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Pension Reform, Growth, and the Labor Market in Ukraine

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Ukraine's pension system requires radical reforms to restore credibility to the system and remove distorted incentives that make it unsustainable. Resumption of growth alone will not solve the current difficulties.

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Summary findings

In recent years — as a result of economic contraction, declining employment and real wages, and changes in the behavior of the labor market — Ukraine's tax base of the social security system has declined, threatening its sustainability. About 40 percent of the labor force works in the informal sector, paying no taxes, and many members of the formal workforce underpay taxes because they also do informal work.

Using a model that links the social security system, the labor market, and the macroeconomy, Riboud and Chu ran simulations to assess the sustainability of the current pension system and the relevance and viability of possible reforms. All simulations assume economic reform and the resumption of growth. They conclude:

- Economic contraction is not the only cause of problems with the pension system. To reverse current trends, most of the labor force would need to be working in the formal sector — an unlikely event, given current incentives.
- Reform is essential. Restoring the former system would be too costly, and maintaining the status quo would make the system unsustainable.
- Reforms which focus on short-term budgetary effects and neglect the interactions between the social security system and the labor market are likely to fail.
- Raising the retirement age to 65 would have a significant financial impact but would need to be accompanied by deeper structural reforms. Raising the retirement age quickly may entail the least political cost, as many old people are currently working.
- For the deeper structural reforms needed, introducing a funded-tier should be considered. It would be an effective way to correct distortions and restore credibility.
- Introducing such reforms will be costly and affect several generations of workers and pensioners in different ways. Tradeoffs must be carefully evaluated.

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PENSION REFORMS AND GROWTH IN UKRAINE:
An Analysis Focusing on Labor Market Constraints

by

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and
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I. Introduction

The social security system in Ukraine has many components that are carried over from the Soviet era. The benefits provided by the system include pensions; maternity, sickness, and other employee benefits; unemployment insurance benefits and job search assistance for unemployed workers; and allowances for the elderly and families with children. In addition, a special fund has been set up to assist the victims of the Chernobyl accident. About 80 percent of benefits are financed through payroll taxes amounting to 52 percent, while the remaining is financed out of general revenues of the state or from local government budgets. Overall, about 15 percent of GDP is spent on the various programs in 1996 (see **Table 1**). By far the most important program is the pension system which represents about 8 percent of GDP and provides benefits to more than a quarter of the population (over 14 million Ukrainians in 1996).

Over recent years, in Ukraine as in many other FSU countries, economic and political developments - in particular the sharp economic contraction experienced since 1990 - have put under strain the social protection system. Resources shrank sharply at a time when the claim for these resources increased, raising issues of coverage, benefit adequacy and sustainability. The major concerns have been on the one hand, the contribution of the social security system to massive budget deficits, and on the other hand, the failure to provide an adequate safety net.

These issues have been at the center of all discussions regarding stabilization and structural reforms and the proposed solutions have mostly consisted of expenditure cuts accompanied by improved targeting of limited resources toward a smaller group of beneficiaries. While defining these recommendations, the analysis has focused on the immediate trade-offs between the fiscal adjustment and the establishment of a comprehensive social safety net. Little attention has been paid to the possible impact of the proposed changes on the rest of the economy - in particular on the labor market, savings and investment, and the growth path of the economy.

Now that Ukraine seems more firmly engaged into a reform process and that economic prospects are improving, increasing attention needs to be paid to the issue of long-term sustainability and adequacy of system design. In this context taking into account the interactions between the social security system and other key economic variables becomes increasingly important.

The objective of this paper is to examine the viability of the current pension system and the relevance of possible pension system reforms by integrating the social security system within a macroeconomic framework which reflects the specific features of the Ukrainian economy. The analysis focuses on the main component of the social security system, the pension system, and explicitly takes into account the links that exist between the various parameters which determine in the short and medium term the balance of the pension fund and other key economic and demographic variables which affect the growth path of the economy, notably labor force participation behavior, unemployment, the size of the informal sector and the path of real wage growth. This approach allows for taking into account incentive effects and measuring trade-offs between various goals.

Table 1

Social Protection Expenditures as % of GDP					
	1992	1993	1994	1995	1996 (est)
Total	16.2	13.1	13.7	13.6	14.5
Financed out of payroll taxes	13.2	10.6	11.4	11.1	11.4
Pension Fund	8.8	8.3	8.0	7.9	8.1
Social Insurance Fund	1.2	0.8	1.1	1.0	1.0
Employment Fund	0.2	0.2	0.3	0.3	0.3
Chernobyl Fund	3.0	1.3	2.0	1.9	2.0
Financed out of general budget revenues					
Allowance for elderly & children	3.0	2.5	2.3	2.5	3.1
Other social spending					
Health, Education, & Culture	11.2	9.6	11.3	11.7	10.5
Consumer subsidies	5.6	10.3	6.7	3.2	2.5
Memo: GDP (trillions of Kbv)	5.033	148.3	1138	5293	8686

Source: Data Provided by the Ukrainian authorities and World Bank estimates.

The following section provides a brief description of the structure and features of the pension system in Ukraine. Section 3 analyzes the impact of recent macroeconomic trends and transformation of the labor market on the balance of the pension fund. It also documents the changes introduced in the system since the country's independence. Section 4 describes the model and contains an analysis of the medium-term sustainability prospects. The analysis is made assuming that Ukraine will pursue its reform efforts and recover a growth path. The first question examined in the paper is whether sustained growth and macroeconomic stability over a period of about 30 years would make possible the restoration of benefit levels and features prevailing in the past. It will be shown that this option needs to be ruled out even in the context of a fairly optimistic growth scenario. Section 4 then turns to a second question: whether it would be viable to maintain the system "as it is" currently, that is, with the less generous features introduced recently. The answer will be again negative based on expected behavioral changes.

As reforms appear unavoidable, Section 5 analyzes several alternatives. The first part of the section deals with reforms of limited scope which focus on reducing coverage and expenditures without changing the nature of the system. Particular attention is paid to a possible increase in the retirement age. An attempt is made to assess whether these reforms would be

effective and sufficient to ensure the sustainability of the pension system. The second part of Section 5 examines more radical reforms consisting of shifting from the current PAYG to a fully-funded system. Several transition paths and their associated costs are analyzed taking into account the specificity of local conditions. Section 6 provides detailed conclusions.

II. Description of the Pension System.

2.1. Types of Pensions.

The Ukraine Pension system is similar to public pension schemes in many industrialized countries (World Bank, 1993). It is based on the pay-as-you-go (PAYG) principle. Workers and their employers make contributions to the program over their active careers. These contributions finance benefits to current pensioners. The present employer contribution rate is 32.56 percent of workers' salaries; employees contribute 1 percent of their wages. The pension system currently offers five types of pensions to more than 14 million beneficiaries (Kane 1996):

Old age pension. Men over the age of 60 and women over 55 are eligible to receive an old age pension. For the full standard pension, men must have worked for 25 years, and women 20 years, in covered employment. The level of a standard old age pension equals 55 percent of reference earnings (an index of 5 peak years of earnings), plus 1 percent for each year over the minimum standard pension employment years. The normal ceiling of a standard pension is 3 times the minimum pension. People who have not worked long enough to earn a standard pension but have reached the retirement age are eligible for a partial pension. The level of a partial pension depends on the number of employment years but is no less than 50 percent of minimum old age pension. The old age pension program is by far the most important since it benefits about 80 percent of all pensioners (about 11 million individuals).

Invalidity pension. This type of pension is available for those who are injured or too sick to work (that is, about 10 percent of all pensioners, or about 1.4 million individuals). Depending on the invalidity category and the number of years of covered employment, the pension level can vary from half the minimum wage to 3 times the minimum wage.

Survivor's pension. This pension is available for the spouse or minor children of deceased workers (currently about 800 thousand beneficiaries). Survivor's pensions are in general lower than old-age or invalidity pensions. The average survivor's pension is only about two-thirds of the average old-age pension. For minor children the maximum eligible age of receiving the survivor's pension is 18.

Social pension. This pension is for those who have not worked in covered employment but who meet certain conditions, such as being over the normal retirement age or disabled from birth. As social pensions are made available to those who are not contributing to the fund they

are a form of social assistance payments which has a wide coverage. The level of a social pension is equal to 50 percent of the minimum old age pension, and can be between 30 and 200 percent of the minimum old age pension for invalids and disabled. About half a million persons receive social pensions.

Service pension. This program is the smallest (only about 40 thousand. beneficiaries). These pensions are a particular type of old-age pensions for workers in special occupations (such as aviators, truck drivers, lumbermen etc..). These workers can retire at a younger age or with shorter duration of employment.

In addition, the pension fund is made responsible for paying certain child allowances (IMF, 1996) . However, these allowances represent a relatively small amount (about 3 percent of total Fund outlays).

2.2. Main Features of the Pension System.

Compared with many equivalent systems in OECD countries, Ukraine's pension system is generous in several aspects:

Low retirement age. The normal retirement age is 60 for men and 55 for women. In many OECD countries such as Germany, Italy, and Japan, the normal retirement age is 65 for both men and women. As noted below, the actual age at which people can start collecting a pension can be even younger.

Generous eligibility conditions. The generosity of the system is also reflected in several additional characteristics. First, people can start collecting a pension before the retirement age if they have accumulated enough years of covered employment. Second, people in certain occupations and industries are permitted to retire before the regular retirement age. These workers may receive privileged pensions that are higher than the maximum standard old age pension. Third, people can continue to work even after they have started collecting old age pensions. If they work in a covered sector the post-retirement working years still count in the pension level calculation. Fourth, covered employment includes non-contributing activities, such as higher education, armed services, and caring for disabled person or a child under the age of 3.

High replacement ratio. The level of pension compared with the wage level is relatively high[1] in Ukraine. After working for 25 years, a male worker is eligible to receive an old-age pension that is 55 percent of his reference earnings. Women receive the same percentage after working for 20 years. For each additional year worked, the replacement rate increases by 1 percentage point. Thus, for a typical full career worker who has worked for 40

[1] As will be explained below, this feature has been modified since 1993.

years, a full pension replaces about 70-75 percent of previous earnings. In advanced industrialized countries, a public retirement pension replaces only about 40-70 percent of their average wages while at work.

All these factors have contributed to a high level of spending for pensions and to a situation whereby pensioners have come to represent over a quarter of the population. Pension expenditures in Ukraine - as in many other transitional economies (Fox, 1994) - represent a higher proportion of GDP (about 8 percent) than the average observed in countries with comparable income per capita (2.9 percent in lower-middle income countries, 6.9 percent in upper-middle income countries).

III. Recent Macroeconomic and Labor Market Trends and their Impact on the Pension System.

3.1. Macroeconomic Trends

Since its independence, Ukraine like other FSU countries experienced a sharp economic contraction and substantial macroimbalances (**Table 2**). Between 1991 and 1994, the macroeconomic environment deteriorated continuously. The monthly inflation rate reached an average of 47 percent in 1993 and the decline in GDP accelerated to 24 percent in 1994 leading to an accumulated 45 percent decline since 1991. It was only in October 1994 that the Government initiated serious reform efforts - including a reduction in the budget deficit to 5 percent of GDP in 1995, price and trade liberalization, and the start of mass and small-scale privatization. These efforts have resulted in a sharp reduction in monthly rates of inflation (to about 1 percent in mid-1996) and a slowdown of the decline in real GDP. However, the resumption of growth is not expected before 1997.

The sharp economic contraction has put great strains on the social protection system - and in particular on the pension system. While the number of beneficiaries has continued to grow (although slowly), the revenues of the fund declined sharply as a result of significant changes in the labor market.

First of all, **real wages** fell sharply leading to the decline of the wage bill, tax base of the pension system. The sharpest decline occurred between 1990 and 1993 with real wages falling to about 37 percent of their 1990 level. During the same period GDP fell in a lesser proportion, only to 68 percent of its previous level. Further wage decline in 1994 was compensated by an increase in 1995 leaving real wages currently at their 1993 level.

Table 2

Macroeconomic Indicators							
	1990	1991	1992	1993	1994	1995	1996 (est.)
Real GDP growth rate	-3.8%	-8.4%	-9.7%	-14.2%	-23.5%	-11.8%	-7.9%
GNP per capita (US$) (Atlas)	..	2636	2753	2439	1913	1650	1514
As % of GDP							
Current account deficit	..	..	..	..	-6.1	-4.2	-2.2
Fiscal Deficit		-14	-29	-12	-8.2	-4.7	-2.8
External Debt	..	..	..	..	23.8	23.0	21.4
Real exchange rate index (1/1993=100)	..	..	125	108	54	47	39
Nominal exchange rate (1000 LC/$)	0.0006	0.0022	0.0336	1.288	49.86	147.0	200.0
Inflation rate (year average)	..	..	1210	4735	891	376	75

Data Source: World Bank

Second, while total **employment** only fell by 10 percent between 1992 and 1995 and open unemployment remains low (2.4 percent in 1995) [2], significant changes have occurred in terms of labor force participation, occupational choice and allocation of time between various occupations. As explained below, these changes have induced a decline in the number of contributors to the social security system.

3.2. Changes in Labor Force Participation and Occupational Choice

Labor force participation rates observed in the FSU were high, mostly due to the fact that women had reached in the early 80s the highest labor force participation rates in the world [3](see Mincer, 1985). As in other industrialized countries, women had been drawn into the labor force through the migrations from rural toward urban areas, substituting work outside the household for family agricultural work. The process had been accompanied by a marked rise in the level of women's education and a similarly sharp decline in fertility. The soviet socialist economic system, ideology and growth strategy had played an additional key role in hastening the incorporation of women in the labor force (see Ofer & Vinokur 1985).

Although labor force participation rates were high over most of the life-cycle, rates were extremely low before the age of 20 and were falling sharply after the age of 55 for women and

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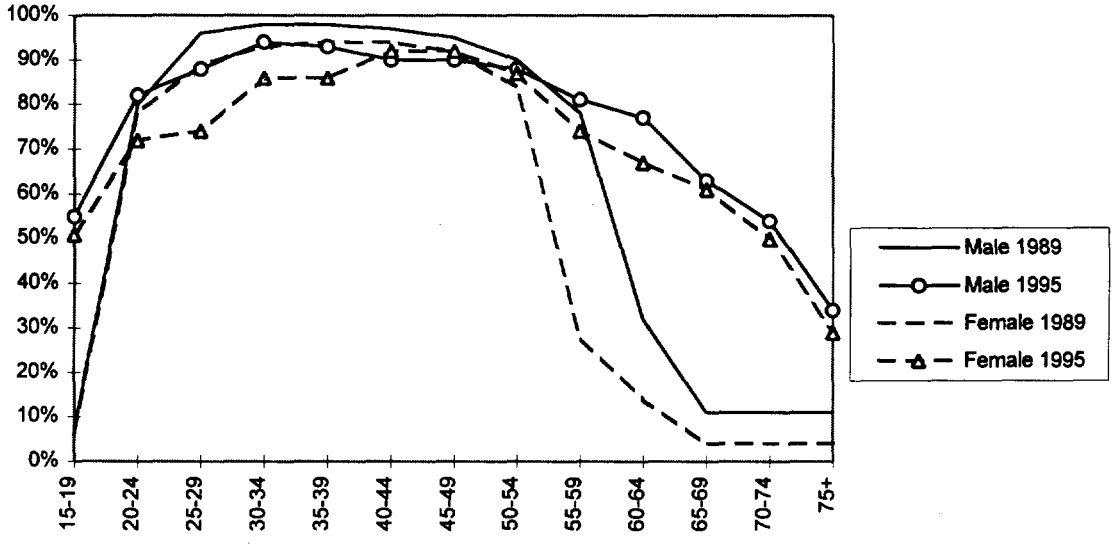
[2] Estimate based on World Bank Household Survey (1995) - other estimates (See Rapawy 1996, WB Poverty Assessment 1996) are of the same order of magnitude. Inspite of low open unemployment, there is evidence of hidden unemployment. It is estimated that in 1995, approximately 2 million employees of state-owned enterprises stay on the payroll although working for shorter hours or on leave without pay.

[3] except among the Moslem population who had quite different demographic and labor force behavior (higher fertility and lower labor force participation) than the rest of the population.

60 for men. This could be explained by the development of, and easy access to the education sector and the low retirement age. At young ages, the labor force behavior observed in the FSU was close to the one observed in European countries in which large public investments in education took place and labor force participation rates were significantly below those observed in Anglo-Saxon countries (OECD, 1994).

The transition brought about several changes. As a response to the sharp income decline and cuts in public spending, **labor force participation rates** increased sharply for both men and women in the 15-19 age group and at old ages (see **Chart 1**). For example, in the age group 60-64, rates increased from 32 to 77 percent between 1989 and 1995 for men, and from 14 to 67 percent for women.

Chart 1. Ukraine Labor Force Participation Rates



Source: World Bank household Survey (1995)

Another change has been the increased **importance of informal activities**. One important form of such activities in Ukraine consists of work on land plots, cattle/poultry breeding etc.. which represent significant sources of additional income. These activities are performed either as a complement to employment in the formal economy or have become the main occupation. In 1995, over 65 percent of men and women employed by a state or private enterprise[4] report spending additional time working on land plots. And over half of those who do not report being employed in the formal sector indicate that they work on land plots. In other words, in addition to a large proportion of those employed who allocate part of their time to

[4] This number largely exceeds the number of hidden unemployed estimated to about 2 million workers in 1995 (IMF 1996).

secondary - informal - activities, a high proportion of the labor force has informal work activities as main occupation (see **Table 3**). Another important form of possible informal activities can be self-employment. Although one could have expected to see self-employment develop rapidly during the transition, available data indicate that self-employment remains very limited in Ukraine. About 5 percent of working men (and 3 percent for women) report self-employment as their main occupation and a very small proportion of the labor force combine self-employment with other types of occupation.

Table 3

Labor Force Participation Rates
Employment Rates in Formal & Informal Sectors
- 1995 -

	MEN	WOMEN
Labor force participation rate for population aged 15+	.79	.71
Total Employment rate (Population aged 15+)	.76	.70
Employment rate in the formal sector	.51	.37
% of those working in the formal sector:		
- also working on land plots	.66	.67
- also working as self- employed	.05	.04

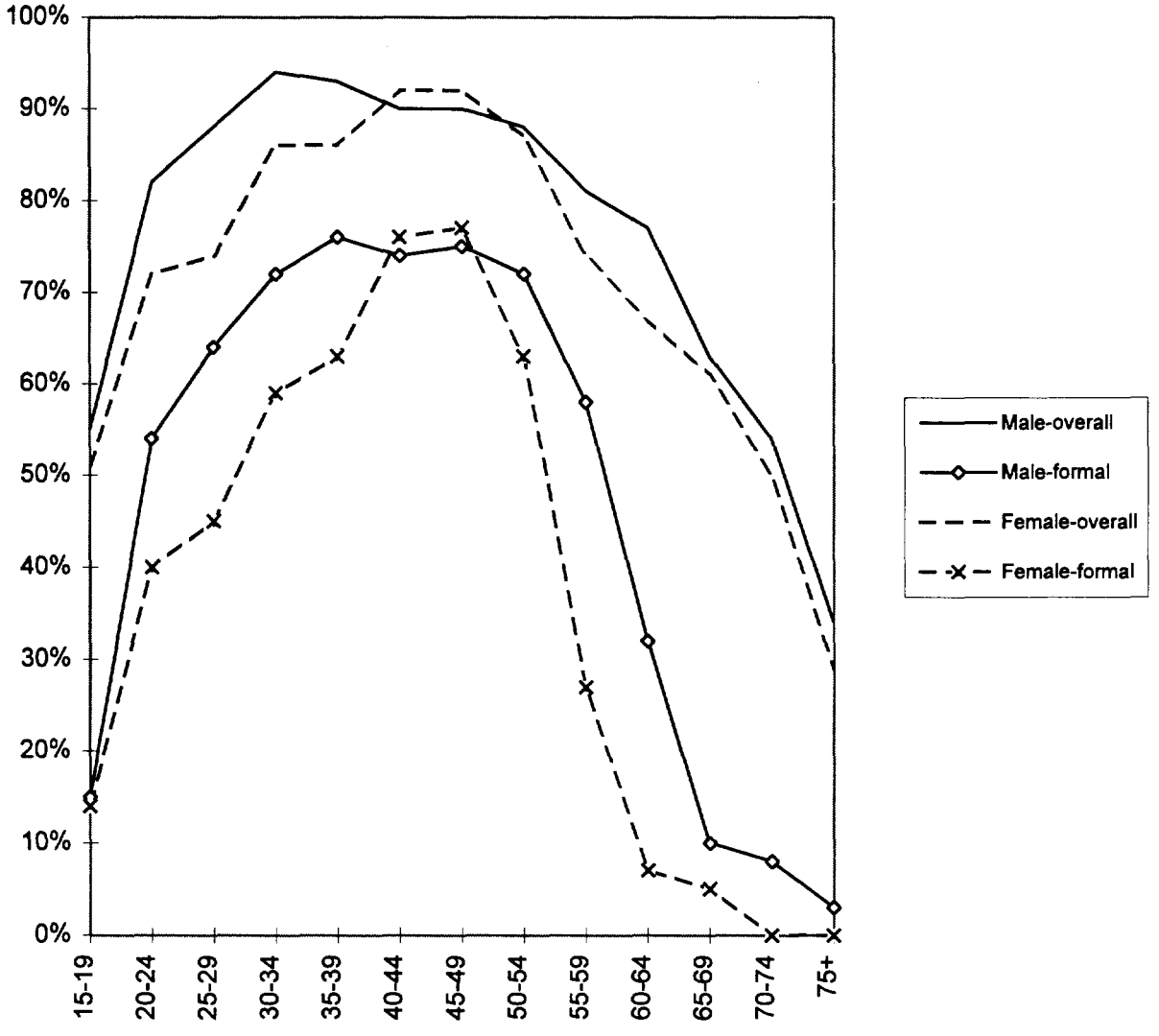
Note:
1. In the calculation of employment rates, unemployed are excluded.
2. People working exclusively on land plots or as self-employed are assumed to belong to the informal sector.

Source: 1995 Household Survey

The fact that a significant proportion of the labor force allocates time - sometimes exclusively - to occupations that can be qualified as informal and thus not subject to tax enforcement leads to a significant reduction in the number of contributors to the public social security system. **Chart 2** shows total male and female activity rates as well as rates calculated on the basis of participation to formal employment[5]. Employment rates in the formal economy are found to be substantially lower than total employment rates for both men and women. The discrepancy between these two rates is particularly strong for women. Overall, while 76 percent of men and 70 percent of women aged 15+ report working activities, only 51 percent of men and 37 percent of women are engaged in formal activities (though not exclusively). Thus, *one third of men and approximately one half of women in the labor force are likely to avoid any form of taxation of their labor income*. It is also worth noticing that most of the increased work activity observed in recent years both at young and old ages is taking place in the informal sector (see **Chart 1**).

[5] Individuals working exclusively on land plots or as self-employed are considered as working in the informal economy.

Chart 2. Labor Force Activity Rates in Overall Economy and in Formal Sector 1995



Source: World Bank household survey (1995)

Clearly, the economic transformation during the transition has led to significant changes in occupational choice and allocation of time within the household. The collapse of real wages in the formal sector has induced workers to allocate part - or all - of their working time to informal activities. Within households, the allocation of time is marked by a return toward a more traditional division of labor between men and women with women devoting a much higher proportion of their time to obtaining a secondary income, especially at young and old ages.

An additional factor contributes to depress even further the tax base of the pension system. There is increasing evidence that, even in the formal sector, a substantial amount of underreporting of productive activities and sales takes place. A March 1996 survey indicates that 39 percent of sales of all enterprises (48 percent for private enterprises) remain hidden in Ukraine (see Kaufman, 1996). This phenomenon is neither new nor specific to Ukraine. Personal informal incomes and outlays were extremely widespread in the FSU: 75 percent or more of households derived over 5 percent of their income from informal sources and 40 percent derived over one fourth in the late 1970s in Ukraine (see Grossman, 1989). The phenomenon is also observed in many transition economies (see for example, Arvay and Vertes 1995 for the case of Hungary). Its relative importance however, may have increased over recent years.

Overall, the decline in real wages, the fall in formal employment and underreporting of productive activities in the formal sector have contributed to a decline in the reported wage bill and thus, to an erosion of the tax base for the social security system. By 1993, the share of wages (net of taxes) in GDP had fallen to 23 percent, down from about 45 percent in 1991 (see **Table 4**)

As a result, while until 1993 payroll contributions were sufficient to cover the expenditures of the Pension Fund, spending climbed much faster than contributions in 1993 leading to a transfer from the central budget equal to about 2.6 percent of GDP to cover the deficit (see **Table 5**).

3.3 The Government's Response

Faced with resource limitations, the Government was unable to maintain a significant budget transfer to the Fund after 1993. Thus it opted for *shrinking benefits while attempting to preserve a minimum standard of living for low-income pensioners*. This was achieved by narrowing the range of payments and reducing the overall benefit level. As the majority of pensions (standard old-age pensions) are subject to a cap, the Government controlled the level of the maximum pension and let it drift relative to the average wage. While in 1991 the maximum pension was 7 percent above the average wage, it fell to less than half the average wage by 1993 and declined even further since then (see **Table 4**). As a consequence, an increasing number of pensioners received the maximum pension. This also applied to new pensioners who reached retirement with high wages (as a result of inflation and growing wage inequality). In contrast, to protect low-income pensioners the level of the minimum pension was increased relative to the average wage thus leading to a sharp compression of pension levels.

As a result, the effective replacement rate fell to approximately 1/3 of the average wage and on the expenditure side, the system moved closer to a social assistance program providing benefits loosely connected to the level of previous wages and years of contribution. On the revenue side, the system maintained its social insurance feature by taxing - heavily - reported wages of workers in the formal sector, that is, currently only about 60 percent of the labor force.

Table 4

Pension and Wage Rates in Ukraine					
	1991	1992	1993	1994	1995
Average pension/average wage	0.44	0.49	0.42	0.36	0.32
Maximum pension/average wage	1.07	0.69	0.45	0.42	0.31
Average pension/Average social pension	1.63	2.58	2.85	2.53	2.62
Average wage (000 kbv/month)		6.37	155.1	1375.5	7347.9
Wage bill (as % of GDP)		33%	23%	27%	33%
Real wage (1990=100)		81.3	36.8	32.9	36.9

Source: Data provided by the Ukrainian authorities, Tacis, and World Bank estimates.

Table 5

Pension Fund Balance as% of GDP					
	1992	1993	1994	1995	1996 (pro.)
Pension Fund balance	2.8	0.7	0.8	0.1	0.0
Revenue	11.6	9.0	8.8	8.0	8.1
Payroll Contributions	..	6.3	8.2	7.2	7.6
Budget Transfers	..	2.6	0.5	0.6	0.5
Other	..	0.1	0.1	0.2	0.0
Expenditure	8.8	8.3	8.0	7.9	8.1
Old-age pensions	..	6.4	5.2	4.2	4.6
Military pensions	..	0.2	0.3	0.4	0.4
Child allowances	..	0.2	0.2	0.2	0.2
Other pensions	..	1.5	2.3	3.1	2.9
Memo:					
Consolidated government budget balance	-17.8	-10.3	-8.2	-5.2	-3.4
Revenue	41.6	44.0	45.5	42.5	42.8
Expenditure	59.4	54.4	53.7	47.7	46.2
GDP (trillions of Kbv)	5.03	148.3	1138	5293	8686

Source: Data provided by the Ukrainian authorities and World Bank estimates.

IV. Non-Reform Scenarios: Medium Term Sustainability Prospects

Before the sharp economic downturn, the accounts of the Ukraine Pension Fund were balanced. Indeed, between 1990 and 1992, the Fund was able to run a small surplus and pensioners enjoyed the relatively generous provisions outlined in Section II. The current cutbacks were forced by the stark economic reality and are viewed by many decision makers as only temporary. This explains why the most fundamental characteristics of the Soviet-era

system, such as early retirement ages and wide coverage, have remained intact and why discussions on possible reforms have remained limited. Thus the first basic question to examine is whether this view is realistic and whether the country can restore the old pension benefit schemes once the economy recovers? If not, two questions arise: would the pension system be sustainable if one were to keep its most recently introduced features or should one envisage deeper structural reforms ?

4.1. Methodology and Basic Assumptions

A. The Model

To address these questions, a simulation model has been constructed. It integrates four modules: pension fund, labor market, macroeconomic, and demographic modules (see **Appendix A** for a detailed description of the model). The model covers the period 1995-2030 and provides a consistent framework for analyzing the balance of the Pension Fund under current provisions as well as for assessing the impact of various policy reforms. It allows for taking into account the interactions between the social security system and other key economic variables

The Pension Fund module calculates the Fund balance for each year based on expenditure and contribution data provided by the other modules. The number of pensioners depends on demographic factors and eligibility rules set by the pension system. The level of contributions to the fund depends not only on the level of employment, wages and the social security tax but also on the relative importance of the informal sector. It is assumed that workers in the informal sector do not contribute to the pension fund although they may be future beneficiaries either because they have accumulated rights in the past (prior to, or in the early stages of the transition) or because they are eligible for social pensions under the present set of regulations. The Pension Fund is linked to the consolidated government account. So a large and persistent deficit can undermine fiscal balance and threaten macroeconomic stability.

The labor market module defines trends in employment and real wages responding to the evolution of macroeconomic conditions. It calculates total labor income in the formal economy. This in turn determines the revenues of the Pension fund for a given level of the social security tax. The flow of workers exiting the labor force and eligible for retirement determines the stock and age composition of pensioners. The allocation of workers between the formal and informal sectors responds to changes in relative wages (net of social security contributions) in these two economic sectors.

The production sector is divided into two parts: formal and informal. It is assumed that shifting production to the informal sector reduces overall economic efficiency. So the effect of investment on growth declines as the size of the informal sector expands. Lower efficiency in the informal sector originates from greater uncertainty and ill-defined property rights which raise

operating costs, hinder the exploitation of economies of scale and, more generally, increase transaction costs (see Kaufmann & Kaliberta, 1996). Distortions in the labor market arising, in particular, from the high rate of taxation on labor in the formal sector create incentives for a reallocation of labor toward the informal sector. The productive sector thus responds to reforms that induce changes in overall labor supply and in its allocation between the formal and informal sectors of the economy.

The demographic module feeds the other three modules with the projection of population growth and demographic patterns (mortality/birth rates for each age/sex cohort). It provides information on the size of cohorts needed to calculate employment in the labor module.

The model is thus able to take into account the links between the socio-economic factors which determine the balance of the fund in the short- and medium-term. It also represents an attempt to quantify the feedback effects of policy changes in the area of social security on labor market equilibrium, fiscal balance, savings and investment, and more generally on the growth path of the economy.

B. Stabilization and Economic Reforms: Prospects.

The point of departure of the analysis is the current situation. The macroeconomic environment can be briefly described as follows: average monthly inflation rates have now fallen to about 1 percent and have remained at that level since the beginning of 1996; the budget deficit is expected to be below 4 percent of GDP; the exchange rate is stabilized but GDP is still falling (a negative growth rate of about 8 percent is expected). In terms of structural reforms, most domestic prices have been freed, trade has been liberalized, and about half of small-scale privatization has been completed.

The basic assumption for the coming years is that the government will continue to maintain a tight monetary and fiscal policy and will pursue its reform efforts. The budget deficit will be contained at 3-4 percent of GDP and inflation will fall to less than 10 percent a year by 2000. Structural reforms aimed at developing the private sector will be implemented steadily. They include completion of small-scale privatization; progress in privatization of medium- and large-scale enterprises and agricultural land; imposition of hard-budget constraints to remaining state-owned enterprises; full liberalization of trade; and a gradual reduction in the size of the budgetary sector. Under these assumptions, Ukraine could take full advantage of its natural and human resources as well as of the existing infrastructure. Growth could resume from 1997 on, starting with a modest rate of the order of 2 percent in 1997, followed by an average of 6 percent during the next three years, and a return to 4-5 percent after the turn of the century. Real wage growth would follow a similar path although growth rates would have to be slightly lower to take into account some growth of the labor force.

C. Demographic Trends: An Aging Population

The Ukrainian population is expected to grow older over the next 35 years. The average rate of population growth is projected to be 0.24 percent a year. This long-term growth rate is much smaller than world average, but comparable to other FSU countries (see Tables in **Appendix B**). Given life expectancy patterns, the percentage of people over the age of 60, the current retirement age for men (for women it is 55), is expected to increase from about 18 percent today to 25 percent in the year 2030.

Given these demographic trends, the old-age dependency ratio, defined as the ratio of the population over the age 60 (55 for women) over the population with ages 20 - 59 (or 20-55 for women), is expected to increase from the current level of 49 percent to almost 59 percent by the year 2030. It is unlikely that these demographic trends will be greatly altered by economic or political developments. As under the current Pension Law, everyone over the legal retirement age is eligible for some kind of pension, demographic factors will put pressure on the balance of the Pension Fund in the long run.

D. Labor Market Trends

From a demographic point of view the old age dependency ratio is measured as the population aged 60+ (55+ for women) over the population of working age. However, for the purpose of the analysis of the balance of the pension fund, the relevant ratio is the ratio of the population eligible for pensions over the number of contributors among the population of working age (system dependency ratio). Given the changes in labor force participation and allocation of time between informal and formal sectors and thus, the reduction in the number of contributors, this ratio is currently equal to about 120 percent[6], that is, almost 2.5 times the demographic ratio. In other words, the number of pensioners now exceeds by a significant margin the number of contributors to the PAYG system.

How this ratio will change over time depends both upon the demographic trends described above and upon the changes in the labor market that will continue to take place as a response to market signals. As a starting point, the assumption is made that the sharp increase observed in activity rates both at early and post-retirement ages is linked to the substantial decline in living standards experienced during the transition, and is thus, mostly an income effect As the economy recovers these activity rates would progressively decline at both ends of the age distribution. However, they would not return to their past levels. At young ages, two factors

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[6] A large discrepancy between the system dependency ratio and the demographic dependency ratio can also be found in other countries such as Argentina, Hungary or Latvia, where extensive tax evasion and early retirement also exist (see Vittas 1995 and Fox, Palmer & McIssac 1996). In both Argentina and Hungary, the system dependency ratio is nearly double the demographic ratio. In Latvia as in Ukraine, it is more than double. The extent of tax evasion and informalization of productive activities is thus particularly high in the latter two countries.

would have opposite effects: on the one hand, growth and increasing returns to education (as the economy restructures) would induce a recovery of school enrollment rates; on the other hand the likely increase in the cost of access to education compared to Soviet times would prevent the restoration of past levels of enrollment. It is therefore assumed that the activity rates of youth would gradually converge toward the average level observed in European countries. At post-retirement ages, assuming in the base scenario that the eligibility rule for pensions is not modified, rates would also decline as a response to improvements in living standards. However, they would not return to previous levels if the recovery of wages (and thus of pension levels) remains slow even under the hypothesis of fairly rapid growth. Indeed if real wages grow in line with GDP, wage levels would still be at about 60 percent of their 1990 levels by 2005.

With respect to activity rates between the ages of 20 and 60 for males (or between 20 and 55 in the case of women) the main assumption is that male labor force participation rates will remain roughly the same (and therefore similar to what they were in the past). Female activity rates between the ages of 20 and 55 however would decline slightly and become similar to those observed in Western Europe. It is expected that the development of the private sector will entail the loss of job security and the reduction of non-pecuniary benefits typical of public employment, which made it easier for women in the past to combine work with child raising activities.

The crucial factor for the sustainability of the Pension Fund, however, is not so much the evolution of labor activity rates but the relative importance of the informal economy and tax evasion. As a starting point in the base scenario, the assumption is made that the share of employment in the formal sector will remain at its current level (.60) over the next few years. However, as will be discussed in more details later this hypothesis appears unrealistic as three factors point to a further expansion of the informal sector unless policy changes are introduced. First, the high payroll tax provides strong incentives to employers to evade tax payments. Second, the recently introduced changes (compression of pension levels) have loosened the link between contributions and benefits and have consequently changed the social security contribution into a pure tax on labor. There is little incentive to contribute to a fund when expected benefits are not connected to contributions. Third, labor adjustment has just started in Ukraine with little labor flows out of state-owned enterprises into private enterprises or into self-employment. As both self-employment and the private sector expand, the possibility and likelihood of tax evasion will increase. The analysis will show the sensitivity of results to changes in assumptions regarding the size of the informal economy.

4.2. Could all the original features of the old-age benefit scheme be restored if the economy is back on a growth path ?

Restoring the original features of the pension system would essentially mean increasing gradually the replacement ratio and the range of payments, reintroducing at least partially some

link between contributions and benefits.[7] Current eligibility rules, including the early retirement age and the redistributive component in favor of those who have contributed little or nothing to the pension fund would be maintained.

Reintroducing some link between contributions and benefits would reduce the incentives toward tax evasion and the informalization of production. However, it would not eliminate them as the very high rate of taxation and the redistributive component of the system would remain. It is unlikely that the relative size of the informal sector would decrease significantly, given, in particular, the substantial labor reallocation toward the private sector and self-employment that is still expected to take place.

Simulations show that, even in the case of resumption of sustainable growth, the weight of demographic trends and a persistently high system dependency ratio would impinge on the balance of the pension fund. Assuming that the share of the informal sector remains constant, attempting to gradually increase the replacement ratio from about 30 percent in 1996 to about 50 percent by 2030 would make the deficit of the fund gradually grow from less than 1 percent of GDP in 1996 to over 3 percent in 2000 and 7 percent by 2010, threatening fiscal adjustment and stabilization (see **Scenario 1**). A very substantial reallocation of the labor force away from the informal sector into the formal sector, with positive feedback effect on growth would be needed to alter the results. Simulations show that almost 100 percent of the labor force would need to be employed in the formal sector and contributing to the fund to achieve a balance of the pension fund under these conditions (see **Scenario 2**).

Attempting to restore the past generous features of the pension system, in particular granting to pensioners a higher level of social protection (relative to wage-earners) than what they receive today does not appear as a realistic policy option, even if there is resumption of growth. Such an option would not be consistent with a continuous effort to maintain macroeconomic stability.

4.3 Would maintaining the "status quo" be sustainable ?

If restoring the past features of the social security system does not appear fiscally sustainable, would maintaining the current features - including the recent policy changes - be a more realistic policy option ? In other words, could Ukraine maintain a highly redistributive pension system, practically a social safety net (or social assistance) system, with a wide coverage but providing modest benefits ?

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[7] Increasing the range of payments would necessarily imply raising the replacement ratio as it would be impossible for social and political reasons to lower the minimum pension.

Scenario 1. Gradually restoring early-90s replacement ratios with constant share of informal sector

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.04	9.36	9.51	9.64	9.88	10.12	10.65	10.76
Total expenditure	8.49	9.61	10.79	11.63	13.02	16.25	17.31	18.46	19.04
Fund balance	-0.06	-0.57	-1.43	-2.12	-3.37	-6.37	-7.18	-7.81	-8.28
Average replacement ratio	29%	29%	31%	33%	37%	46%	47%	46%	49%
Dependency ratio	111%	120%	120%	119%	118%	117%	118%	121%	117%
Share of formal sector employment	59%	59%	59%	59%	59%	59%	59%	59%	59%

Scenario 2. Gradually restoring early-90s replacement ratios with declining informal sector

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.02	9.95	10.52	11.25	12.91	14.03	15.80	16.43
Total expenditure	8.48	9.62	10.46	11.19	12.24	14.51	15.14	15.95	16.44
Fund balance	-0.06	-0.59	-0.52	-0.67	-0.99	-1.60	-1.10	-0.15	-0.01
Average replacement ratio	28.6%	29%	31%	34%	38%	47%	48%	48%	50%
Dependency ratio	110.8%	120%	108%	101%	92%	78%	72%	68%	65%
Share of formal sector employment	59%	59%	66%	70%	75%	88%	96%	99%	99%

Note: This is a "what-if" scenario in the sense that there is no economic rationale for an increasing formal sector.
The share of informal sector is set arbitrarily so that the Pension Fund will remain roughly balanced.

Scenario 3. Maintaining the "status quo" - replacement ratio practically constant

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.04	9.36	9.51	9.64	9.88	10.12	10.65	10.76
Total expenditure	8.49	9.61	10.03	10.49	10.77	10.89	11.18	11.94	12.03
Fund balance	-0.06	-0.57	-0.67	-0.99	-1.12	-1.00	-1.05	-1.28	-1.27
Average replacement ratio	29%	29%	29%	30%	30%	30%	30%	30%	31%
Dependency ratio	110.8%	120%	120%	119%	118%	117%	118%	121%	117%
Share of formal sector employment	59%	59%	59%	59%	59%	59%	59%	59%	59%

It is obvious that, *ceteris paribus*, this option could be fiscally sustainable. Maintaining the replacement ratio at about one third of the average wage would imply that pensions grow in real terms at the same rate than wages. If the share of the formal sector were to remain practically constant, the balance of the pension fund would depend mainly on two sets of factors working in opposite directions. Demographic factors would worsen the situation. On the other hand, the gradual decline of hidden unemployment in the formal sector through labor shedding would reduce the number of beneficiaries of old-age pensions[8]. Simulations show that, in such a case, the deficit of the pension fund would remain around 1 percent of GDP, which could be accomodated without jeopardizing fiscal adjustment (see **Scenario 3**).

Such conclusion, however, fails to consider that the whole incentive framework inducing an increase in the informal sector would remain in place. The formal sector would remain heavily taxed and the link between contributions and benefits would remain loose inducing substantial income redistribution within cohorts. Enterprises would still be induced to shift operations to informal markets and to use less labor-intensive technologies. From the point of view of individual workers, the system would remain actuarially unfair. **Chart 3** illustrates this point. It compares the present value of contributions with the present value of expected pensions for men and women who spend 30 years of their working life in the formal sector and have a length of life determined by the average life expectancy for the whole population. The calculation is made for workers with various wage levels at the time of exit from the labor force and assumes a 3 percent average annual real wage growth and a 3 percent real interest rate. These estimates show that all male workers, irrespective of their wage levels, could expect to receive less than 20 cents for every dollar of contribution. Women would receive somewhat more - between 20-35 cents per dollar - both because of their earlier retirement age and longer life expectancy.[9] In any case, the large redistributive component makes it unlikely that workers would willingly contribute to the fund.

As a result, assuming that the fund would remain balanced by maintaining the "status quo" would be highly unrealistic. Indeed, a small shift of the labor force away from the formal sector would immediately threaten the balance of the fund. For example, if only 50 percent of the labor force instead of 60 percent were to contribute to the fund, the fund deficit would increase to over 2 percent of GDP.

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[8] Savings would be limited as those not eligible for standard old-age pensions would become eligible for minimum pensions or social pensions.

[9] These calculations are sensitive to the assumptions made on real wage growth and real interest rate. For example, for a 5% wage growth and a 3% interest rate, female workers could expect to receive 25-45 cents per dollar of contribution. Inversely with a 3% wage growth and a 5% interest rate, the return would only be 15-25 cents per dollar.

Chart 3. Ratio of Present Value of Expected Pensions over Present Value of 30 Years of Contribution at Time of Retirement

note: assuming rate of real wage increase = 3%, real interest rate = 3%,
life expectancy = 65 for men, 73 for women.

An additional element to take into consideration is the high probability of lack of confidence and social support that such a policy option would entail. Even with sustained growth for a period of over 20 years, the livings standards of the population would improve slowly. Given the 60 percent fall in real wages between 1990 and 1995, real wages would not recover their 1990 level before 2020, that is, after about 25 years. During all that period, pensions would remain at 30 percent of a depressed level.

Thus one has to conclude that *the changes recently introduced in the pension system - if made permanent - would not constitute a valid medium- and long-term reform option.* The main reason is that the whole set of incentives favorable to the development of the informal sector would remain in place.

V. The Need for Reforms

The simulations presented above clearly show that, either attempting to restore all past features of the pension system or even simply maintaining the "statu quo" are not viable options - even in the context of resumption of growth. Ruling out these options implies that reforms are necessary. This section examines various options and attempts to measure their impact.

5.1. Reforms of Limited Scope.

Previous studies of the Ukraine pension system (e.g., World Bank, 1994; IMF, 1996; Kane, 1996) have identified and recommended a number of short- and medium-term reforms which have as main objective to ensure fiscal sustainability. The proposed measures either aim at saving resources or at improving collection of revenues. The first set includes reducing pensions for working pensioners, establishing a uniform maximum pension (that is, eliminating some privileges for several categories of pensioners) and raising the retirement age. The second set of measures aims at raising revenues through enforcement of tax payments, the inclusion of income-in-kind in the taxable wage base, and the extension of the obligation to pay the 32 percent payroll tax to those engaged in entrepreneurial activity. In the medium-term, the main recommendations are to base the level of pensions on years of contributions rather than on years of service, and to increase the spread among pensions in order to restore some link between contributions and benefits.

The most significant of these measures is likely to be the increase in the retirement age. Simulations discussed below will show its impact. All the other short-term measures - although in the right direction - are unlikely to have a significant impact as they fail to take into consideration the main factors that make the whole system unsustainable. For example, raising the effective tax rate by including income-in-kind and improving tax enforcement may encounter enormous difficulties as the incentives to informalize productive activities will be even greater than before. Such measures would be more effective if introduced when distortions affecting labor supply and occupational choice are reduced or removed.

As for the increase in the spread among pensions, it amounts to raising the level of the maximum pension as it would be socially and politically impossible to lower the minimum pension which is currently only equal to about 20 percent of the average wage. Thus the average replacement ratio would increase. Simulations presented in the last section showed that, even with sustained growth, this would make the deficit of the pension fund grow rapidly in the absence of other reforms.

Raising the retirement age is often a difficult political decision which receives little public support. Most countries who take that decision opt for a gradual increase. Some, however - such as Georgia among FSU countries - choose to implement the change in one shot. To compare the different cases, various simulations have been run (see **Scenarios 4-9**). In **Scenario 4**, retirement age is raised from 60 to 65 for men, and from 55 to 60 for women in 1997. In **Scenario 5**, a further increase to age 65 is assumed for women. In addition in both scenarios, privileges given to certain categories of workers who can retire before the formal retirement age

are reduced though not fully eliminated.[10] In both cases, there is no attempt to remove retroactively the rights of those who retired earlier. The third simulation (**Scenario 6**) assumes a more gradual increase in retirement age. All three scenarios assume that, with economic recovery, the Government will attempt to improve the standards of living of pensioners and raise gradually the replacement ratio to reach about 50 percent by 2030.

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[10] The closing of mines and restructuring of large enterprises is expected to lead to early retirement for certain categories of workers and may prevent a complete elimination of rights to early retirement. Howver,a complete elimination of these rights is envisaged in Scenario 9.

Scenario 4. Increasing retirement age (men to 65, women to 60) with increasing replacement ratio

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.11	9.54	9.77	10.05	10.54	10.85	11.36	11.48
Total expenditure	8.49	9.63	10.77	11.57	12.65	14.18	14.76	16.20	16.92
Fund balance	-0.06	-0.52	-1.24	-1.80	-2.60	-3.64	-3.91	-4.84	-5.44
Average replacement ratio	29%	29%	31%	34%	37%	45%	46%	45%	48%
Dependency ratio	111%	119%	116%	113%	108%	96%	95%	101%	100%
Share of formal sector employment	59%	59%	59%	60%	60%	61%	61%	61%	61%

Note: Retirement age increases by one year each year from 1997 to 2001 so that men aged 59 and women aged 54 in 1996 will retire in 2002.

Scenario 5. Increasing retirement ages to 65 with increasing replacement ratio

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.22	9.62	9.84	10.12	10.68	11.01	11.51	11.61
Total expenditure	8.49	9.64	10.72	11.47	12.42	13.13	12.90	13.88	14.42
Fund balance	-0.06	-0.43	-1.10	-1.63	-2.30	-2.45	-1.90	-2.37	-2.81
Average replacement ratio	29%	29%	31%	34%	38%	47%	49%	48%	50%
Dependency ratio	111%	117%	114%	110%	104%	84%	78%	82%	81%
Share of formal sector employment	59%	59%	59%	60%	60%	61%	62%	61%	62%

Note: Retirement age increases by one year each year from 1997 to 2001 for men, to 2006 for women.

Scenario 6. Gradual increases of retirement ages (see note below) with increasing replacement ratio

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.24	9.65	9.89	10.18	10.74	11.10	11.61	11.68
Total expenditure	8.49	9.64	10.72	11.64	12.77	13.37	12.92	13.99	14.70
Fund balance	-0.06	-0.40	-1.07	-1.76	-2.60	-2.62	-1.83	-2.38	-3.01
Average replacement ratio	29%	29%	31%	34%	38%	47%	48%	48%	50%
Dependency ratio	111%	117%	114%	111%	106%	86%	77%	81%	80%
Share of formal sector employment	59%	59%	59%	60%	60%	61%	62%	61%	62%

Note: Retirement age increases gradually (by two years each year) to 65 for men and 60 for women at the end of 1996, and then then retirement age for women increases gradually to 65. So that men aged 59 in 1996 will retire at the age of 61 in 1998, and those 58 in 1996 will retire at the age of 62 in 2000, and so on.

Scenario 7. Increasing retirement ages to 65 with replacement ratio practically constant

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.22	9.63	9.87	10.17	10.77	11.13	11.66	11.75
Total expenditure	8.48	9.64	10.14	10.36	10.29	8.69	8.29	9.00	9.24
Fund balance	-0.06	-0.42	-0.51	-0.49	-0.12	2.08	2.84	2.67	2.51
Average replacement ratio	28.6%	29%	30%	31%	31%	31%	31%	31%	31%
Dependency ratio	110.8%	117%	114%	110%	103%	83%	77%	81%	80%
Share of formal sector employment	59%	59%	59%	60%	60%	60%	60%	60%	60%

Note: Retirement age increases by one year each year from 1997 to 2001 for men, to 2006 for women.

Scenario 8. Increasing retirement ages to 65 with declining formal sector and constant replacement ratio

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.22	9.63	9.80	9.88	9.29	9.27	9.63	9.64
Total expenditure	8.49	9.20	9.97	10.39	10.41	9.23	8.91	9.66	9.93
Fund balance	-0.06	0.02	-0.34	-0.59	-0.53	0.07	0.37	-0.03	-0.29
Average replacement ratio	28.6%	28%	29%	31%	31%	31%	31%	31%	31%
Dependency ratio	110.8%	117%	114%	111%	108%	103%	99%	105%	105%
Share of formal sector employment	59%	59%	59%	59%	57%	49%	46%	45%	45%

Note: This is a "what-if" scenario in the sense that no rationale is provided for declining formal sector.

Scenario 9 . Increasing retirement ages to 65 (with elimination of early retirements) and increasing replacement ratio

	1995	1996	1997	1998	2000	2005	2010	2020	2030
PAYG Pension Fund (% of formal GDP)									
Payroll contributions	8.43	9.22	9.62	9.84	10.12	10.68	11.01	11.51	11.61
Total expenditure	8.49	9.64	10.60	11.21	11.84	12.45	11.90	12.76	13.38
Fund balance	-0.06	-0.43	-0.98	-1.37	-1.73	-1.77	-0.89	-1.25	-1.76
Average replacement ratio	29%	29%	31%	34%	38%	47%	48%	47%	49%
Dependency ratio	111%	117%	113%	108%	99%	80%	72%	75%	75%
Share of formal sector employment	59%	59%	59%	60%	60%	61%	62%	61%	61%

Note: Retirement age increases by one year each year from 1997 to 2001 for men, to 2006 for women.

All three simulations show that raising the retirement age has a significant financial impact. However, it would not generate sufficient savings to compensate for the additional expenditures that the desired increase in the overall level of pensions relative to wages would

imply. In other words *the savings generated by retirement at a later age would not allow the Government to increase significantly the replacement ratio.* If the Government aims at a 50 percent replacement ratio, the deficit of the pension fund would be significant in the long run (over 5 percent of GDP if the retirement age for women is raised to 60, and about 3 percent of GDP if it is raised to 65). It is worth noting that these results are obtained under a set of favorable circumstances as the simulations assume no further increase in the informal sector. In fact, the increase in the spread among pensions and the increased level of pensions would induce a small increase in the formal sector and a higher growth rate.

Because of the long life expectancy of women in Ukraine, raising their retirement age to 65 rather than to 60 makes a significant difference: the long-term deficit is reduced by nearly 50 percent. This points to the need to consider 65 as the most appropriate retirement age.

Whether the increase in retirement age is gradual or immediate does not matter in the long run, but of course matters in the short run. A sharp increase would thus have the advantage of easing the fiscal adjustment during the early years of the transition. It is also worth considering that the political difficulty of introducing such a reform may be significantly lower[11] when the labor force participation rates of older people are high as it is the case now in Ukraine.

The remaining simulations presented in **Scenarios 7 & 8** assume an increase in the retirement age combined with a more modest increase in the level of pensions. Pension increases follow the path of real wages so as to maintain the replacement ratio practically constant. In such case, an increase in the retirement age would generate a surplus after the turn of the century provided the share of the formal sector remains practically constant (**Scenario 7**). However even a modest reallocation of labor toward the informal sector - 55 percent of the labor force instead of the current 40 percent - would be sufficient to wipe out the surplus (see **Scenario 8**). Finally Scenario 9 envisages to accompany the increase in pension age by a radical elimination of rights to early retirement. As could be expected, Scenario 9 shows a decline in the fund's deficit (compared to the deficit in scenario 5) but no elimination.

This exercise clearly shows that, *however significant and necessary is the increase in the retirement age, it cannot by itself ensure the sustainability of the pension system* and more radical reforms are needed.

5.2. More Radical Reforms: Transition toward Fully -Funded Systems

The analysis presented above leads to two conclusions. First, in the absence of reforms the financial situation of the pension system will worsen[12] - even if the economy returns to a

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[11] Such a measure was introduced in Georgia in January 1996, precisely at a time when pensions were considerably reduced and older people were forced to rely on other sources of income (such as work) to cover their basic needs.

[12] unless, of course, the Government continues to adjust downward the level of benefits.

sustainable growth path. Second, reforms that fail to change the incentive framework appear doomed to failure. The strong incentive to informalize production and avoid taxation is also linked to the lack of credibility of government policies and mistrust of the overall population toward state-managed programs that failed to provide protection to vulnerable population groups during the transition. This explains why private sector initiative to supplement falling official benefits has increased rapidly in Ukraine as it did in Russia. Almost 20 private pension funds are now in operation in Ukraine in spite of the absence of a regulatory and legislative framework that could provide some protection to those who deposit their savings in those funds.

The fact that private sector initiative is developing independently points undoubtedly to the need to put in place urgently the necessary legislative and regulatory framework. It also indicates that there is no longer need for a public social security system that would attempt to cover all needs for old-age security. Reforms should thus consider a mix of public and private responsibilities. Although this paper focuses on the restructuring of the public scheme, it assumes that the promotion of private voluntary pension schemes through the establishment of an appropriate legislative framework would be part of the overall social security reforms in Ukraine.

The most obvious reform to consider for the public scheme would be the introduction of a fully-funded system (see Corsetti & Schmidt-Hebbel, 1995; Vittas, 1995). Such pension arrangement implies that each generation pays for its own retirement through the buildup of a stock of capital during their working years. The major benefit of such system is that it establishes a clear link between contributions and benefits as each worker has an account in which his/her savings are accumulated and draws on this account at a later stage of his life. This reduces the incentives to avoid the burden of the payroll tax by shifting to informal activities or underreporting wages. Although one could also restore a link between contributions and benefits under a PAYG system with an appropriate pension formula, the link would remain weaker due in particular to intra-generational income redistribution. The incentives to participate in the share of the formal economy would thus be greater with a funded scheme. One could also expect that a funded scheme would contribute more effectively to restoring credibility and trust as it could be privately managed (although subject to public regulations). Confidence is an another important factor that can induce a larger share of labor working in the formal sector and less tax evasion.

Other benefits of a funded system would be a shift toward long-term financial savings which would contribute to the development of capital markets, and a likely positive impact on the overall rate of saving. In addition the adoption of a defined-contribution program would imply a minimal risk of government involvement.

A. Transition Paths: Tradeoffs and Policy Issues.

Shifting from a PAYG to a funded system entails creating a transition deficit as the contributions of those enrolling under the new plan are no longer available to pay for the

pensions of current retirees. The financial responsibility for the obligations toward current pensioners is gradually shifted to the government thus reducing - pari passu - the liabilities of the pension system. To finance the transition costs the government can either issue new government debt and/or use budget surpluses (raising taxes or reducing public spending).

There is obviously some flexibility in the design of a transition path. The final choice of a particular path and the associated cost depend to a large extent on the way several issues - some of them potentially of significant political sensitivity - are addressed. Critical decisions need in particular, to be taken regarding the rights to guarantee to pensioners covered under the old system; the level at which the contribution rate will be set under the new plan; and the distribution of the fiscal burden of the transition between generations. In addition, the government must decide whether the new fund will be made responsible for the payment of social or minimum pensions. The design and choice of a particular transition path thus implies taking decisions which can affect several generations of workers and pensioners in different ways. They can also have different implications regarding savings, capital formation and growth.

In the following various transition paths - with their associated costs - will be examined. They correspond to alternative ways of addressing the foregoing issues taking into account factors specific to Ukraine. In no way, these simulations pretend to cover all possible cases, in particular in terms of timing and speed of implementation of the reform. The objective is mainly to underline the trade-offs and examine the most critical elements.

All simulations (see **Scenarios 10-16**) assume that the transition to a mandatory funded system would start in 1997[13] with the cohort of younger workers (aged 15-29) contributing to the new fund. Thus in 1998, workers aged 15-30 would be enrolled in the new plan and so on... It is therefore only at the end of the 35-year projection period that all workers in the labor force would be enrolled. Since the analysis made in an earlier section made clear that increasing the retirement age was a necessary component of any reform of the social security system in Ukraine, all simulations assume an increase in the retirement age up to 65 for both men and women. In addition, it is expected that credibility of reforms will gradually build up and that changes in the incentive framework will induce an increase in the share of the formal sector in total employment. However, given the difficulty to predict the speed and magnitude of the behavioral changes all scenarios assume a response lag and only a moderate growth of the share of the formal sector. By 2030 still a little less than 3/4 of the labor force would be in the formal sector.

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[13] The choice of 1997 is arbitrary. Delaying implementation by a few years would not affect the conclusions of the analysis.

Finally all simulations assume that, at least in the early years, the assets of the funded tier will mostly comprise government-issued bonds. The diversification of assets in the fund's portfolio will take place gradually as the financial sector strengthens and develops. The possibility for the government to borrow from the funded tier to cover its obligations toward current pensioners (or part of them) makes possible the introduction of the new pension plan without short-term fiscal impact. There is just an exchange of cash for government debt, and even the interest of the debt is assumed to be paid by issuing new debt during the period of analysis (the first outlays from the funded tier are not expected to take place before 35 years when the first cohort retires under the new system). An alternative is of course to allow the funded tier to diversify its assets at an earlier stage. This could increase the public support for the reform but the fiscal cost and thus the burden on the current generation would also greatly increase.

Scenarios vary in the following:

(i) Rights guaranteed to current pensioners. It is obvious that the cost of the transition to a funded system will be smaller, the smaller the benefits provided to current pensioners. However, it is important to consider in the case of Ukraine that, over recent years, pensioners have already been subject to a significant reduction in their levels of benefits. Introducing a reform that would imply a further reduction of benefits to one-fourth of the population, could be extremely difficult for social and political reasons, especially at a time of economic recovery. Such case is not examined in this paper. Two options will therefore be considered: (a) indexing pensions over real wage growth which would maintain the replacement ratio at its current level; or (b) indexing pensions on changes in the price level, which would lead to a lower and decreasing replacement ratio. A more generous solution, amounting to a significant increase in the replacement ratio, is ruled out. As shown earlier it would imply a significant deficit even in the absence of reforms. The choice between options (a) and (b) depends on consideration of costs and equity.

(ii) Contribution rate. Maintaining high payroll taxes while reducing labor market distortions through a stronger link between contributions and benefits would help creating a surplus under the PAYG system. This could lower the transition costs. However, there is little justification for a 33 percent forced savings rate under a funded system. A lower rate would leave room for individual choices and enrollment in voluntary private plans. With a reduction in tax evasion and the internalization of benefits a funded system would reduce (or eliminate) the redistributive component. The same replacement ratio could be achieved with a lower contribution rate. All these considerations - in addition to the objective of reducing tax evasion - point into the direction of lowering the contribution rate. The question is then to decide by how much and how rapidly, and for whom (workers under the old or the new system). This also has significant distributional and fiscal implications.

Simulations will consider several contribution rates (33, 23,17 and 10 percent) allowing for some comparison. When a reduction is envisaged, it will either be gradual (by one percentage point every year), or at once in 1997. The choice of the range 17-23 percent is based on the assumption that the acceptability of the reform will be greater if those enrolling under the new plan can expect higher pension levels than under the current plan. This will be discussed further below. Choosing 10 percent would reduce the mandatory scheme and leave more room for additional voluntary private plans.

(iii) Distribution of the fiscal burden between generations. As pensioners enrolled under the new plan will enjoy larger benefits[14] than current pensioners for a given contribution rate, one could envisage to partially tax the former to reduce the transition deficit. The forced redistribution from current workers to current pensioners would remain compensated by higher expected benefits. Two alternative ways of doing so are examined. The first amounts to have all members of the labor force - whether belonging to the new or the old plan - benefit from a gradual decline in the contribution rate (from 33 to 23 percent by 2010). However, over the whole period, those enrolled under the new plan would only accumulate 22 percent[15] into their accounts. The difference - an amount decreasing over time - would help finance the transition costs. The other alternative is to lower the contribution rate to 23 percent for all workers but at once in 1997. Workers affiliated to the new plan would however only accumulate 17 percent of their wages into the fund. Over the whole period, 5 percentage points would be redistributed toward current payments of pensions.

Social and Minimum Guaranteed Pensions. The remaining important issues are the treatment to be given to social pensions and whether a minimum pension should be guaranteed to those who have only contributed for a few years to the fund. Social pensions are a clear component of a safety net. One question - often debated - is whether this type of pensions should be financed out of payroll taxes or general tax revenues, and whether it should be given to all or subject to means-testing. One could easily argue that it would be preferable to shift all social assistance payments to the budget in order to eliminate the distortionary effects of the payroll tax. However, in the current circumstances social pensions are low in Ukraine - equal to about 18 percent of the average wage. Given the likely labor market and macroeconomic scenarios, less than 1 percent of the total payroll tax is (and will be) needed for their payment. Keeping social pensions as a liability of the pension system does not appear to have significant financial implications as long as current regulations remain in effect.

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[14] A significant notch can be expected at the time of retirement of workers enrolled under the new plan. While pensioners under the PAYG system can expect a replacement ratio of the order of .3 with a 33 percent contribution, those adhering to new plan could reach a ratio of .8 with similar contribution provided the rate of interest is equal to the rate of real wage growth.

[15] The one percent difference between 23 and 22 percent would be used for the payment of social pensions as explained in the next paragraph.

Deciding on a minimum guaranteed old-age pension depends on whether a first pillar - mostly redistributive- would be maintained in addition to the funded system. Most countries - such as Chile - which do not have a first PAYG pillar have a guaranteed minimum pension. In the rest of the analysis, we will proceed under this assumption and maintain the same level for both minimum and social pensions. One percent of the payroll tax will be kept for that redistributive purpose.

B. Simulation Results

Maintaining pensions indexed on real wage growth and a 33 percent contribution rate while raising the retirement age and benefiting from an increase in formal sector employment would generate a surplus within a few years (**Scenario 10**). As of 2000 total contributions (including those to the funded tier) could exceed expenditures. The surplus although small at the start, would reach almost 4 percent of GDP by 2005. In spite of this surplus, a significant amount of debt would need to be issued: by 2000 the amount of debt would reach 10 percent of GDP and about 128 percent by 2030, assuming a 3 percent real interest rate.[16]

Lowering the contribution rate to 23 percent at the start of the implementation of the reform would, ceteris paribus, generate a deficit in early years (**Scenario 11**). The stock of government debt to the funded tier would reach 7 percent of GDP by 2000 and would be equal to 149 percent at the end of the period. It is interesting to observe that a gradual lowering of the payroll tax (by one percentage point every year for 10 years) - instead of an immediate drop - would make practically no difference in terms of total debt accumulation (**Scenario 12**). The differential impact in terms of lower debt would only be noticeable in the early years when the stock of debt is still small. Both scenarios however differ in terms of their impact on the government's budget deficit. Lowering the contribution at once creates in the early years, a deficit which exceeds the endowment needed for the newly created fund. This difference needed to pay for current pensions (around 3 percent of GDP until 2000 and still slightly negative until 2005) would necessarily have to be financed out of the budget, either by raising other taxes or by cutting public spending. This option may therefore be more difficult to implement in the context of a tight expenditure program unless the sudden lowering of the tax is accompanied by some other measure, such as a reduction in pension levels, which would lower expenditures.

A modest surplus could be restored by indexing pensions on prices rather than on real wage growth while reducing the contribution rate. This would reduce somewhat the burden passed on future generations. In this case, the overall debt would accumulate to about 127 percent of GDP by 2030 (**Scenario 13**).

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[16] It is assumed that the service of the debt is covered by issuing new debt.

Scenario 10. Starting the funded tier with the generation younger than 30 in 1997, increasing retirement ages to 65 and maintaining a 33% tax rate

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.42	9.96	10.62	11.97	12.40	13.12	13.42
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.32	8.30	8.28	8.99	8.98
Balance	-0.06	-0.50	-0.57	-0.27	0.30	3.67	4.12	4.12	4.44
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			198	514	1629	8867	28232	175051	765451
Gov't borrowing from Funded tier			256	315	477	414	1364	8326	28228
(as % of formal GDP)			2.5%	2.6%	2.8%	1.4%	2.8%	6.4%	8.3%
Stock of gov't debt			256	614	1731	4857	12603	88118	438412
(as % of formal GDP)			3%	5%	10%	16%	26%	67%	128%
Extra resources needed for PAYG			-57	-32	0	0	0	0	0
(as % of formal GDP)			-1%	-0.3%	0.0%	0%	0%	0%	0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

Note: It is assumed that in 1997 all workers younger than 30 will contribute to funded tier, in 1998, workers younger than 31, etc. For these workers 32% tax goes into their personal account, 1% is used for social pensions. Real interest rate on funded tier balance is 3% annually.

Scenario 11. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax to 23% for all workers in 1997, increasing retirement ages to 65, and maintaining constant replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	6.61	7.04	7.46	8.40	8.70	9.21	9.42
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.33	8.30	8.29	9.01	8.99
Balance	-0.06	-0.50	-3.37	-3.19	-2.87	0.10	0.41	0.20	0.44
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			137	358	1132	6148	19569	121306	530399
Gov't borrowing from Funded tier			137	197	365	1026	2153	9248	28578
(as % of formal GDP)			1.4%	1.6%	2.1%	3.4%	4.4%	7.1%	8.4%
Stock of gov't debt			137	358	1132	6118	18743	115560	508777
(as % of formal GDP)			1%	3%	7%	20%	38%	88%	149%
Extra resources needed for PAYG			-341	-389	-490	0	0	0	0
(as % of formal GDP)			-3.4%	-3.2%	-2.9%	0.0%	0.0%	0.0%	0.0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

Note: For workers enrolled under the new plan, 22% tax goes into their personal account, 1% is used for social pensions. Real interest rate on funded tier balance is 3% annually.

Scenario 12. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax for all workers by 1% a year from 1997 to 2006 (to 23% in 2006), increasing retirement ages to 65, and maintaining constant replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.14	9.43	9.35	8.76	8.70	9.21	9.42
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.33	8.30	8.30	9.01	8.99
Balance	-0.06	-0.50	-0.85	-0.80	-0.97	0.46	0.41	0.20	0.43
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			192	492	1496	7268	21264	125200	538987
Gov't borrowing from Funded tier			192	267	462	965	2154	9252	28597
(as % of formal GDP)			1.9%	2.2%	2.7%	3.2%	4.4%	7.1%	8.4%
Stock of gov't debt			192	492	1496	6614	19498	117325	512827
(as % of formal GDP)			2%	4%	9%	22%	39%	90%	150%
Extra resources needed for PAYG			-86	-97	-166	0	0	0	0
(as % of formal GDP)			-0.8%	-0.8%	-1.0%	0.0%	0.0%	0.0%	0.0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

Note: In 1997, for workers younger than 30 , 32% tax goes into their personal account, 1% is used for social pensions. in 1998, for workers younger than 31, 31% tax goes to funded tier, 1% is used for social pensions, etc., and after 2006, 22% tax will go to funded tier, 1% is used for social pensions. Real interest rate on funded tier balance is 3% annually.

Scenario 13. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax for all workers by 1% a year from 1997 to 2006 (to 23% in 2006), increasing retirement ages to 65, and lowering replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.14	9.44	9.36	8.76	8.71	9.21	9.42
Total PAYG expenditure	8.49	9.64	9.89	9.85	9.85	7.75	7.62	7.90	7.59
Balance	-0.06	-0.50	-0.75	-0.41	-0.49	1.02	1.09	1.30	1.84
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			192	492	1495	7264	21256	125176	538928
Gov't borrowing from Funded tier			192	267	462	796	1818	7800	23795
(as % of formal GDP)			1.9%	2.2%	2.7%	2.6%	3.7%	6.0%	7.0%
Stock of gov't debt			192	492	1495	5854	16840	99950	433474
(as % of formal GDP)			2%	4%	9%	19%	34%	76%	127%
Extra resources needed for PAYG			-76	-50	-83	0	0	0	0
(as % of formal GDP)			-0.8%	-0.4%	-0.5%	0%	0%	0%	0%
Average replacement ratio	29%	29%	29%	29%	30%	29%	29%	27%	26%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	68%	71%	71%	72%	72%

Note: For workers enrolled under the new plan, 22% tax goes into their personal account, 1% is used for social pensions. Real interest rate on funded tier balance is 3% annually.

Scenario 14. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax for all workers by 1% a year from 1997 to 2006 (to 23% in 2006) with contribution to the funded tier remaining at 22% for the whole period, increasing retirement ages to 65, and maintaining constant replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.14	9.43	9.35	8.76	8.70	9.21	9.42
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.33	8.30	8.30	9.01	8.99
Balance	-0.06	-0.50	-0.85	-0.80	-0.97	0.46	0.41	0.20	0.43
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			134	349	1104	5996	19083	118294	517233
Gov't borrowing from Funded tier			134	192	356	892	2095	9016	27851
(as % of formal GDP)			1.3%	1.6%	2.1%	2.9%	4.2%	6.9%	8.1%
Stock of gov't debt			134	349	1104	5336	17306	110396	491019
(as % of formal GDP)			1%	3%	6%	18%	35%	84%	144%
Extra resources needed for PAYG			-86	-97	-166	0	0	0	0
(as % of formal GDP)			-0.8%	-0.8%	-1.0%	0.0%	0.0%	0.0%	0.0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

Note: In 1997, for workers younger than 30, 22% tax goes to personal account, 11% to PAYG,
in 1998, for workers younger than 31, 22% tax to funded tier, 10% to PAYG, etc., and after 2006,
22% tax will go to funded tier, 1% is used for social pensions. Real interest rate on funded tier balance is 3% annually.
This is an optimistic "what-if" scenario in the sense that share of formal sector is same as Scenario 11.

Scenario 15. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax for all workers by 1% a year from 1997 to 2006 (to 23% in 2006) with contribution to the funded tier remaining at 17% for the whole period, increasing retirement ages to 65, and maintaining constant replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.14	9.43	9.35	8.76	8.70	9.21	9.42
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.33	8.30	8.30	9.01	8.99
Balance	-0.06	-0.50	-0.85	-0.80	-0.97	0.46	0.41	0.20	0.43
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			101	263	831	4513	14742	93294	410362
Gov't borrowing from Funded tier			101	145	268	637	1632	7145	21933
(as % of formal GDP)			1.0%	1.2%	1.6%	2.1%	3.3%	5.5%	6.4%
Stock of gov't debt			101	263	831	3853	12965	85396	384149
(as % of formal GDP)			1%	2%	5%	13%	26%	65%	112%
Extra resources needed for PAYG			-86	-97	-166	0	0	0	0
(as % of formal GDP)			-0.8%	-0.8%	-1.0%	0.0%	0.0%	0.0%	0.0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

Note: In 1997, for workers younger than 30, 17% tax goes to personal account, 16% to PAYG,
in 1998, for workers younger than 31, 17% tax to funded tier, 15% to PAYG, etc., and after 2006,
17% tax will go to funded tier, 6% is used for social pensions. Real interest rate on funded tier balance is 3% annually.
This is an optimistic "what-if" scenario in the sense that share of formal sector is same as Scenario 11.

Scenario 16. Starting the funded tier with the generation younger than 30 in 1997, lowering social security tax for all workers by 1% a year from 1997 to 2004 (to 25% in 2004) with contribution to the funded tier remaining at 10% for the whole period, increasing retirement ages to 65, and maintaining constant replacement ratio under PAYG

	1995	1996	1997	1998	2000	2005	2010	2020	2030
As % of formal GDP									
Payroll contributions (all)	8.43	9.14	9.14	9.43	9.35	9.12	9.44	9.99	10.22
Total PAYG expenditure	8.49	9.64	9.99	10.23	10.33	8.30	8.30	9.01	8.99
Balance	-0.06	-0.50	-0.85	-0.80	-0.97	0.81	1.15	0.98	1.23
Funded Tier (trillions of Kbv., curr. price)									
Total assets (stock)			61	159	502	2725	8674	53770	235106
Gov't borrowing from Funded tier			61	87	162	222	477	2935	9121
(as % of formal GDP)			0.6%	0.7%	0.9%	0.7%	1.0%	2.2%	2.7%
Stock of gov't debt			61	159	502	1957	4980	32068	153224
(as % of formal GDP)			1%	1%	3%	6%	10%	24%	45%
Extra resources needed for PAYG			-86	-97	-166	0	0	0	0
(as % of formal GDP)			-0.8%	-0.8%	-1.0%	0.0%	0.0%	0.0%	0.0%
Average replacement ratio	29%	29%	30%	31%	31%	31%	31%	31%	31%
System dependency ratio	111%	118%	114%	107%	99%	71%	68%	71%	69%
Share of formal sector employment	59%	59%	62%	65%	69%	71%	71%	72%	72%

These scenarios clearly differ in terms of distributional impact. One can distinguish three relevant population groups: those already retired; those still in the labor force who will be covered under the new plan; and those also in the labor force but younger who will be covered partially or fully under the new plan. The first scenario (10) gives all the benefits of the reform to the generations enrolling under the new plan. They will benefit from higher pensions and higher growth; some of them as well as the next generations will have to pay back the accumulated debt. The other population groups can only benefit from the slightly higher growth that the reform would bring about. The second and third scenarios (11 & 12) shift additional benefits of the reforms to those still in the labor force who will not participate in the new plan. As a result, the burden passed on future generations increases. The fourth scenario (13) lowers the burden passed on future generations by imposing higher costs to those currently retired.

It would be preferable for equity reasons that each of these population groups gain from the reform. This would also increase social support. In addition it would be highly inequitable to make the poorest population groups who have borne all the costs of the transition to a market economy bear additional costs linked to the implementation of a pension reform. For all these reasons scenarios 11 and 12 appear as the best options. They at least maintain a constant replacement ratio to those already retired and provide some benefits to those still in the labor force who will nevertheless retire under the old scheme. The election between them amounts to

choosing between a gradual or sudden decrease in the contribution rate. While a sudden change is likely to have more impact in terms of incentives and acceptability, it can only be implemented if additional fiscal resources can be found.

Simulations so far have considered the lowering of the contribution rate without previous discussion of the rationale for choosing a particular rate. The choice of the contribution rate under a funded system clearly depends on the "desired" pension level and on investment returns. We have assumed that investment returns would remain at 3 percent in real terms over the whole period. Another key assumption is that the acceptability of the reforms will be greater if those enrolled under the new plan can anticipate larger benefits under the new scheme than with the previous one. Although the new system would be contribution-based and thus would not guarantee a given benefit (or replacement ratio) the contribution rate could be set in function of an "expected" benefit. A 22 percent contribution rate could give a replacement ratio of about 50 percent while a 17 percent rate could lead to a 40 percent replacement ratio. Lower contributions would not bring a clear gain in terms of pension level. Higher contribution rates are not considered to leave room for private voluntary pensions that could complement the public pension. Any value within that range could equally be considered.

The remaining scenarios (**Scenarios 14 & 15**) consider these two cases. In addition they envisage that, although the new plan would involve a lower contribution rate (either 23 or 17 percent), those enrolling under the new plan would continue during the transition phase to pay the same tax as other members of the labor force who remain ascribed to the old plan. The difference - a true tax - would help covering the cost of current pensions and reduce the amount of accumulated debt. In other words, as the overall payroll tax is gradually lowered from 33 to 23 percent, those enrolling under the new system only accumulate 22 percent (or 17 percent in the second scenario) in their accounts, the difference being used to cover the transition deficit. When setting the contribution rate to the funded tier at 17 percent, the tax is of course higher and is imposed over a longer period of time. As a result, the stock of accumulated government debt is substantially lower: it would reach 112 percent of GDP by 2030, vs. 144 percent in the other case.

In all scenarios the transition deficit is high and the stock of government debt accumulated by 2030 ranges between 112 and 150 percent of GDP. Servicing that debt, assuming a 3 percent real interest rate implies annual fiscal resources amounting to 3-4.5 percent of GDP, a very substantial burden on future generations. This leads to the conclusion that the preferable option among those analyzed is that corresponding to scenario 15. It leads to the smallest stock of debt and implies choosing the lowest contribution rate and maintaining some degree of taxation (although at a decreasing rate) on the labor force. At the same time, this scenario allows current pensioners to benefit from the economic recovery through the indexation of pensions on real wage growth. It is worth observing that maintaining beyond the period of analysis the 5 percent tax (corresponding to the difference between the 22 percent total payroll

tax and the 17 percent contribution rate to the funded tier) would generate fiscal revenues equal to about 2-2.5 percent of GDP, a little over half of what would be needed to service the debt.

Of course, if one were to choose a more liberal approach leaving more room to voluntary private pension schemes, one could envisage an even lower contribution rate which would reduce further the stock of government debt and the burden on future generations. This is done in scenario 16. The debt burden is then lowered to 45 percent of GDP. However, the flexibility for doing depends on the political will to reduce substantially the role of the state in setting mandatory contributions. A rate below 14 percent would likely lead to a lower replacement rate than the one existing under the current scheme.

V. Summary and Conclusions

The first part of the paper shows that, over recent years, not only the economic contraction and the accompanying decline in employment and real wages, but also significant changes in labor market behavior have contributed to a decline of the tax base of the social security system in Ukraine threatening its sustainability. Currently 40 percent of the labor force works exclusively in the informal sector and thus avoids any form of taxation. A significant fraction of the remaining 60 percent combine formal and informal activities and hence, underreport their actual incomes. These changes affect the short- and medium-term balance of the fund as those working in the informal sector not only do not contribute to the payment of benefits to current pensioners but they also keep claims on future benefits either because of their previous status of employee in the public sector (government or state-owned enterprise) or simply because they remain eligible for social pensions.

The sustainability of the pension fund is thus not only function of the level of economic activity, of demographic factors, and of the set of rules that govern the pension system. It also depends to a large extent on factors which induce the development of informal sector activities and tax evasion. Among these factors are the changes recently introduced in the pension system which aim at ensuring its sustainability while preserving a minimum standard of living to low-income pensioners. The sharp reduction in the benefit level combined with a high rate of taxation, as well as the loosening of the links between contributions and benefits have transformed the social security contribution into almost a pure tax on labor. In addition, the growing incapacity of the government to provide an adequate level of protection to the old has reduced the credibility of government-managed social programs, inducing the development of private pension schemes.

With this socio-economic background as starting point, and with the help of a model that takes into account links between the social security system, the labor market, and the overall macroeconomic framework, simulations were run to assess the sustainability of the current

pension system as well as the relevance and viability of possible reforms. All of them assume the pursuit of economic reforms and the recovery of a sustained growth path .

The first conclusion of the analysis is that the view that economic contraction is the main cause of the difficulties faced by the pension fund is not correct. Sustained growth and macroeconomic stability would not be enough to restore the benefit levels and features prevailing in the past. Attempting to increase the range of payments and the overall replacement ratio would - even with growth - lead to a substantial increase in the fund's deficit, threatening macroeconomic stability. Almost all the labor force would need to be working in the formal sector - an unlikely event with the present set of labor market incentives - to reverse the answer.

The paper also examines the viability of the current "statu quo". Benefits have been reduced and the range of payments is compressed, transforming the pension system into a highly redistributive system, practically a social assistance program which provides modest benefits to a large proportion of the population. The analysis leads to the conclusion that this could not become a permanent feature of the system as sustainability would require no further increase in the relative size of the informal sector. However, this is inconsistent with the whole set of incentives favorable to the development of informal activities that would remain in place.

The conclusion of the first part of the paper is clear: reforms are necessary. Even with a fairly optimistic growth scenario, there is little prospect that the difficulties faced by the pension system will gradually disappear. On the one hand, restoring the past features of the system would be too costly. On the other hand, keeping the system as it is would maintain mechanisms that tend to make it unsustainable.

The second part of the paper first considers reforms of limited scope aimed at saving resources or at improving revenue collections. These are found to be insufficient or ineffective as they fail to address the issue of the incentive framework. The only effective measure is to increase the retirement age which has a significant financial impact. An increase up to the age of 65 would be needed for both men and women. Raising the retirement age fast rather than gradually would ease the fiscal adjustment in the early years and may imply less political cost as it would be implemented when labor force participation rates of old people are high as it is the case now in Ukraine. However, the analysis also shows that, however significant and necessary, raising retirement age would not by itself ensure the sustainability of the pension fund. This measure needs to be accompanied by deeper structural reforms.

The paper then examines more radical reforms consisting of a shift from the current PAYG to a fully-funded system which could be privately managed (although subject to public regulations). Such reforms will be an effective way to remove distortions in the incentive framework and to restore credibility in the system. The analysis focuses on selected alternatives and key policy variables. All scenarios maintain three basic assumptions. The first one is that the

introduction of a funded system would induce an increase in the formal sector by removing distortions in the incentive framework. The increase, however, is assumed to be gradual and moderate. The second assumption is that the assets of the funded tier will, in the early years, comprise mostly government debt to allow for the financing of the transition with realistic fiscal implications. Third, all scenarios assume that a small redistributive component (payment of social pensions and a minimum guaranteed pension) would remain the responsibility of the new pension fund.

With these assumptions the model generates simulations that allow the identification of the best option that entails: (a) indexing pensions using real wage growth for pensioners under the old scheme (that is to maintain a constant replacement ratio); and (b) maintaining during the transitional phase some degree of taxation on those enrolling under the new plan while ensuring an expected pension benefit higher than in the recent past. In such case, all generations including those that have suffered most during the early stages of the transition to a market economy would benefit from the reform and growth recovery.

The reform would also include a lowering of the contribution rate for all workers (covered under the old and the new plan) and an increase of the retirement age to 65. A rapid decrease in the contribution rate is likely to have more impact in terms of acceptability, credibility and incentives. However, it cannot be implemented without an equally rapid increase in the retirement age and additional budgetary resources.

The analysis shows the need to lower the payroll tax from 33 to 23 percent for all workers and to set at 17 percent the contribution rate to the funded tier. Maintaining a 6 percent tax on those enrolling under the new system would help financing the transition deficit. And setting the contribution rate at about 17 percent would provide higher pension levels under the new plan than under the old plan while minimizing the stock of debt left to future generations. There is obviously some flexibility in the choice of these particular rates depending on the weight that one wishes to give to public and mandatory pension schemes vs private and voluntary ones. Lowering further the contribution rate to the fully-funded system would lower the stock of debt and increase the weight of private voluntary schemes. Imposing a less than 6 percent tax on those enrolling under the new system would imply a higher burden for future generations.

In summary, the main conclusions of the paper are as follows. Reforms of the pension system in Ukraine are undoubtedly necessary and urgent even in case of economic and sustained growth. However reforms which focus on short-term budgetary effects and do not consider the interactions between the social security system and the labor market are likely to fail. Reforms must consider introducing a funded tier as an effective way to correct distortions and to restore credibility. They must also include an increase in the retirement age. Introducing such reforms will be costly and impose an unavoidable burden to future generations. Those generations,

however, will also be the beneficiaries of the reform, enjoying higher pension levels as well as higher productivity growth.

Appendix A

Specification of the Model

Overview

This appendix briefly describes the model used in the simulations reported in sections IV and V of the paper. The model consists of four modules: Pension Fund, labor market, macroeconomic, and demographic modules. All data sources and projections are based on annual numbers. The macroeconomic module was developed based on the World Bank's RMSM-X model. The most important distinction of this model is the inclusion of the informal sector and the full specification of the production function. (Only modifications to the standard RMSM-X model are documented in this Appendix. Complete specification of the RMSM-X model can be found in standard World Bank documentations such as *User's Guide to the RMSM-X*, The World Bank, May 1995.)

Production

The economy produces one good for both consumption and investment. Production takes place in two sectors: formal and informal sectors. The informal sector avoids paying taxes, including the social security tax. Following the assumptions of the endogenous growth model (Corsetti and Schmidt-Hebbel, 1995), the level of production in the formal sector (Y_1) is determined by the available capital stock (K_t) and the effective labor (J_{1t}) allocated to the formal sector:

$$(1) \qquad Y_{1t} = A\, K_t^{\alpha}\, J_{1t}^{(1-\alpha)},$$

where A is a productivity index and α is a parameter of the Cobb-Douglas production function. The effective labor in both sectors is determined by labor-time (L_t) valued at the average labor productivity in year t and time-varying labor efficiency (ε_t). The latter is assumed to be determined by the economy-wide capital intensity:

$$(2) \qquad J_{it} = \varepsilon_t\, L_{it} \equiv (K_t / L_t)\, L_{it}.$$

The informal sector only uses labor. Output is determined by the amount of effective labor and the informal sector labor productivity:

$$(3) \qquad Y_{2t} = A\,(1 - f_t)\, J_{2t},$$

where f_t is the efficiency loss due to the extra costs of operating in the informal sector. It is measured by:

$$(4) \qquad f_t = a_1 + a_2\, h_{2t}^{\cdot} + a_3\, gf_t^{\cdot},$$

where gf measures government's resources devoted to tax administration, and h_{2t} is share of one sector's labor time in overall labor:

(5) $h_{it} = L_{it} / L_t$,

So equation (4) implies that the cost of operating in the informal sector increases with the size of the sector.

The overall output can now be written as a function of labor allocation between two sectors and capital stock:

(6) $Y_t = Y_{1t} + Y_{2t} = A(h_{1t}^{(1-\alpha)} + (1- f_t)\, h_{2t})\, K$,

With this specification, moving labor out of the formal sector is equivalent to reducing capital stock in the formal sector.

Wages and Allocation of Labor between Sectors

Labor flows between the formal and informal sectors are induced by changes in relative wages. Workers in the formal sector have to contribute to the social security system and pay taxes. The net wage (W_1) in the formal sector is thus:

(7) $W_{1t} = (1 - ss_t\,(1-d_t))\, WT_t$,

where ss_t is the social security tax rate, WT_t is the gross wage in the formal sector, and d_t measures the extent to which social security contributions are perceived as a tax. At one extreme, $d_t = 0$ when future pension benefits are totally unrelated to the amounts of social security contributions (e.g., when pension benefit is flat). At the other extreme, $d_t = 1$ when the present value of pension benefits is equal to the present value of contributions discounted at the market rate of return (i.e., a fully-funded pension system.) So given the social security tax rate and the level of efficiency loss in the informal sector, an individual's expected value of d_t is determined by:

(8) $d_{it} = (PBT_{it} - PBS_{it})/MR_{it}$

where *i* is the person's age, PBT_t is the present value (PV) of total expected pension benefits in year *t* for a person with age *i* that pays social security tax, PBS_t is the PV of expected social pensions (available to non-contributors beyond the legal retirement age), and MR_t is the PV of total social security contributions if the tax is paid until the expected retirement time.

The expected lifetime pension benefit for being in the formal sector can be calculated as:

(9) $PBT_{it} = \Sigma^{l>t+n-i}{}_l(\Pi^{l>j>t+n-i}{}_j\,(1- MOR_{j-t+i,j})(1/(1+r)^{l-t})\Sigma_k\, PFP_k\, FP_{kl}) \,/\, \Pi^{n-i+t>j>t}{}_j\,(1- MOR_{j-t+i,j})$,

where PFP_k is the probability of enjoying type *k* pension upon retirement age, n is the expected retirement age, FP_{kl} is the pension payment in year *l* for type *k* pension, r is the real interest rate, and MOR_{lt} is the average mortality rate for age *l* in year *t*. The value for PBS is calculated in the exactly same way.

The value of MR for a person with age *i* in year *t* is:

$$(10) \quad MR_{it} = \Sigma^{n-i+t>l>t}{}_{l} \, (\Pi^{l>j>t}{}_{j} \, (1 - MOR_{j-t+i,j}) \, (1/(1+r)^{l-t}) \, ss_l \, WT_l),$$

Equations (7) to (10) show that social security reforms create incentives for the expansion of the formal sector to the extent that they induce an increase in d, and thus a reduction in the wedge between gross and net wages in the formal sector.

The allocation of labor between the two sectors is determined by a static equilibrium condition and a dynamic adjustment process. The static equilibrium condition is:

$$(11) \quad SL_i^s = (W_i + \mu_i)^\gamma / \Sigma_{j=1,2} \, (W_j + \mu_j)^\gamma,$$

where SL is the static share of labor in each sector, γ is an elasticity parameter, and μ represents non-pecuniary factors determining labor allocation. The actual share of labor before equilibrium is attained is determined by:

$$(12) \quad SL_{it} = \theta \, SL_i^s + (1 - \theta) \, SL_{i,t-1},$$

where θ is a parameter representing the speed of labor share adjustments.

Labor Supply

Total labor supply NT_t can be defined as:

$$(13) \quad NT_t = \Sigma_{i>18} \Sigma_{j=m,f} \, S_{tij} \, G_{tij} \, N_{tij} \equiv \Sigma_{i>18} \Sigma_{j=m,f} \, S_{tij} \, L_{tij}$$

where N_{tij} is the total number of population with age *i* and sex *j* in year *t*, S_{tij} is the average labor participation rate for population cohort N_{tij}, and G_{tij} is the ratio of cohort-specific to average labor productivity in year *t*. G_{tij} is influenced by experience and age.

Economy-wide actual unemployment is the amount of excess labor supply:

$$(14) \quad UN_t = NT_t - L_t \equiv NT_t - L_{1t} - L_{2t}.$$

While official unemployment is total labor supply minus official employment:

$$(15) \quad UNO_t = NT_t - L_{1t} - L_{2t} - (1 - \iota) \, LO_t.$$

where LO_t is the number of people officially employed but not working in the formal sector in time *t*. These people do not contribute to the Pension Fund; however, they remain eligible for old-age pensions when they reach the retirement age. In other countries, the ratio $L_{1t} / (L_{1t} + LO_t)$ would be called the compliance rate. However, for Ukraine a large part of LO_t is legal, and there is no way of knowing the true compliance rate. To avoid confusion, we do not use the compliance rate terminology. Note that a

person can have an offical employment status and work in the informal sector at the same time. So ι is the percentage of people in such a situation.

Number of Pensioners

Under the current pension law, there are four types of pensions: old-age, disability, survivor and social pensions (disregarding service pensions which are negligible). In the model, each pensioner is tracked by age and sex. The number of new old-age pensioners $PENO_t$ in period t is:

(16) $PENO_t = \Sigma_i\Sigma_{j=m,f} RET_{tij} ELG_{tij} N_{tij}$,

where ELG_{tij}, the percentage of people who are eligible for old-age pensions in cohort N_{tij}, is determined by age and years of contributions. RET_{tij} is the percentage of eligible people who actually receives an old-age pension.

The number of new disability pensioners is determined by:

(17) $PEND_t = \Sigma_i\Sigma_{j=m,f} DIS_{tij} (L_{1tij} + LO_{tij})$,

where DIS_{tij} is the probability of a worker being disabled in labor cohort L_{1tij}. Note that everyone on the official employment list is eligible for this type of pension.

The number of new survivor's pensioners is determined by:

(18) $PENS_t = \Sigma_i\Sigma_{j=m,f} MOR_{tij} SUR_{tij} (L_{1tij} + LO_{tij})$,

where MOR_{tij} is the mortality rate for population cohort N_{tij}, and SUR_{tij} is the proportion of survivors per worker.

The total number of old-age and disability pensioners is:

(19) $PENOT_t = PENO_t + \Sigma_i\Sigma_{j=m,f} (1 - MOR_{tij}) PENOT_{t-1,ij}$

and

(20) $PENDT_t = PEND_t + \Sigma_i\Sigma_{j=m,f} (1 - MOR_{tij}) PENDT_{t-1,ij}$.

The total number of survivor's pensioners is determined by:

(21) $PENST_t = PENS_t + \Sigma_i\Sigma_{j=m,f} (1 - MOR_{tij}) PENST_{t-1,ij} - PENST_{t-1,18,j}$.

The last item in equation (21) reflects the fact that children reaching the age of 18 are no longer eligible for this type of pensions.

The total number of social pensioners is calculated as a residual:

(22) $PENSO_t = \Sigma_i \Sigma_{j=m,f} \; COV_{tij} (N_{tij} - L_{tij} - (1 - \iota) LO_{tij} - PENOT_{tij} - PENDT_{tij} - PENST_{tij})$,

where COV_{tij} is the social pension coverage rate of the non-working population who do not receive any other pension, and *i* must be equal or exceed the legal retirement age.

Finally, the total number of pensioners is:

(23) $PEN_t = \Sigma_i \Sigma_{j=m,f} \; (PENOT_{tij} + PENDT_{tij} + PENST_{tij} + PENSO_{tij})$.

Pension levels

Currently, the old-age and disability pensions are calculated using a complex five-step formula: (1) the average salary is calculated for the last two years preceding retirement; (2) a replacement salary is calculated based on the level of average salary; (3) a statuary replacement rate is calculated based on years of service; (4) the minimum floor and maximum ceiling of pensions is imposed; and (5) a means-tested pension floor is applied for low-income pensioners (see Table 1.5, 1.6, and 1.7 in Kane (1996) for details).

The pension rate for survivor pensioners depends on replaceable salary of the deceased worker and the type of survivor (see Table 1.8 in Kane (1996) for details). The full rate of pension is 30 percent of replaceable salary. The Pension is also subject to a minimum pension. Social pension rate is set as minimum pension.

For the projection period, the minimum pension is assumed to be a certain percentage of the official minimum wage. The latter is fully adjusted for inflation and but only partially indexed to the average real wage:

(24) $mw_t = inf_t + \phi \, w_{1t}$, $\qquad 1>\phi>0$,

where *mw* is the growth rate of minimum wage, *inf* is inflation rate, and w_1 is the growth rate of wages in the formal sector.

Pension Fund Balance

The current Pension Fund is based on the defined-benefit "Pay-As-You-Go" scheme. For the fund to balance, the social security tax rate must equal the system dependency ratio times replacement ratio:

(25) $ss_t = (PEN_t / L_{1t}) * (P_t / WT_t)$,

where P_t is the average pension level. So for a given s
ocial security tax rate, the pension fund balance depends on the relative size of pensioners versus contributors and the relative magnitude of average pension versus wage.

The Pension Fund obtains inflows from social security tax contributions, the government budgetary transfer (BT), interest income/loss from existing fund balance, and other sources of income (OS) such as voluntary contributions from companies and individuals:

(26) $SI_t = ss_t L_{1t} WT_t + BT_t + PFB_{t-1} r_{gt} + OS_t$,

Outlays can be defined as:

(27) $SE_t = \Sigma_i \Sigma_{j=m,f} \Sigma_k b_{tk} W_t PEN_{tijk} + AD_t$

where b is the fraction of the average wage that equals the pension payment for type *k* pension (including the social pension). AD_t is the administrative cost of running the Pension Fund. It is assumed to increase with the size of the Fund:

(28) $AD_t = b_1 + b_2 SE_t^{\cdot}$.

The Fund balance at the end of period *t* is:

(29) $PFB_t = PFB_{t-1} + SI_t - SE_t$.

Appendix B

Average Annual Total Population Growth Rate

	1990-2000	2000-2010	2010-2020	2020-2030
World	1.59	1.34	1.17	1.00
Low & Middle-income econ.	1.84	1.55	1.34	1.15
Brazil	1.72	1.27	1.12	0.86
China	1.33	0.94	0.81	0.68
High-income econ.	0.56	0.39	0.25	0.15
Europe & FSU continental	0.44	0.38	0.29	0.25
Ukraine	0.36	0.29	0.24	0.25
Russian Federation	0.46	0.44	0.38	0.31
Belarus	0.51	0.43	0.36	0.33
Czechoslovakia	0.25	0.37	0.31	0.28
Germany	0.20	0.02	-0.11	-0.16
Hungary	-0.38	-0.14	-0.10	-0.05
Poland	0.41	0.46	0.41	0.35

Data source: World Bank.

Percent of Population Aged 65 and Up

	1990	2000	2010	2020	2030
World	6	7	7	9	11
Low & Middle-income econ.	5	5	6	7	10
Brazil	4	5	6	9	12
China	6	7	8	11	15
High-income econ.	13	15	16	20	24
Europe & FSU continental	12	14	15	18	21
Ukraine	13	16	16	18	20
Russian Federation	11	14	14	18	20
Belarus	12	15	15	18	20
Czechoslovakia	12	13	13	17	19
Germany	15	17	21	23	28
Hungary	14	15	17	20	21
Poland	10	12	12	16	19

Data source: World Bank.

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