reflected this age-specific effect. In the UK experience of the late 1980s, for example, Disney and Whitehouse (1992) find that the age factor dominates under many assumptions regarding rate of return, administrative costs and other factors. Figure A.1 below illustrates the tendency of younger workers to switch disproportionately. Males are also more likely to switch to the funded, private alternative.



Throughout Latin America the age effect has also driven younger workers to switch in greater numbers. This was true for Chile when the scheme was introduced and more recently in the cases of Argentina, Peru and Uruguay. The age distribution of optants in Argentina is illustrated below in Figure A.2. Another ex-post analysis by Rofman (1996) found that under reasonable assumptions, persons under age 40-45 at the time of the reform could expect to benefit from participation in the funded pillar. The fact that even older workers switched, albeit in smaller numbers, suggests that other factors were at work. These factors might include very low credibility of the PAYG scheme or inflated expectations of high returns in the second pillar. Unfortunately, it is clear that there were also cases in which older workers were convinced to switch by unscrupulous salespersons in what is known in the UK as overselling.

**Figure A.2 Males Opting into Mixed Scheme in Argentina by Age**



**The Switching Analysis in Hungary**

As described in Annex 1, a second model was developed which allowed the user to focus on specific types of individual workers and how they would be affected by the reform. The individual model used the same macroeconomic and demographic assumptions as the fiscal model. This model allowed policymakers to generate results according to income level, gender, labor force participation, age and other relevant factors. The model was also able to compare the pension outcomes for the same individual in the mixed scheme and in the modernized PAYG scheme. This information was useful to policymakers, not only in order to anticipate the speed of the transition, but also to inform individual workers who would be making the decision.

In addition to the macroeconomic assumptions, the user must input a starting and ending wage which is used to generate an age-earnings profile. Next, the age of the worker in 1998 is entered along with his estimated past and projected future years of participation in the pension system. For the first pillar, the full reform scenario (retirement age, indexation changes etc.) is used and an expected retirement age must be entered which corresponds with the retirement age law. For the second pillar, an assumption regarding the administrative costs either as a percentage of assets, contributions or both is made (not entered by individual users). The assumed rate of return is expressed relative to wage growth is entered by the user but a default rate is available. The assumed return on reserves during the annuity stage is fixed in the model. Finally, the mortality tables to be considered in the annuity calculation are fixed and correspond to those used to produce the aggregate simulations. For the baseline case, Annex Table 1 summarizes the main assumptions.

**Table A.1 Switching Model, Baseline Assumptions**

Parameter	Assumption
Starting/Ending Wage as % of Average Wage	Men-80/120, Women-70/100
Real 2nd Pillar Return Relative	Wage growth plus 1.5%
Real Return on Annuity Reserves	Equivalent to wage growth
Mortality Tables Used to Calculate Annuity	Unisex; Actual Projected Tables
Taxation	PIT levied on benefits paid out
Administrative Costs	15 % of contributions
Age of Retirement	61

The model calculates the old age pension which is generated by the new formula for either the modernized (1.65 percent accrual rate on gross wages) or the new first pillar (1.22 percent accrual rate on gross wages) of the mixed system as well as the annuity which can be expected from the second pillar. The result is expressed as an entry replacement rate which is indexed in the same way as the PAYG scheme. In the baseline case, the indexation method for all pension benefits is half price and half wage growth. This allows us to compare entry pension replacement rates since all three pensions (modernized, first pillar and second pillar) will behave in the same way after the first year. All pension benefits are taxed at today's PIT rates with the relevant brackets indexed to wage growth.

The assumptions are generally conservative. Current administrative costs in the voluntary third pillar are less than 10 percent of contributions, thus significantly lower than the assumed 15 percent of contributions for the second pillar. While there will be some upwards pressure on administrative costs because of guarantees and new requirements to provide information, economies of scale are likely to reduce expenditures per participant as the system expands and the average fund size becomes larger.

Applying projected mortality tables is consistent with the fiscal projections. However, if life expectancy does not rise as fast as assumed, annuities from the second pillar would be larger. The use of unisex tables is consistent with the planned legislation. It raises annuities for women at the expense of men, a bias also found in the PAYG scheme.

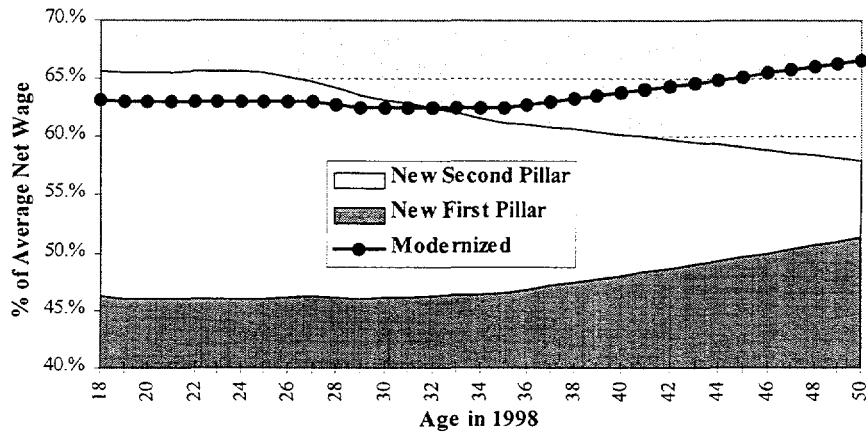
Finally, the assumed rate of return differential is conservative, taking into account the experience of OECD countries over the last few decades. Even this conservative differential assumes, however, that investment restrictions will not be overbearing in the medium term, so that portfolios of the pension funds will be balanced between government bonds and higher yielding instruments including equities.

The results of this simulation exercise is shown below in Annex Figure A.3, which shows the entry replacement rates for individual cohorts ages 18 to 50. The top line shows the projected path of the PAYG replacement rate in the modernized or reformed PAYG system. The gradual



decline reflects various factors, including the shift to the gross wage based formula and the extension of the assessment period to a lifetime wage history. The same factors affect the new first pillar which is shown by the shaded portion on the bottom part of the graph. The area above the new first pillar line shows a growing entry replacement rate provided by the second pillar. The sum of the two areas is the replacement rate from the mixed system. In this scenario then, the mixed system becomes attractive for workers in their low 30s. The maximum accumulation period is reached for the youngest workers, so that the long-run replacement rate stabilizes at slightly more than 65 percent of net wages with almost one third of this generated in the second pillar.

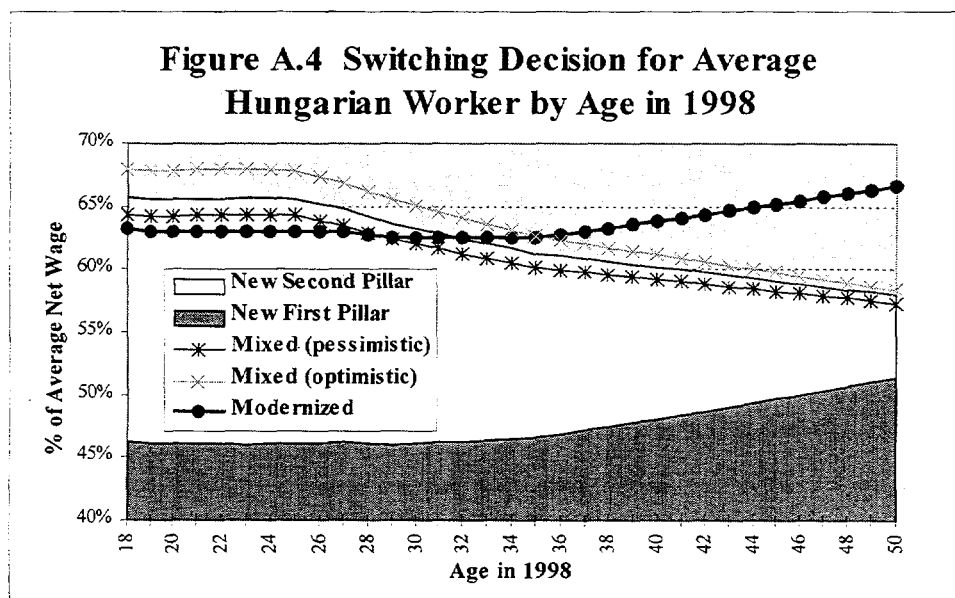
**Figure A.3 Switching Decision for Average Hungarian Worker by Age in 1998**



The calculation of the new first pillar replacement rate for workers already in the labor force requires further explanation. The calculation of the new first pillar benefit is based on a linear accrual rate of 1.22 percent per year multiplied by the average gross wage and subject to personal income taxation. In terms of net wage, the accrual rate is equivalent to about 1 percent per year. This straightforward calculation also applies for a worker who is 30 years old and has 10 years of contribution history in 1998 despite the fact that the accrual rate in the scheme to which he had been contributing was much higher, approximately 1.8 percent per year. If the Government had forced workers to switch to the new scheme, it is likely that at least some workers would have demanded the higher statutory accrual rate. Indeed, the possibility of intervention by the Constitutional Court was anticipated for the forced switch and there were many relevant precedents over the last few years. The use of a voluntary opt-out arrangement not only avoided these legal problems, but probably resulted in fiscal savings equivalent to approximately 1/4 of the accrued rights of workers under age 40, a significant reduction in the implicit pension debt (IPD).

Another result of this calibration is that if more older workers switch, the IPD is reduced even further as workers forfeit increasing amounts of past rights. This would occur, for example, if workers had more optimistic expectations regarding the returns to the second pillar. Figure A.4 tests the sensitivity of the results to alternative assumptions about the rate of return during the accumulation period. In the “optimistic” scenario, a two percent differential between gross returns and wage growth raises the switching age by about three years to 35. Of course, if workers are pessimistic in this regard and expect the rate of return to be equal to wage growth, only workers below age 27 would be interested in switching.

As mentioned earlier, the relative riskiness of the two pillars is more difficult to anticipate. If the public DB promise lacks credibility, this will result in a higher switching age for a given expectation about the rate of return in the second pillar. If workers distrust the private sector, they might accept a lower pension from the public scheme which they consider secure. Confidence in the second pillar, however, may increase as a result of the system’s guarantees.



Finally, it should be noted that the Government could have reduced the pension debt further by lowering accrual rates in either the new first pillar or in the compensatory pensions for workers with past rights. This could have been done by reducing the first pillar accrual rate or the accrual rate used to compensate past years of contribution to say, 1.1 rather than 1.22 percent. This would have resulted in the stabilization of replacement rates for cohorts aged 34 and below in the baseline scenario. Instead, the youngest workers are able to take advantage of the second pillar and get higher replacement rates than those in their early thirties.

The decision not to reduce the first pillar or the accrued rights further stemmed from three related concerns. First, the Government was sensitive to the need to maintain the target replacement rates even under pessimistic conditions, and decided not to attempt to appropriate this difference. Second, the Government also feared that reducing accrued rights beyond the proposed levels would tend to diminish the base of support to the reform. Finally, the Government wanted to avoid making the new scheme voluntary for new entrants. Arguments in favor of voluntarism would have been strengthened by less robust results for younger workers.

### **Conclusion**

This analysis shows that the Government chose a set of first pillar accrual factors and a valuation of acquired rights which would, under reasonable assumptions, lead only younger workers to switch. The compound interest rate effect in the second pillar makes the mixed system a progressively less attractive proposition above the age of 40. In this way, the Government hopes to avoid early transition deficits and allow time for the expenditure reductions in the modernized scheme to begin to cover part of the public deficits caused by the diversion of the 8 percent contribution.

If current workers switch voluntarily, the IPD will be reduced to some extent because they will have forfeited some of their acquired rights under the old system. Age-specific compensation for acquired rights could have been used to reduce the IPD further, but was rejected. The Government also chose to set a new first pillar accrual rate at a level which, under reasonable assumptions, will lead to replacement rates which are higher than the current targets. Again, this decision represented a missed opportunity to reduce the IPD further, but proved instrumental in building greater support to the reform, and in avoiding a voluntary scheme for new entrants or an alternative form of guarantees.

Finally, it should be noted that the Government intends to stage an extensive information campaign which will allow workers to become fully informed about their decision to opt out or stay in the current scheme. In this way, the Government will affect the outcome of the switching decision and avoid much of the second guessing which might otherwise occur. In addition, the public awareness of the new scheme and the new active role of the individual in his own retirement planning may have an impact beyond the pension system itself.



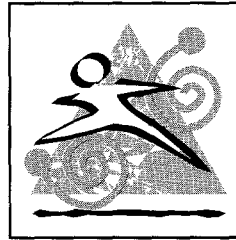
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### Summary Findings

After discussing the evolution of the policy dialogue in Hungary, the paper broadly describes the reform of the pay-as-you-go public pension system and its partial privatization as legislated in July 1997. Through a combination of a debt and tax financed transition, the first partial pension privatization in Central Europe is shown to generate increased national savings while placing the pension system on a more sustainable course. The potential positive impact on savings was diminished by politically-motivated compromises. Outstanding issues include problematic features of the “second pillar” and the reemergence of pay-as-you-go deficits in the long run. This suggests that further reforms, such as raising the retirement age beyond 62, will eventually be required.

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