

**Macro-Experimental Economics in the Kyrgyz Republic:
Social Security Sustainability and Pension Reform**

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Despite a decade of transition, pension systems in formerly socialist countries still desperately need viable reform. This paper assesses reform packages advocated by different international agencies, and considers their sensitivity to varying economic and demographic assumptions. Failure to account for demographic-economic interactions strongly biases forecasts. Few viable reform options exist, due to the near absence of capital markets, the collapse of formal sector employment, and huge differences between urban and rural sectors. The divergent results from projections made under different assumptions imply that policymakers should examine the realism of policy suggestions (and associated actuarial forecasts) very carefully.

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1. Introduction

One-quarter of the world's population lives in countries undergoing transition from centrally planned to market-based economic systems. Accompanying the movement from central planning to systems with greater market orientation are concurrent structural shifts that threaten macroeconomic stability. Chief among these are marked declines in GDP and formal sector employment, and hence in tax revenue and state capacity. Simultaneously, surges in premature retirements and aging populations have combined to increase demand for social expenditures. Given generous welfare state rules inherited from the Soviet era, the consequence has been a dramatic increase in the share of social expenditures in GDP across the region.

Given declining state capacity to provide transfers, adequate funding of pension obligations has emerged as a central problem of the transition from socialism. Transition countries' systems are poorly targeted, and increasingly unable to provide basic social support for the most exposed segments of a society. This failure to provide an adequate safety net exists *despite* the fact that pension expenditures in most transition economies represent a large proportion of GDP. 1995 pension expenditure shares ranged from 1.3 to 11 percent of countries' GDP, or 10 to 26 percent of government budgets (Branco, 1998).¹ Although pension expenditure shares tend to be highest in the European states of the former USSR, these shares are perhaps most striking in the relatively impoverished and demographically youthful Central Asian republics of Kazakhstan (4.7%), Uzbekistan (5.3%), and Kyrgyzstan (7.3%).

The unsustainability of Soviet welfare policies has been recognized to varying degrees both by the successor governments and by the international donor community. Pressure for social policy reform from the international community has been strong, and specific measures often have been the basis for desperately sought loans. Thus, many transition nations have commenced dramatic social welfare reforms aimed at reducing government spending commitments and simultaneously strengthening capital markets.

This paper examines the introduction of these reforms in one of the smallest, least developed transition states, Kyrgyzstan. This case is of particular interest because Kyrgyzstan became the object of competing models and conflicting advice from different agencies. Interagency rivalry appears to have strongly influenced policy advice given, while the Kyrgyz Government's frantic search for soft loans caused it to accede to virtually all external proposals, virtually without regard to implementation capacity. The outcome has been a degree of experimentation strongly opposed by much of the population, and an apparent failure by some senior policymakers to grasp the gravity of the situation.

The remainder of the paper is organized as follows. Section 2 discusses the politics of pension reform and considers salient features of the Kyrgyz economy, while Section 3 outlines the macro-actuarial model used. Forecasts

of deficits facing the present pension system are presented in Section 4. Section 5 turns to a key factor in any reform – the vast transfers from the formal, urban sector to the rest of the economy. Forecasts of various reform options are then discussed in Section 6, and a concluding section follows.

2. Pension Deficits and Pension Reform

Transition governments gradually have perceived the impossibility of maintaining the Soviet era's generous pension systems. These systems were characterized by defined-benefit principles and high replacement rates (defined as the average pension/wage ratio). In most cases, the only requirement for obtaining a pension was a certain number of years of employment. Pension systems were funded by payroll taxes, with additional transfers from the state budget as needed.

At the same time, the region's citizenry maintains a deeply held belief that a comprehensive pension system is essential. The experience of transition countries to date suggests that the populace is deeply reluctant to make changes in a pension system, even in the face of fiscal disaster. Thus, governments face an unenviable but inescapable task of reforming pension systems while maintaining political stability and financial solvency.

2.1 The Kyrgyz pension system

The Social Fund (SF) of the Kyrgyz Republic, formed in 1993 with the rank of a Ministry, is responsible for pension and other social welfare payments. Revenues are generated by payroll taxes, but these have covered only 76% (1997) to 83% (1999 est.) of total expenses in recent years. Since SF expenditures in recent years have been 7 to 8% of GDP, its deficits have averaged roughly 1.5% of GDP. Such deficits are especially striking for a demographically young country. Kyrgyz Republican government transfers are made to offset part of the deficit and to cover certain pension types; arrears are also common.

The Social Fund operates on a "pay-as-you-go" (PAYGO) basis, and consists of four nominally separate funds: the Pension Fund, Social Insurance Fund, Employment Fund, and Medical Insurance Fund. Payroll contributions to the SF are defined as a fraction of net wage, with the Pension Fund tax (32%) far exceeding the Employment Fund tax (3%), or the Social Insurance and Medical Insurance taxes (both 2%). The Pension Fund dominates SF activities on the expenditure side, accounting for 84%-87% of the total.

The share of pensioners in Kyrgyzstan's population has been stable since the mid-1990s (**Table 1**), although it rose rapidly in the initial post-Independence period. This recent stability reflects demographic structure: the small World War II cohort began retiring in the 1990s, and will continue to dominate the retirement pool until 2002-04. Thereafter, the population eligible for retire-

ment will rise rapidly. Despite this effect, the share of pensioners in the population is exceptionally large for a country at Kyrgyzstan's demographic stage and level of economic development, and is close to the US level.

Table 1:
Kyrgyzstan's Pensioner Population (thousands)

	1994	1995	1996	1997	% of total number of pensioners in 1997
Old-Age	448.7	443.9	439.3	437.8	80.7%
Disabled	45.4	46.0	49.8	53.0	9.8%
Survivors	44.8	46.0	48.6	50.2	9.3%
Total Pensioners	541.0	537.0	539.9	542.7	100%
Total Population	4450.7	4512.4	4574.1	4634.9	
<i>Old Age Pensioners as % of population</i>	<i>10.0</i>	<i>9.8</i>	<i>9.6</i>	<i>9.4</i>	
Total Pensioners as % of population	12.2	11.9	11.8	11.7	

Pension levels in Kyrgyzstan are not high – hardly surprising for a nation with per capita GDP currently about US \$300.² While nominal pensions have been raised periodically, real pension values have generally declined. So has the replacement rate, which fell from 63% in 1994 to 45% in 1997. Other than in 1995, the average monthly wage has been lower than the Government's estimated minimum consumption expenditure required for subsistence. With pensions approximately equal to half of the average salary, many pensioners unquestionably are well below the official poverty line. This evident poverty has made the Kyrgyz Government reluctant to further reduce payments to the elderly – despite overwhelming evidence from the 1993, 1996, and 1997 LSMS surveys that child poverty is a far more severe problem in Kyrgyzstan (Anderson and Becker, 2000).

2.2. Policy options and actual reforms

Pension reform options for transitional countries are limited by weak capital markets, deteriorating formal sector employment, and prior commitments, especially to pensioners in rural areas, from which contributions are negligible. Options can be divided into three categories: strengthening PAYGO (known as the "Solidarity system"), adopting a system of notional accounts, and shifting to a funded system. While it is possible to have funded, defined-

benefit systems, the most common arrangements at present are unfunded or incompletely funded defined benefit (PAYGO) systems, and fully funded, individual, defined-contribution systems.

Actuarial, macroeconomic, and administrative advantages of different structures have received detailed attention, as have their effects on economic growth (for example, World Bank, 1994; Jones 1997; and Gray, 1998). However, analysis of the options for reform in transitional economies is incomplete, especially given the considerable limitations of existing actuarial forecasting models, and each reform approach enjoys powerful international advocates. In Kyrgyzstan, the World Bank has pushed strongly for adoption of notional accounts; the Asian Development Bank has advocated transition to a funded system (and, while USAID is not actively involved in Kyrgyzstan's pension reform efforts, it has advocated funded systems elsewhere).

The International Monetary Fund emphasizes macroeconomic stability, and thus prefers PAYGO reforms without transition costs, though it did not oppose the notional accounts plan. Kyrgyzstan's pension policy is of interest to the IMF precisely because of the large deficits generated in the 1990s, and because of the system's manifest unsustainability. The Fund is not concerned with meeting social objectives; rather, it is concerned that the social policies do not create macro instability. This is an acute problem in Kyrgyzstan, a poor country more than 60% rural, with a somewhat democratic government, considerable economic inequality, and an essentially universal pension system. Recognizing the end of vast transfers from the USSR and a post-Soviet GDP decline that reached nearly 60%, the Fund has urged the Kyrgyz Government to reduce benefits and/or eligible beneficiaries.

Indeed, the World Bank won commitments in 1997-98 from the Kyrgyz Government to take many deficit-controlling steps. These included raising the retirement age by three years for both men and women (although this increase was ultimately spread out over a 9-year period), improved accounting and collection efforts, and efforts to reduce in-kind pension payments (in rural areas, "equivalent value" payments in flour and other foodstuffs were common through 1998).

The Bank also strongly pushed the introduction of a notional defined contribution (NDC) system that tracks individual contributions, and links retirement benefits to these payments. Since the contributions are kept in virtual accounts earning a state-determined rate of return, while actual payments are made from current contributions and Republican government transfers, in effect the NDC system is a defined-contribution PAYGO. The accounting requirements and hence installation and maintenance costs of NDC are considerable, and must be offset by improved compliance, either because the public believes that these accounts are of value (enabling them to receive more than a minimum pension at retirement), or because the system improves monitoring.

As shown below, the World Bank's policies were built around highly optimistic economic and demographic assumptions. These implied that modest benefit curtailments would suffice to eliminate medium-term deficits, and that the NDC system would ensure long-run stability. In reality, the two-year period of economic recovery ended abruptly in 1998, due in part (but not entirely) to the effects of the Russian crisis. Squeezed budgets meant the rapid degradation of the NDC system, with notional accounts not receiving interest credit adequate to cover inflation. Nor, at least as of mid-1999, has the NDC system been extended beyond the major cities.

For its policies to succeed, the Asian Development Bank needed equally dazzling achievements. The ADB has been enthusiastic about switching to fully funded, individual account systems based on defined contributions, ideally with assets managed by independent Pension Funds. The ADB also envisioned growth of voluntary supplemental contributions to private funds. The World Bank and other international donors have advocated similar systems, but only for more economically advanced nations. However, in early 1998 the ADB was optimistic that such funds would encourage financial sector development in Kyrgyzstan, thereby accelerating economic growth.

The Russian crisis in the second half of 1998 effectively finished off the already teetering Kyrgyz Stock Exchange, which has now been merged with its larger Kazakhstani counterpart. Nor has there been significant interest in issuing bonds or shares by large Kyrgyz enterprises. In short, moving toward a funded, individual accumulation system seems extremely remote today – and was even in 1998. The NDC reform remains in place, but it is truly notional, since contributions through mid-1999 were not adjusted for inflation, and there were no plans to do so in the immediate future.³

This is not to say that the Kyrgyz Government would have opposed such a sweeping move. On the contrary, both the President's Office and the Ministry of Finance appear preoccupied with receiving soft loans to meet budgetary needs, and could be expected to acquiesce to almost any recommended policy that came with sufficient funding. The ADB considered granting a loan to cover major costs of transition from a PAYGO to an individually-funded system (during which payroll contributions would presumably decline by the amount needed for individual accounts, while immediate obligations by the Social Fund would not fall substantially for nearly two decades), though the amount envisioned would not have covered full transition costs, even though these were reduced by the small wartime cohorts that started retiring in 1997.⁴ Worse, it was widely perceived that any international loan would be quickly diverted to other government spending needs. The Social Fund itself naturally opposed the funded system, since it perceived a loss of funds without a loss of obligations for the foreseeable future – and, ultimately, a loss of power.

The combination of international agency optimism and funding on the one hand, and Kyrgyz Government desperation on the other, resulted in adoption of policies that were radical – but probably inadequate to achieve long-run

macro sustainability. The questions of interest are whether the international agencies' optimism was excessive from an *ex ante* perspective and, if so, why.

3. *Modeling Transition Pension Systems*

During the past decade, a large number of pension system forecasting models have been developed, of which the World Bank's evolving Pension Reform Options Simulation Tool-kit (PROST) is among the most advanced and widely applied. Pension forecasting models for transitional countries (described in **Appendix 1**) differ from those applied to developed countries in several respects, while unstable demographic, economic, and financial conditions limit forecast reliability. Nonetheless, policy must be made using available information, even if it is quite limited, and long run pension system choices cannot wait. In principle, these models can be used for budget forecasting, providing bases for making pension system choices, modifying system rules, and determining appropriate rates for individuals seeking an insurance component to their pensions. In practice, existing models in transition nations lack an adequate database to determine individual rates with any confidence, and, as long-term structures, are inappropriate for short- or medium-term revenue forecasting. Thus, the main purpose of forecasting models is illustrative, involving assessment of pension system balances in a relative sense, depending on different pension reform scenarios, rather than being intended for accurate revenue and expenditure projections. Unfortunately, this is poorly understood by both donors and, especially, government officials, who have very high discount rates, and care about forecasting revenues and deficits over the next few months rather than the next few decades.

Pension forecasting models crucially depend on macroeconomic and demographic assumptions. The economic and demographic sides of the model are not generally linked during estimation, giving rise on occasion to some implausible implications. These models are usually run for up to 50 years, mainly because today's demographic events and changes in current policy have impacts that will not be entirely felt for decades. Macroeconomic assumptions are crucial because they determine the pace of economic recovery, and hence system contributions. These assumptions are usually taken from economic forecasting models, and alternate pension forecasts are made based on a range of optimistic to slightly less optimistic economic forecasts.

Despite dramatic changes in demographic structures (Becker and Bloom, 1998), existing pension forecasts in transitional economies typically pay little attention to shifting fertility, mortality, and migration patterns underway. It turns out (Section 4) that neglecting demographic dynamics creates an optimistic bias for pension fund balance projections, both for existing and reform scenarios. Thus, the urgency of reform is understated, and the adequacy of modest reforms is overstated. The presence of large migration flows adds

further to instability: successful economic recovery in one republic is almost certain to lead to inflows of elderly people with some claims to pensions.

Current actuarial models consider many variables related to pension forecasts, but are structurally simple. Forecasts are built on data for a particular "benchmark" year. Future values of exogenous parameters also must be chosen. Common practices in choosing future parameters include assuming that current values remain constant forever; that recent past trends are maintained forever; or that convergence to long term trends occurs. Forecasts based on formal econometric estimation are also possible, but virtually nonexistent in analysis of transition pension systems.

The current generation of actuarial forecasting models was developed in 1996-1998. The World Bank initially created several models, including for Ukraine, Hungary, and Poland, while USAID sponsored models of Romania and Kazakhstan. These models are often criticized as being country-specific. However, all of these models have similar structures, with Macroeconomic, Population, Labor, and Pension "blocks". They differ in their usage of country-specific accounting formulas for pension systems, assumptions about interaction among macroeconomic variables, and reform scenarios. These models have largely been superseded by the World Bank's PROST model, a universal model intended for applications in different countries, and which is becoming increasingly flexible. Ironically, the PROST is often criticized for being too general.

A typical pension forecasting model contains both an aggregate component, which projects pension fund performance, and an individual statement designed to estimate contributions and benefits under different options for a participating individual. The aggregate module starts from demographic projections; annual pension expenditures and pension fund revenue forecasts then follow. Calculations are based on system averages.

Despite the conceptual simplicity of a pension forecasting model, a user has to obtain a vast amount of age- and gender-specific data. Data for population, fertility, mortality, and immigration are needed for the Population block. The Labor block requires age and gender-specific labor participation rates, unemployment rates, and earnings profiles. The Pension block stores benchmark year information about a pension system, and also contains projections of contributors; old-age pensioners; disability, survivor, evasion and exemption rates; and replacement rates. The Macroeconomic block requires information on the following data for the base year: GDP, pension fund balance, wages, and pension payments. It also requires forecasts of real GDP growth, inflation, real interest rates, budget transfers to the state pension fund, wage growth elasticity with respect to GDP growth, and retirement ages.

Another way to assess whether a government is able to bear indefinitely the burden of social commitments in general and its existing PAYGO pension in particular is to estimate the intertemporal budget constraint of the entire public sector. This constraint states that present and future taxes and social security contributions must cover all present and future government expenditures (trans-

fers, investment, and debt service). This method is known as generational accounting (Auerbach, Gokhale and Kotlikoff, 1994). Appendix 2 provides a brief outline of the method and the generational accounts of the Kyrgyzstan and several European Union countries.

4. Budgetary Forecasts for the Kyrgyz Social Fund

The Kyrgyzstan PROST model starts by making demographic projections; annual pension expenditures and fund revenue forecasts then follow. The underlying data were collected by the Social Fund (SF), and were prepared for model use by World Bank actuarial staff. We use World Bank parameter estimates throughout except where noted, both for convenience and for the sake of forecast comparability.

To provide a reference point for actuarial simulations, we construct a set of scenarios using common SF and World Bank data for 1997. All of the simulations incorporate compliance behavior that reflects improved collection measures enabled by World Bank assistance. The projection period is 1997-2050.⁵ Critical baseline assumptions include a stable retirement age of 60 for men and 55 for women, and constant output per worker. That is, real GDP growth, g , equals labor force growth. In all model variants, wage growth is set equal to growth of GDP per worker, and in PAYGO variants, mean pensions are fixed in proportion to mean wages. The baseline fixed productivity assumption enables us to abstract from the impact of changing economic structure on the system. In fact, if rapid economic growth occurs, then SF deficits will diminish or disappear; if per capita GDP falls much further, it seems likely that the nation's social safety net will completely collapse. These points are obvious, and do not need detailed simulations for their demonstration. On the other hand, it should be understood that the simulations presented are counterfactuals, and not true forecasts. Deficits of the magnitude forecast under present conditions cannot be sustained, and in fact will never be realized.

The "stable baseline" (*STABLE*) simulations assume constant demographic parameters fixed at 1997 levels (**Table 2**) as well, thereby serving as a basis for comparison with counterfactual forecasts based on alternative trends for mortality, fertility, and migration. As demographic assumptions largely drive actuarial forecasts, it is important to consider their underlying rationale. For "dynamic mortality" scenarios, we permit age- and gender-specific mortality rates to decline gradually, until mortality patterns recover to near 1987 levels by the year 2007. That is, we assume that the dramatic increase in mortality (typically by 35% to 45%) that occurred for nearly all adult age groups during the early 1990s is gradually reversed (see Becker and Ukaeva, 1999; Becker and Hemley, 1998). Since there is a considerable gap in life expectancy between Kyrgyzstan even at its 1987 peak and developed or middle-income countries today, we assume further gradual increases in life expectancy (1.1-1.2 year increase in retirement age life expectancy per decade) until 2027. Fertility

counterfactuals involve continuation of the nation's rapid birth rate decline, until total fertility rates reach replacement levels.

Table 2:
**Pension Fund Balance With and Without Demographic Change
 and Economic Growth.**
(All figures in millions of 1997 som and percentage of GDP)

		2000	2010	2020	2030	2040	2050
<i>I. STABLE</i>							
No demographic or economic change	<i>Som</i>	-921	-700	-3,345	-9,780	-30,135	-84,125
	<i>%GDP</i>	-2.1	-0.8	-2.0	-3.3	-5.6	-8.7
<i>IIA. MORTALITY RECOVERY</i>							
Constant fertility; no economic change	<i>Som</i>	-923	-788	-3,913	-12,162	-39,112	-112,419
	<i>%GDP</i>	-2.1	-0.9	-2.4	-4.1	-7.3	-11.7
<i>IIB. Dynamic Fertility</i>							
Constant mortality; no economic change	<i>Som</i>	-921	-694	-3,289	-9,957	-32,590	-94,914
	<i>%GDP</i>	-2.1	-0.8	-2.0	-3.3	-6.1	-9.8
<i>IIC. BASELINE</i>							
Dynamic demographics; no economic change	<i>Som</i>	-923	-782	-3,856	-12,339	-41,601	-123,470
	<i>%GDP</i>	-2.1	-0.9	-2.3	-4.1	-7.8	-12.8
<i>III. OFFICIAL PRELIMINARY</i>							
Constant demographics; rapid economic growth	<i>Som</i>	-906	+931	+6,306	+28,016	+84,688	+197,661
	<i>%GDP</i>	-2.0	+0.7	+1.7	+2.6	+2.7	+2.1
<i>IV. GROWTH PLUS DEMOGRAPHIC CHANGE</i>							
Dynamic demographics and rapid economic growth	<i>Som</i>	-908	+855	+5,902	+24,814	+56,473	+23,528
	<i>%GDP</i>	-2.0	+0.7	+1.6	+2.3	+1.8	+0.3

The *OFFICIAL (PRELIMINARY)* simulation that served as the basis for World Bank projections assumes continued 1997 mortality patterns, which in fact are extremely favorable from a fiscal standpoint (and hence dreadful from a human standpoint). Female life expectancy at age 58 is 21 years; male life expectancy at age 63 is 13 years. Thus, high mortality to some extent compensates for early retirements. More importantly, some 13% of women and 38% of men who enter

the labor force will not survive to the new retirement ages at 1997 mortality rates, thereby greatly reducing potential state pension burdens.

However, there is evidence of mortality recovery since 1995 in Kyrgyzstan and other former Soviet republics (Becker and Ukaeva, 1999), and it is difficult to imagine that further gains will not take place if economic stability is restored. Since mortality in most of the world is declining rapidly, to assume life expectancy recovery to late Soviet levels during the coming simulation decade is hardly radical. Rather, conservative pension system forecasting should include assumed mortality decreases, as these decreases will raise system obligations. Assuming stable mortality rates chosen from a period of extremely high mortality inevitably leads to an understatement of pension system liabilities.

Even by 2007 with mortality recovery, Kyrgyz retirement age life expectancy will still be far below current US levels. Declining mortality implies a larger total population, and a larger share of retirees, since more people will survive to retirement age. Thus, in the *STABLE* simulation, the proportion of pensioners in the population rises from 12% in 2000 to 20% by 2050; with declining mortality the share rises to 22%. Gradual mortality recovery has little impact on the number of contributors (their numbers increase by less than 3% in 2050 in the event of declining mortality), but by 2050 the number of pensioners will be 18% greater than in the *STABLE* scenario. More pensioners in turn mean a higher system dependency ratio, and more pension liabilities relative to contributions. Life expectancy recovery, even of the modest sort used in these projections, therefore has a negative impact on the Pension Fund balance. By 2040, the Pension Fund deficit is some 30% greater than in *STABLE*; even by 2010, the projected deficit increases by 12%.

Not only has Kyrgyzstan experienced rising mortality; it has also experienced collapsing fertility. The 1990 total fertility rate (TFR) of 3.7 had fallen to 2.8 by 1997, and to 2.6 by the 1999 census – more than one live birth per women. Furthermore, a staggering collapse in the incidence of marriage (by more than 40%), taken together with the extreme rarity of marriage among women over 25 years, essentially ensures the continued decline of TFRs as the unmarried cohort ages. For dynamic fertility counterfactuals, we therefore assume further TFR annual decreases of 2% during 1997-2007 and 1.5% from 2008-2017, with stability thereafter. These assumptions permit continuation of the striking decline in expected live births per woman, but at a decreasing rate. TFR is allowed to decline to 2.4 by 2007, and eventually stabilizes at 2.05. Decreased fertility eventually translates into a smaller, older population. Although in this scenario the absolute number of pensioners declines only slightly in the next half-century, their population share is set to increase markedly, to 25% by 2050 – and by 2030 there are roughly as many pensioners as there are contributors. Pension fund deficits thereby worsen, though not substantially until about 2040. Kyrgyzstan will age in the coming half-century even if life expectancy does not recover and fertility ceases to decline: the proportion of pensioners will rise from 12% in 2000 to 20% in 2050. With even modest demographic

trending, though, the rate of growth of pensioner's share will double, with a projected rise from 12% to 28%. Because extremely strong fertility and mortality trends exist, these changes are far more plausible than constant demographic behavior, and therefore the *BASELINE* scenario incorporates these trends.

Even though mortality and fertility dynamics lead to opposite effects on the number of contributors and beneficiaries, both adversely affect pension fund balances. Declining mortality means more retirees; declining fertility means fewer workers. During the next 50 years, these effects are virtually additive (since the smaller cohorts will not be retiring in large numbers for 55 years); as Table 2 shows, the combined effect is quite large. In fact, the fiscal impact is somewhat understated, since Kyrgyzstan is projected to run vast Solidarity system deficits (barring reform) even in the event of demographic stability. Put differently, even if the current system had projected pension system balance in the absence of demographic change, by 2050 these changes would cause forecast system deficits of more than 4% of GDP. In reality, though, even under the fiscally optimistic *STABLE* scenario, barring economic growth or policy reforms beyond improved compliance, pension expenditures are set to rise from 6.6% of GDP in 1997 to 17.5% in 2050, generating a projected deficit of 8.7% of GDP.

One way to escape the yawning deficits forecast is to grow the economy. After nearly 10% economic growth in 1997 (following the opening of the Kumtor gold mine) and 7% economic growth in 1996, optimists envisioned rapid economic recovery, and in early 1998 the IMF pronounced a medium run economic growth forecast of 6% for Kyrgyzstan. The World Bank, for reasons of fraternal loyalty and policy coordination, tends to accept Fund forecasts, and so initially used this 6% growth estimate in its actuarial simulations of Kyrgyzstan's Solidarity system. As the *OFFICIAL (PRELIMINARY)* simulation in Table 2 shows, the results were spectacular – improved compliance and minor Solidarity system rule changes suffice to eliminate deficits by 2001 and ensure long run system stability, especially if one assumes fiscally favorable demographic behavior.⁶ Indeed, if one assumes sufficiently high rates of economic growth, there is no need for any reform. All problems will be gone under any pension system type. Conversely, very pessimistic scenarios will predict disaster even with the most carefully designed reform – though Government deficits shrink when defined contribution systems are adopted.

Even in early 1998, however, sustained growth of 6% was optimistic, especially as warnings already had been issued about Government's debt-service capacity. The Russian crisis of August 1998 quickly resulted in declining demand for Kyrgyz goods and loss of what little confidence there was in its financial institutions, making it clear that 6% growth was a fleeting rather than permanent event. With more realistic growth rates, the Solidarity system is not financially sustainable without major changes in pension rules.

This vast range of Solidarity system forecasts (roughly $\pm 1.5\%$ of GDP even by 2015) has several implications. First, it is easy for a modeler to obtain whatever results he or she wishes. Thanks to growth compounding over very

long periods, growth rates far less dramatic than 6% will make the Solidarity system sustainable in the long run, especially if one modifies other assumptions as well. Secondly, forecast variability can be reduced by enforcing some consistency among economic and demographic assumptions, and especially by assuming mortality recovery accompanies rapid economic growth. Third, providing forecasts under the alternate assumptions of a stable economic and demographic environment (*STABLE*), and a constant economic pattern together with continued demographic transition (*BASELINE*) are valuable, since they offer insights into what will happen to the pension system if economic and/or demographic circumstances do not change. These are inherently somewhat pessimistic forecasts, but it is far more important for policymakers to know what will happen if the economy does not improve than to use highly optimistic economic growth assumptions – in which case any policy will look good.

Probably the most appropriate scenario for policy selection purposes is *BASELINE* scenario III. Assuming rapid economic growth has little merit, especially when it comes to choosing policies that are intended to provide a safety net. Pension and other safety net components will be of greatest value precisely if economic recovery falters; policy should therefore be chosen on the basis of something close to a “maximin” strategy. If, on the contrary, one makes optimistic assumptions that are not realized, one will also end up advocating modest reforms that turn out to be inadequate. As the error is realized, corrections can be made, but in the meantime valuable time is lost. This is especially important for countries like Kyrgyzstan with relatively small retirement populations today – but larger retirement cohorts looming on the horizon. The bias of forecasts like *OFFICIAL (PRELIMINARY)* means that further reforms may well be necessary, but will have to be implemented under even worse conditions.

5. Universal Pensions in an Underdeveloped Economy: Urban-Rural Transfers

Most developing and transitional economies are characterized by huge intersectoral differences. Since socialist societies provided pensions to agricultural workers, even if they contributed little tax revenue, and since these commitments have been retained in the successor states, the gap between urban and rural areas is particularly important in analyzing pension systems in transition nations. In Kyrgyzstan, as in other formerly socialist countries, rural incomes are far below those in urban areas. Solidarity system contribution rules differ as well: rather than paying a payroll tax, rural agricultural workers’ enterprises (most commonly, cooperatives) pay a land tax, of which 25% is dedicated to the Social Fund. In short, rural Kyrgyzstan has limited capacity to contribute to the Social Fund, is lightly taxed, and, for that matter, has a low level of compliance.

In effect, Kyrgyzstan has two pension systems. Dividing the actuarial simulation into separate urban and rural accounts (**Table 3**) yields the striking result that the urban component of the existing PAYGO system is financially sustainable for 40 years before changing demographics drag it into deficit, *even without real per worker economic growth*. This differential is maintained when we adjust the estimates to permit differential fertility rates, reflecting the fact that rural fertility is greater. Obviously, differences become greater still if we allow differential rates of economic growth, especially in recovery scenarios, since urban growth has been and will likely continue to be far greater than in the countryside.

In effect, the existing Solidarity system channels resources from urban to rural areas as a means of combating rural poverty. This may be a desirable social objective, although it does represent a vast transfer for a country as poor as Kyrgyzstan.⁷ But it is essential to recognize that Kyrgyzstan's current PAYGO system is not *generally* bankrupt. Rather, the urban component appears to be viable for many decades, and the system's deficits are driven by vast transfers to rural areas. Indeed, since Kyrgyzstan is 64% rural, and since rural areas contribute only one *som* for every 11 *soms* in pension fund benefits, it is hardly surprising that the SF runs large deficits.

Table 3.
Urban and rural balances of the Pension Fund
(million som)

		1997	2000	2010	2020	2030	2040	2050
BASELINE	som	-750	-923	-782	-3,856	-12,339	-41,601	-123,470
	%GDP	-2.5	-2.1	-0.9	-2.3	-4.1	-7.8	-12.8
Identical fertility	Urban som	+99	+163	+1,078	+1,679	+2,087	-2,412	-22,100
	%GDP	+0.3	+0.4	+1.2	+1.0	+0.7	-0.4	-2.3
	Rural som	-849	-1,102	-1,900	-5,500	-14,415	-39,239	-101,141
	%GDP	-2.8	-2.5	-2.1	-3.3	-4.8	-7.3	-10.5
Differential fertility	Urban som	+99	+164	+1,097	+1,637	+1,331	-5,681	-32,496
	%GDP	+0.3	+0.4	+1.2	+1.0	+0.4	-1.1	-3.4
	Rural som	-849	-1,103	-1,947	-5,586	-13,658	-36,555	-93,003
	%GDP	-2.8	-2.5	-2.1	-3.4	-4.6	-6.8	-9.6

This rural-urban distinction is critical in designing pension policy. The overwhelming majority of rural pensioners receive minimum or near-minimum pensions. Thus, future rural pensioners' benefits will not be affected at the margin by increased credits from notional or fully funded accounts. These

reforms will, in effect, fix the part of the current PAYGO system that is not terribly broken; namely, the urban formal sector.

Unfortunately, it is much easier to identify this rural-urban imbalance than it is to design a solution. Kyrgyzstan's *Zhegorku Kenesh* (Parliament) is influential, and is dominated by rural, deficit constituencies. Any move to reduce the huge rural subsidies would meet with determined opposition. Most likely, the best that can be done is to recognize the transfer explicitly, and perhaps eventually to cap the magnitude.

6. Reform Options and Forecasts

6.1. Strengthening the Solidarity system

A conventional PAYGO system is a public pension scheme that ensures a basic post-retirement or disability income to the working population. It is a *defined-benefit system* in the sense that benefit levels are specified by system rules, and these benefits do not reflect the present discounted value of past contributions. Pension payments come from current contributions, typically from payroll deductions. Benefits can be payable to every retiree meeting certain qualifications, or can be means-tested.

The Soviet pension system inherited by the Kyrgyz Republic was generous. Retirement ages, at 60 for men and 55 years for women, were low. Many special provisions for early retirement were granted, including for work in hazardous conditions, and for military, medical workers, and teachers. Pensions were financed directly from the budget in the amount needed. Socialist countries had extremely high labor force participation rates and full employment; and, for the Soviet Union as a whole, the demographic structure was reasonably favorable. Consequently, despite its terms, the Soviet pension system did not face serious financial difficulties.

The collapse of socialism has meant economic decline throughout the region, and hence declining pension fund contributions and rising premature retirements (Becker and Urzhumova, 1998). Pension populations are also on the verge of growing rapidly, since the new retirement populations from roughly 1997-2003 are small wartime cohorts, while post-war baby boomers will come to dominate the retirement population in the near future. The combination of economic deterioration and demographic burdens has made reform inevitable, and many formerly socialist countries already have reduced the generosity of their pension systems. Overt reductions in replacement rates – the ratio of pension benefits to wages – have occurred in Romania, the Czech Republic, Albania, and Croatia. However, many countries facing high and increasing costs (notably, Slovakia, Bulgaria, Poland, and former Soviet republics) have been unable to reduce pension generosity sufficiently to counteract increases in system dependency rates. We have seen that Kyrgyzstan's existing Solidar-

ity system is unaffordable without major changes in benefit provision, retirement age, labor force participation, and contribution rates. Altering these policy rules is politically difficult, while achieving economic success (and hence rising participation rates) is highly uncertain. The question, then, is whether sufficient changes can be made in light of their political unpopularity, or whether excessive generosity is inevitable in the Kyrgyz environment.

Strengthening the existing Solidarity system has many attractions. A PAYGO system does not rely on financial markets, which are immature or non-existent in transitional countries. Citizens are comfortable with defined benefit systems, and regard it as a major safety net in the society. System rules are easy to understand and administer. Basic social pensions are ensured in a sound PAYGO system, and this assurance, together with a redistributive element, strengthens social stability.

Decreasing pension costs is the key to reducing transition economies' pension fund deficits. Increasing already high payroll tax rates is unrealistic. Improvements in tax compliance will help improve pension fund revenues. But even under full compliance, payroll tax rates sufficient to eliminate deficits would remain high, constraining employment and discouraging economic growth. Thus, the plausible options include (a) reducing benefit levels, (b) reducing the system dependency rate, and (c) increasing compliance. In Kyrgyzstan, none of these options is easy. Pensions are already small, and few pensioners have alternative income sources, so that reductions are extremely unpopular politically. System dependency rates can be reduced by increasing retirement ages, abolishing premature retirement provisions, and increasing the stringency of disability eligibility – again, all unpopular moves. A measure to improve compliance is to unify pension contribution collection with other tax collection. However, in Kyrgyzstan the Tax Inspectorate has been seen as less competent and trusted than the Social Fund, so that unification could turn out to be counterproductive. Thus, popular hostility to necessary Solidarity reforms is one of the main reasons for considering alternative measures that lead to reduced state subventions.

6.2. Notional Systems

The “notional defined contribution” (NDC) scheme links benefit payments to past contributions, and has been adopted by Latvia as well as Kyrgyzstan. While payments above a minimum level are determined by past contributions (thus making it a “defined contribution” program at the margin), most payroll contributions are disbursed to current pensioners rather than being invested, thereby retaining its PAYGO status.

Two principles underlie the NDC approach. First, while governments are committed to making minimum payments to pensioners, their obligations are reduced to those who make few or no contributions during their working lives. Secondly, to the extent that people perceive a connection between contribu-

tions and future pensions, disincentive effects of payroll taxes will be reduced, thereby stimulating formal sector employment and pension fund contributions – though this remains a theoretical rather than an empirically observed event.

However, these benefits accrue in the long-run, and do not solve short-run pension fund solvency problems. Thus, NDC reforms in practice tend to be combined with the Solidarity system reforms outlined above. Ideally, NDC reforms would be implemented before a crisis occurs, or after it is solved. Kyrgyzstan's experience suggests that pension funds faced with large current deficits tend to accrue notional interest rates at negative real rates – hardly a confidence-building move. Nor should NDC reforms be regarded as easier than Solidarity reforms. NDC implementation requires the introduction of massive information systems' computing capacity for personal accounts, as well as specification of formulas to calculate benefits on personalized accounts. NDC reforms also necessitate major public education campaigns, since they must be accepted by an inexperienced public.

6.3. Fully-Funded systems

The World Bank (1994) and Andrews and Rashid (1996) argue that government social security obligations in transition economies must be reduced, with individuals taking greater responsibility for obtaining income security from private insurance and savings schemes. In particular, Kazakhstan has attempted to shed long-run government commitments by switching to mandatory, publicly or privately managed pensions.

The fully-funded, mandatory, defined contribution system is a scheme in which contributions are paid by workers and/or employers. Payments are deposited in a publicly regulated, and either privately or publicly managed asset management fund, which in turn invests the proceeds in a portfolio of securities. Upon retirement, participants either make phased withdrawals, or draw an annuity based on the accumulated value of their deposits and net returns thereon. According to fiduciary principles, asset management fund portfolios should be designed to maximize yields while safeguarding against speculation. Most governments, however, expect these funds to generate a pool of capital that can contribute to meeting domestic investment demand needs, and to covering public debt issues.

Some authors (James, 1997) provide evidence of a positive impact from the introduction of a mandatory savings plan on economic growth in a variety of countries, with the largest gains (6.6% of GDP) recorded in Chile. These gains are attributed to increased savings (and, given capital restrictions, investment), as well as productivity gains due to the removal of labor market distortions. Increased productivity due to financial market development after pension reform is often cited as a further gain, though benefits are not easily quantified. Positive compliance incentives are also cited as an advantage of

funded, DC systems, though empirical support for this advantage remains to be found (Mesa-Largo, 1998).

Despite its theoretical attraction, fully-funded systems have not won unanimous support, especially from the IMF (for example, Branco, 1998). Because movement to a fully-funded system implies a transition period in which Solidarity contributions decline but obligations do not, a country making the switch must have access to substantial resources, either from budgetary surpluses, privatization proceeds, or international loans. When these resources do not materialize, short- and medium-run macroeconomic stability is threatened. This is a moderate concern in Kazakhstan, a relatively developed transition economy with large numbers of potentially attractive firms that can be privatized, and with substantial oil income.⁸ In Kyrgyzstan, which has none of these advantages, move to a funded accumulation system without international loans would be impossible.

Even if resources to fund the transition are obtained, fully-funded systems require adequate legal and regulatory frameworks, and active financial markets. Because contributions rather than benefits are defined, contributors face the risk of fluctuating pension benefits. Since savings are mandated by the state, implicit public liabilities are created, as few governments will be able to resist compensating contributors to pension management funds that fail. Furthermore, funded, defined-contribution systems lack a redistributive component. Consequently, their introduction is likely either to be regressive, or it will necessitate continued operation of a substantial Solidarity payments in a nation such as Kyrgyzstan. Given these limitations, fully-funded system advocates typically advance “multi-pillar” schemes that also include a reformed PAYGO system and voluntary supplementary defined contribution components.⁹ Raising retirement ages and steps to enhance compliance also reduce transition funding problems.¹⁰

Beyond these three basic options, all international agencies advocate a voluntary fully-funded system from contributions from workers who wish to supplement their retirement income, or whose employers voluntarily compensate their workforce partly through deposits to a private pension plan. It is unrealistic to expect voluntary schemes to attract large numbers of savers in Kyrgyzstan, where people are deeply reluctant to use financial institutions even for demand deposits. As of mid-1999, one private “pension fund” (in reality, a term-savings fund) existed with Bishkek; despite credible management, it is very much a minor institution.

Since the World Bank (1994) popularized the concept of a multi-pillar approach, pension reforms have tended to involve the establishment of two (or more) coexisting systems: Solidarity and fully-funded, with either mandatory or voluntary contributions. The Asian Development Bank and bilateral aid agencies tend to endorse the multi-pillar approach as well. In Kyrgyzstan, the World Bank concluded that a single NDC system was preferable because of the small formal sector and the underdeveloped financial system; however, the ADB still leaned toward the multi-pillar design. The IMF usually recom-

mends that transitional countries give first priority to reestablishing safety nets under the PAYGO system, and then consider developing the regulatory infrastructure for an eventual voluntary pillar. Given that the market will sooner or later create a voluntary pillar in a country, the IMF concludes that a mandatory fully-funded system is at best unnecessary and quite likely undesirable for transitional countries – and opposed the establishment of such a system in Kyrgyzstan.

6.4. Reform simulations: raising retirement ages

To be in balance, a PAYGO system must satisfy the condition that contributions equal pension payments, or $T \cdot w \cdot L = a \cdot P$ where T denotes the payroll tax rate, w the average wage, L is number of contributors, a is average pension, and P the number of pensioners. Thus, the tax rate T^* necessary to maintain PAYGO system balance is

$$T^* = \frac{a \cdot P}{w \cdot L} = \left(\frac{a}{w}\right) \cdot \left(\frac{P}{L}\right) \equiv R \cdot D \tag{1}$$

a/w is the ratio of average pension to average wage, or replacement rate **R**; P/L is the ratio of pensioners to contributors, or dependency rate **D**. According to the data from the National Statistical Committee of Kyrgyzstan for 1997, $R = 0.45$, $D = 0.64$; hence $T^* = 29\%$. According to Kyrgyzstan’s Social Fund, $R = 0.5$, in which case T^* should just equal the current value of T , 32%.

These calculations in practice must include scaling factors to account for imperfect compliance and administrative expenses (which were 1.35% of total SF expenses in 1997, and will rise further with introduction of NDC accounts). When one adds in a constant non-compliance rate (not adjusting for rising noncompliance as the payroll tax rate increases), the Solidarity system’s zero-balance T^* value for 1999 is 51.1% (without taking into consideration government transfers). The dramatic difference between full compliance, zero administrative cost T^* and effective T^* reflects administrative limitations as well as limited capacity to pay in an extremely poor economy with a universal pension system.

A payroll tax of 51% solely for pension expenditures is unrealistic. Its imposition would doubtless give rise to further formal sector contraction and still lower compliance rates, and hence would necessitate an even greater T^* . A more realistic PAYGO pension reform scenario is to increase retirement age – a step that is in fact being undertaken, albeit with huge political opposition. **Table 4** shows the impact of the following retirement age increases, assuming an increase starting in 1999:

- To 63 (men) and 58 (women) at the rate of 6 months a year; (an option proposed by the World Bank and Kyrgyz government but rejected by Parliament) (*Option 1*)
- To 65 (men) and 60 (women) at the rate of 6 months a year; (*Option 2*)
- To 65 (men) and 65 (women) at the rate of 6 months a year; (*Option 3*)
- To 63 (men) and 58 (women) at the rate of 4 months a year (the option accepted by the Kyrgyz Parliament). (*Option 4*)

Table 4:
Pension Fund balances with different retirement schemes
and dynamic demographic parameters
 (GDP shares of total pension expenditures)

	1997	2000	2010	2020	2030	2040	2050
BASELINE	-2.5	-2.1	-0.9	-2.3	-4.1	-7.8	-12.8
Option 1: 63m 58w	-2.5	-1.9	-0.2	-1.6	-3.5	-6.9	-12.0
Option 2: 65m 60w	-2.5	-1.9	+0.2	-1.1	-3.2	-6.5	-11.6
Option 3: 65m 65w	-2.5	-1.9	+0.3	-0.1	-2.6	-5.7	-10.7
Option 4: 63m 58w	-2.5	-2.1	-0.1	-1.4	-3.5	-6.9	-12.0

Even the most drastic increase in a retirement age (Option 3) maintains Pension Fund balance only for 20-25 years in the absence of demographic change (simulations not shown), and about 15 years with more realistic demographic assumptions. The half-hearted measures (Options 1 and 4) actually under consideration keep deficits at manageable levels only for 10-15 years, and do not remove the eventual need for more radical reforms.

One can also endogenize retirement age to a level that will enforce pension system balance. Retirement increases would need to be dramatic – to 65.5 for both sexes by 2005, and an eventual increase by 2050 to 70.5 years. The exact schedule of the increase before 2005 does not play an important role.

6.5. Transition to Notional Accounts

The basic relationship for notional accounts is that the present discounted value of total pension benefits for an individual just equal the total amount of deposits in an individual account at the end of working life, or, ignoring discounting,

$$a \cdot 12 \cdot N = Z \quad (2)$$

where a denotes monthly benefit, N is life expectancy at retirement, and Z is total amount of deposits. Since the system is notional, the value of the future flows of benefits may but need not be adjusted by a discount rate; no discounting is used in the NDC system adopted in Kyrgyzstan. Monthly contributions to individual accounts (MP) are made according to the equation:

$$MP = k \cdot Z / 12 \tag{3}$$

where k is a constant coefficient defined by the rules of the pension system. (2) and (3) imply a balance formula for k :

$$k = \frac{MP}{a \cdot N} \tag{4}$$

In the special (no discounting and no interest accumulation) case where monthly pension is equal to monthly contribution, k equals the inverse of retirement life expectancy. In this case, for Kyrgyzstan the k coefficient for men and women combined equals approximately 0.05 (inconsistent with the SF’s proposed k value of = 0.09). Ideally, k would vary with an individual’s retirement age, and revisions should be made regularly in light of mortality rate changes. Whether or not k varies by gender is a social policy issue; in Kyrgyzstan, it does not.

Table 5 contrasts pension fund balance estimates for notional accounts with and without demographic change to the *BASELINE* counterfactual, and without any interest credited to the notional accounts (*i.e.*, nominal interest credited is set equal to the rate of inflation). Notional accounts are based on a contribution rate of 32%, of which 3% is devoted to the pension fund administrative costs.¹ The transition from PAYGO starts in 1999 with $k=0.05$. Establishing a link between contributions and payments improves the SF’s financial situation by limiting its eventual liabilities. Its impact is impressive from a fiscal perspective: deficits are kept at manageable levels for about 25 years. It should also be stressed that these achievements come under a constant real output per worker regime. With economic growth, an NDC system will do better still, and may prevent deficits from emerging altogether. On the other hand, the reason for the achievement is a considerable decline in the replacement rate, and that reduction may prove to be politically unacceptable.

Table 5:
Pension Fund balances under notional schemes
(GDP shares of total pension expenditures)

	1997	2000	2010	2020	2030	2040	2050		
BASELINE			-2.5	-2.1	-0.9	-2.3	-4.1	-7.8	-12.8
NDC (dynamic demographics)			-2.5	-2.2	-0.5	-0.5	-1.2	-3.6	-7.6
NDC (constant demographics)			-2.5	-2.2	-0.4	-0.4	-1.1	-3.4	-7.0

While NDC goes a long way toward restoring fiscal balance, the mere introduction of the notional accounts is insufficient to guarantee permanent financial sustainability. Minimum pension payments eventually cause large deficits; rising dependency rates contribute as well. Ultimately, notional accounts must be accompanied by additional reforms leading to a decrease in the system dependency ratio. This is especially true if replacement rates are to be close to desirable levels: if $a = MP = 29\%$ of wages (after administrative expenditures), real pension receipts will be very low for the overwhelming majority of the population.

6.6 Moving to a funded, defined contribution accumulation system

The counterfactual simulations in **Table 6** show balances for the Solidarity system component of Kyrgyzstan's pension system in the case of a switch to a funded system for the urban population. These simulations introduce a funded defined contribution system in 2001 that is mandatory for non-agricultural workers below a specified age. The simulated scenario assumes a 10% diversion from the 32% Pension Fund contribution (22% is still paid to the Solidarity system) for workers who switch.

Table 6:
Solidarity system balance in the case of a transfer of 10% of urban contributions to a funded accumulation system
(all values in millions of 1997 som)

	Switch is mandatory in 2001 for workers under age of				
	<i>BASELINE</i>	40	35	30	25
1999	-874	-874	-874	-874	-874
2000	-923	-923	-923	-923	-923
2001	-949	-1248	-1164	-1092	-1022
2002	-959	-1315	-1220	-1140	-1060
2003	-913	-1347	-1226	-1137	-1048
2004	-849	-1371	-1225	-1126	-1026
2005	-785	-1425	-1234	-1124	-1011
2006	-741	-1522	-1272	-1148	-1024

The main feature of Table 6 is the trade-off based on the age of switch from PAYGO to a fully-funded, individual accumulation system. Eventually, deficits will be limited in a true accumulation system, though in Kyrgyzstan continued agricultural sector deficits will continue to dominate the Social Fund’s fiscal situation. The fully funded system will ensure long-run urban pension system viability, and will cover some transfers to rural areas.

The difficulty in transferring to a funded system lies in the stresses created during the transition. During the transition to an accumulation system, Solidarity revenues decline, but SF expenditure requirements do not. Furthermore, the younger the age at which the switch from the Solidarity to funded system occurs, the longer – but smaller – will be the SF deficits. A substantial PAYGO system will last until all citizens switch to a funded system, although a Solidarity structure will be necessary as long as the SF covers disability and rural pensions.

Transition funding requirements in Kyrgyzstan almost certainly would have to be met by external sources. This funding, in effect, increases medium term government debt, while reducing long term state obligations. Whether this is desirable depends on the extent to which a fully funded system is needed to control future social expenditures, whether it will be successful in doing so, and whether the funds created will assist in the development of an effective financial market.

In Kyrgyzstan today, a funded accumulation system is unlikely to achieve these objectives, given the collapse of the nascent financial sector.

Kyrgyzstan's banking sector was virtually destroyed by the Russian crisis of August 1998, and then by the Kyrgyzgazmunaizat scandal that arose in December 1998, in which approximately \$18 million of deposits disappeared, causing the collapse of several major banks.² Of course, the Asian Development Bank could foresee none of this when it first promoted a funded accumulation strategy in 1997 and early 1998.

7. Concluding Remarks

None of the reform proposals put forth by international organizations or the Kyrgyz Government effectively deal with the vast rural pension commitments that are at the heart of the Social Fund's current and impending future deficits. As long as Kyrgyzstan remains predominately rural, rural workers remain entitled at least to minimum Solidarity pensions, and rural workers make virtually no contributions to fund their retirement and disability needs, then pension deficits are nearly inevitable. Only dramatic economic growth will generate the changes in rural economic conditions likely to overcome these features. The alternative is to undertake Solidarity system reforms that reduce rural deficits – and, if savings pools are to be created, this also means reducing urban subsidization of the countryside, as well as creating overall balance. However, in a reasonably democratic and mainly rural nation, these transfers are politically important, and their reduction is extremely difficult.

The purpose of pension system modeling is to provide useful information to policymakers. Ignoring demographic trends can easily lead to wildly biased predictions. In Kyrgyzstan and other transition nations, the bias tends to make all reforms look more favorable than they would be otherwise, and this in turn means that partial reforms are favored. The bias also tends to be greater for PAYGO and NDC reforms relative to fully funded system reforms, since funded defined contributions have inherent limits to deficits regardless of demographic structure.

Actuarial models are widely used for pension reform forecasts, despite (or perhaps because of) their structural simplicity. These models generate forecasts for decades into the future based on many arbitrary assumptions, and ignoring the economic structure of a society. Why, in this case, are actuarial models used? And why should we attach credibility to any forecasts? The answer is simply that policy must be made even in the absence of full information and perfect models. Actuarial models offer a framework for an estimation of a range of possible outcomes. Two forecasts, the most (plausible) pessimistic scenario, and the most unbiased forecast possible, are particularly important. By implication, users should understand the biases associated with specific assumptions. For Kyrgyzstan, neglecting dynamics in fertility and mortality both lead to overestimation of the SF's current account balance. Macroeconomic assumptions are even more important. In the absence of well-grounded

growth forecasts, especially in the case of unstable societies, the best alternative is probably to assume constant per capita or per worker output.

The counterfactual simulations presented here provide considerable information despite unstable economic and demographic patterns. They do not, however, favor a particular reform strategy – though they do elucidate many hard choices, and further suggest that multiple steps will be needed. Nonetheless, it is troubling that dramatic reforms have been considered in an environment of terribly limited information, and clearly limited capacity by the Kyrgyz Government to carry out major structural reforms. Even in the absence of the Russian crisis, the Kyrgyz Government might well have manipulated imputed interest rates over time (as they in fact have) to the extent that the population would come to regard the account values as utterly arbitrary. The financial achievements of the NDC reform could have been achieved as well by more direct confrontation of the vast transfers undertaken via the Pension Fund. As for a Kyrgyz funded accumulation system, the financial system that would help it grow has thus far been a Potemkin village, while diversification of pension funds’ assets could come only with the emergence of domestic investment demand.

What the forecasts do indicate is that difficult choices cannot be avoided. Unfortunately, choices were in fact made on the basis of biased, excessively optimistic forecasts. In consequence, adequate reforms remain to be taken, and, barring dramatic economic recovery, unsustainable deficits remain to be systematically addressed.

Notes

1. Official pension system deficits tend to be small, since most governments cover deficits by direct transfers from the state budget. In 1997, the Republican Government transferred roughly 1.5% of GDP to the Kyrgyz Social Fund. That same year, the Russian government transferred 23 billion rubles (about 1% of GDP) from the federal budget to the (off budget) Pension Fund to clear arrears. Of course, some CIS government transfers compensate for past arrears and non-compliance by state enterprises.

2. Average pensions are well below the general poverty line. Moreover, the base pension, a flat-rate payment that ensures a basic payment to the poorest pensioners, is below the food poverty line. Data for 1999 (Kyrgyz Social Fund, unpublished) are:

	<i>Som</i>	% of average wage
Average monthly pension (old-age)	410	42.3
Average monthly pension (all categories)	385	39.7
Base pension	200	20.6
General poverty line	612	63.1
Food poverty line	321	33.1

3. Because economic deterioration from mid-1998 prevented the more radical reforms from being effectively implemented, and because the international agencies presented a united front on the initial reforms, conflict among international agencies never was an important issue. It would have mattered had Kyrgyzstan continued to recover, in which case the strikingly different visions of the World Bank, IMF, and ADB could

have caused confusion and possibly thwarted any further reform. As for the initial reforms, few if any structural changes would have taken place without World Bank pressure (supported strongly by both the ADB and IMF). Raising retirement age was extremely sensitive, and was accomplished only at great political cost.

4. While the ADB was unprepared to make a loan that would have fully covered transition costs (of up to \$100 million/year, for the next decade: see Table 5), a successful start might well have led to subsequent loans.

5. A horizon of more than one half century is far too long for meaningful economic or demographic projections. While an extended forecast duration is needed to examine a pension system's long-run sustainability properties, given present demo-economic behavior and trends, virtually all of the information gained can be obtained from a 25-year projection, and this shorter span is less sensitive to fertility assumptions. Nonetheless, convention in actuarial forecasting is to present very long projections, and so they are included here.

6. Scenario III contains rapid GDP growth (3% in 1999, 4% in 2000, 5% in 2001, and 6% thereafter; the elasticity of wages to GDP/worker is assumed to equal 0.5). Since this was the basis for policy decisions in 1997 and early 1998, it is designated the *OFFICIAL (PRELIMINARY)* forecast – the “preliminary” designation is necessary, since by 1999 a version close to *BASELINE* was adopted. *BASELINE* scenario IIC permits demographic change but a stagnant economy, while scenario IV has demographic change and economic growth.

7. However, Anderson and Becker (2000) argue that these transfers are highly inefficient, since they are not means-tested. Moreover, while poverty is generally severe, and hence so is elderly poverty, the likelihood of being poor is greatest among children – and malnourishment and poor schooling today will reduce labor force productivity in the future as well.

8. Even in Kazakhstan, which also received large international loans, funding the transition has been a difficult issue, at least until rising oil prices led to a government budget surplus in 2000. Moreover, until very recently Kazakhstan's pension funds have invested overwhelmingly in government securities, in which case there is little theoretical difference between a funded and a PAYGO system (other than large intergenerational transfers).

9. In a slowly developing nation such as Kyrgyzstan, these “contingent liabilities” of the public pension system can be quite large, depending on the political clout of low-income, elderly citizens (and, since we do not include estimates of contingent liabilities here, our estimates of budget deficits and transition costs for these reforms should be seen as lower bounds).

10. There are several other important design issues that must be resolved in adopting a funded, individual account system, though these are not central to our story. Among them is the age at which people will be allowed or required to switch to a new system. Workers near retirement will be unable to accumulate sufficient funds in defined contribution accumulation accounts, and therefore must be supported by the old Solidarity system. A second major design issue centers on whether a worker's switch to a funded system is voluntary or mandatory for various age groups.

11. Given the computerization required, it was generally believed that there would be a substantial fixed cost in switching to an NDC system. However, the old Soviet system in which enterprises maintain their own records could not be maintained indefinitely, implying that fixed costs almost as great would have been incurred sooner or later under a maintained PAYGO system as well. Consequently, the simulated administrative cost disadvantage of the NDC relative to PAYGO may be an overstatement (though compliance gains may be exaggerated).

12. For details on the scandal and its consequences, see *Vechernii Bishkek*, February 24, 1999 (Wednesday): “Debt cell”; *Vechernii Bishkek*, July 16, 1999: “Deal: Parliamentary deputies' committee is having its own investigation of ‘KyrgyzGazMunaizat’ case”. Both can be found (in Russian) at <http://vb.kyrnet.kg>.

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Appendix 1:

Algebraic formulation of a basic actuarial pension model.

To calculate a pension fund balance, one starts with data on payroll contribution rate T , average wage w , the number of contributors L , average pension A , and the number of pensioners P . For a system to be in balance in year t , contributions must equal pension payments:

$$S_{it} T_i w_{it} L_{it} = S_{it} A_{it} P_{it}, \quad (\text{A.1})$$

where i denotes age group. The number of pensioners is given by

$$P_{it} = r_{1it} M_{it} + r_{2it} F_{it} + k_{1it} M_{it} + k_{2it} F_{it} + k_{3it} M_{it} + k_{4it} F_{it} \quad (\text{A.2})$$

where M_{it} and F_{it} are number of males and females of age i in year t ; r_{1i} is the male retirement rate for age group i , r_{2i} is the corresponding female retirement rate; k_{1i} and k_{2i} are male and female disability coefficients, respectively; while k_{3i} and k_{4i} are the respective male and female survivor pension coefficients.

The basic formula for average pension benefits of new pensioners in a PAYGO system is:

$$A_{it} = LOS_{it} Z_t W_{it}, \quad (A.3)$$

where LOS_{it} denotes length of service at retirement for age group i in a year t ; Z is the replacement rate; and W is final average wage. LOS for people retiring at standard retirement age(s) is determined by pension system rules. The model calculates average LOS for those who retire earlier based on age-specific labor force participation rates. If half of persons age 25 are active, then a basic pension actuarial model will assume that only one-half year of LOS is accumulated on average at age 25. W takes into account the wage profile, so the average wage of a person retiring at age 60 is different than the average wage of the person retiring at the age of 55, even though in simple models the economy-wide average wage (usually broken down by gender, but not age) is the basis of the calculation. Pension benefits to existing pensioners are typically, though not invariably, adjusted for inflation and real wage growth. For estimation of funded system liabilities, calculations are based on standard actuarial techniques.

T is determined exogenously by pension system rules in forecasting models. Typically, wage rates also are set exogenously, and then move according to the GDP growth rate.

$$L_{it} = [LFPR_{1i} (1 - UR_{1i})] (1 - EE_{1i}) M_i + [LFPR_{2i} (1 - U_{2i})] (1 - EE_{2i}) F_i \quad (A.4)$$

gives the number of effective contributors, where $LFPR$ is age and gender specific labor force participation rate; U is the unemployment rate (age and gender specific); EE gives the exemption and evasion rate (age and gender specific); and M_i and F_i give male and female age-specific populations, respectively.

Demographic projections for population of age 1 and older are simply:

$$M_{t+1,i+1} = M_{t,i} S_{t,i}^m + IM_{t,i+1}^m \quad (A.5)$$

where $M_{t,i}$ is the male population of age i at the beginning of year t ; $S_{t,i}^m$ is the proportion of the male population of age i that survives between year t and $t+1$; $IM_{t,i}^m$ is the net male immigration level of age i between year t and $t+1$. A similar equation projects the female population. The equation for newborn males is:

$$M_{t+1,0} = \mu_{t,i}^f F_{t,i} S_{t,0}^m mk_t + IM_{t,0}^m \quad (A.6)$$

where $M_{t+1,0}$ is the male population less than a year old in year $t+1$; $f_{t,i}$ is the birth rate in year t of women age i ; $F_{t,i}$ is the number of women of age i in year t ; and mk_i is the male/female birth coefficient. A similar equation projects new-born females. As discussed, S , f , and IM are usually treated as constants over time in actuarial models, while in our forecasts we permit these demographic parameters to vary.

APPENDIX 2: GENERATIONAL ACCOUNTING FORECASTS.

The starting point of generational accounting is the intertemporal budget constraint of the entire public sector, expressed in present value terms of base year t :

$$B_t = \sum_{s=0}^D N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} \quad (\text{A.7})$$

B_t equals government net debt in year t . Over an infinite time horizon, net government liabilities must be covered either by the present value of net tax payments projected for generations alive in the base year, or by the present value of net tax payments made by generations not yet born.

Let D denote agents' maximum age, and $N_{t,k}$ the present value in year t of net tax payments (taxes paid minus transfers received) made by all members of a generation born in year k over their remaining lives. Thus, the first right-hand term in (A.7) represents aggregate net taxes of all generations alive in the base year. The second term aggregates the net tax payments made by future generations born in year t or later.

The present value of remaining lifetime net tax payments by each generation is determined by

$$N_{t,k} = \sum_{s=\max\{t,k\}}^{k+D} T_{s,k} P_{s,k} (1+r)^{t-s} \quad (\text{A.8})$$

where $T_{s,k}$ denotes the average tax paid in year s by a representative member of the generation born in year k , and $P_{s,k}$ denotes the number of members of a generation born in year k who will survive until year s . For generations born prior to the base year the summation starts from year t , while for future-born generations, the summation starts in year $k>t$. Irrespective of the year of birth, all payments are discounted back to year t by application of a constant real interest rate r . To compute the remaining lifetime net payments, the future

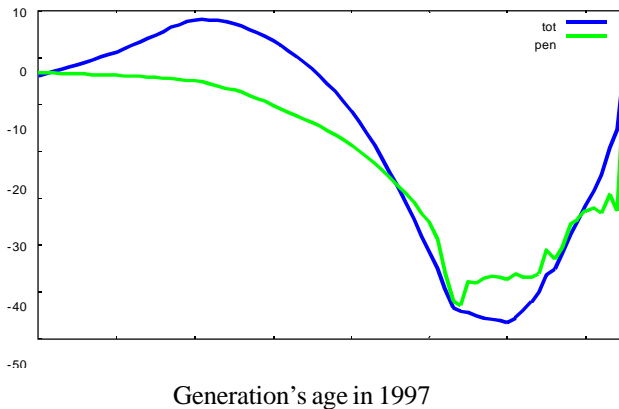
demographic structure must be specified. For living generations, division of the aggregate remaining lifetime net tax payments by the number of cohort members alive in the base year defines the cohort generational account, $GA_{t,k}$.

$$GA_{t,k} = \frac{N_{t,k}}{P_{t,k}} \tag{A.9}$$

These generational accounts indicate the expected per capita fiscal burden for different generations. The accounts are constructed in a purely forward-looking manner, only considering taxes paid and transfers received in or after the base year. As a consequence, generational accounts cannot be compared across living generations because they consider effects of different lifetime. However, one may compare the generational accounts of base year and future-born populations, which are observed over their entire life cycle.

Figure A.1 provides generational accounts of the Kyrgyz public sector (“tot”) and pension system (“pen”) for cohorts ranging from age 0 to 75 in base year 1997. Thus, a person born in the base year has a lifetime net tax payment equal to -7.4 million 1997 som. In other words, if fiscal policy remains unchanged, the discounted value of transfers that a newborn receives until the end of her life will be 7.4 million som greater than the discounted value of taxes she will have to pay. The estimated net tax payment becomes positive for eight-year olds. The generational accounts reach a maximum at the age of 21 and decrease until they change sign at the age of 35. They stay negative thereafter, reaching a minimum of -56.6 million 1997 som at age 60. Generational accounts of the pension system show that the discounted value of net contributions to the Social Fund is negative for all cohorts.

Figure A.1:
Generational Accounts, Kyrgyzstan 1997



Age profile patterns are in part driven by design. Generational accounting is a prospective method, which, by definition, takes into account only rest-of-life tax and transfer payments. Hence, the generational account of an elderly person is negative, as her tax-intensive working years lie behind her, and for the rest of his life she benefits from pension payments. After age 60, the net transfer declines as the remaining lifetime shortens. Secondly, due to discounting, future payments are less important than current payments. Young agents display negative accounts in large part because their tax-intensive working years still lie in the distant future.

There are several ways to express an intergenerational imbalance. One way is to compare the generational accounts of a newborn generation in the base year with the account of a representative future individual. We estimate that future newborns in Kyrgyzstan will pay 26.1 million som in net taxes, which in absolute terms is 33.5 million som more than base year newborns. These vast future increases are required to compensate for deficits for current generations – in other words, a large burden is left to the future under existing tax rules.

Other indicators of intergenerational imbalance include intertemporal public liabilities (*IPL*); the change in the tax burden of future generations necessary to balance the government's intertemporal budget constraint ("*future tax increase*"); and the change in the tax burden of future and present generations necessary to balance the government's intertemporal budget constraint ("*all tax increase*"). These are presented (**Table A.1**) for Kyrgyzstan and, to get a sense of proportion, several European Union countries (European Commission, 1999). The base year for the EU study is 1995. Table A.1 also presents the generational accounts of a base year newborn and a representative future individual.

Table A.1:
MEASURES OF GENERATIONAL IMBALANCE IN KYRGYZSTAN AND
EU COUNTRIES

	(1)	(2)	(3)	(4)	(5)	(6)
	GA	GA	Difference	IPL	Future	All
	1997	1998		(% of	Increase	tax
	(1995)	(1997)		GDP)	(%)	Increase
						(%)
Kyrgyzstan*	-7.4	26.1	33.5	296.6	216.6	31.9
<i>Kyrgyz Pension Fund</i>	-4.8	25.1	29.9	268.5	699.0	174.6
Belgium	-29.1	-16.9	12.2	18.8	6.7	0.6
Denmark	-55.0	-12.6	42.4	71.2	20.3	2.3
Germany	-35.1	82.6	117.7	136.0	58.9	4.7
Spain	-12.3	62.0	74.3	151.9	106.5	5.1

Table A.1: (cont'd)
MEASURES OF GENERATIONAL IMBALANCE IN KYRGYZSTAN AND
EU COUNTRIES

	(1)	(2)	(3)	(4)	(5)	(6)
	GA	GA	Difference	IPL	Future	All
	1997	1998		(% of	Increase	tax
	(1995)	(1997)		GDP)	(%)	Increase
						(%)
France	-56.2	-7.7	48.5	81.3	33.8	2.6
Ireland	-4.9	-6.7	-1.8	-4.3	-1.7	-0.1
Italy	11.0	76.8	65.8	107.3	53.2	4.0
Netherlands	-52.8	-12.5	40.3	75.9	25.1	2.5
Austria	-17.8	119.4	137.2	192.5	82.7	6.5
Finland	-83.2	71.6	154.8	253.2	91.5	8.8
Sweden	-99.0	36.1	135.1	236.5	74.0	7.6
UK	-35.2	29.8	65.1	184.8	74.0	6.0

Source: European Commission (1999), own calculations. Columns (1)-(3) are in million *som* for Kyrgyzstan, and million *euro* for the EC nations.

* The base year for Kyrgyzstan is 1997 and 1995 for the EU.

In short, Kyrgyzstan’s unreformed pension system implies future liabilities that are huge even by the standards of “elderly” advanced European nations. Low wages, low formal sector labor force participation, low compliance rates, and a high share of the population eligible for benefits drive this unsustainability. The high eligibility share in turn reflects high disability rates and early retirement, especially for women.

APPENDIX 3:

RUSSIA’S CRISIS AND BOOMS, MIGRATION, AND SOCIAL FUND DEFICITS.

For most countries, migration assumptions are relatively unimportant in assessing PAYGO system sustainability. This is not true for former Soviet states, however. Many formerly Soviet citizens have the option of receiving pensions from one of two countries – their country of current residence (and, generally, citizenship), and either the country of their ethnicity, or the Republic where they spent most of their working lives. While rules are fluid and not identical from one pair of Republics to another, the relevant point is that many Kyrgyzstani residents at retirement age can receive pensions in Russia and elsewhere for their work during the Soviet era.

Indeed, during the tumultuous period following the break-up of the Soviet Union, migration flows to and (mostly) from Kyrgyzstan were very large – for example, Kyrgyzstan experienced a net population loss of nearly 2% due to emigration in 1992. With relative stabilization in 1996 and 1997 in Kyrgyzstan and other CIS states, migration flows diminished considerably, and net losses were reduced to below 0.3%. Clearly, migration is driven both by relative employment opportunities in other CIS states and by relative pension levels. Focusing on elderly migration, one finds relatively low net emigration in the early Independence years, but a rate three times greater than for other age groups by 1996.

Assuming that migration flows reflect differential rates of economic recovery in Kyrgyzstan and major CIS states, will it matter greatly for Social Fund balances? Ideally, we would like to know {age, gender}-specific migration elasticities with respect to wages and pension conditions. As we do not have this information, a crude approach is to replicate conditions from the early 1990s, which, while bad throughout the former Soviet Union, were especially disastrous in Kyrgyzstan. Our *EMIGRATION* scenario (not reported, but available upon request) repeats the early post-Soviet migration pattern, starting again in 1999, and otherwise contains *BASELINE* assumptions. This, in effect, represents the effect of yet another (relative) domestic crisis or, more optimistically, a Russian boom, as at present. It can be contrasted with an *IMMIGRATION* simulation, with an inflow of population into Kyrgyzstan based on the same group-specific net immigration rates as in the early 1990s (but with opposite sign), starting again in 1999. This scenario gives a crude evaluation of an event like the 1998 Russian crisis.

The impacts of relative recovery or disaster are not vast. Initially, the migration effect of a Russian boom or on Pension Fund balances is positive: pensioners leaving have a greater impact than contribution losses. The peak effect is in 2010, when the Solidarity system deficit declines by about 10%. But these gains are eventually reversed as pensioners die, while workers' lost contributions continue. Conversely, a relative crisis elsewhere creates new pension obligations, but the effect of greater contributions virtually cancels the added costs. This exercise is highly artificial, as it considers only changes in migration patterns. That is, it abstracts from changes in wages, output, labor force participation, and collection rates – and without such changes, migration would not occur. These simulations simply indicate that migration does have a modest but significant impact on SF balances, and hence that migration responsiveness should be incorporated into pension system simulations.