

ANALYSIS OF CENTRAL BANK DESIGN SCENARIOS

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1. INTRODUCTION

The purpose of this report is to analyze two specific pension reform scenarios suggested by the Central Bank, as modified based on discussions with me. This report is part of a series of reports prepared for the government of Armenia in support of its efforts to reform its current national pension system.

In June 2005, I visited Armenia and prepared a report with a full analysis of the benefits and finances of the current pension system. In this report, I argued that the current pension system fails to meet any of the internationally-accepted criteria for an effective pension system and needed to be reformed.

At the request of the government, in August 2005, I visited Armenia again to analyze possible alternative pension system designs that were consistent with the current pension law and the government's published pension reform concept paper. During this visit, I met with many government policymakers and was given a free hand to suggest the reform options that I thought were appropriate.

I focused on two strategies that were representative of the types of reforms that I thought should be considered. In both cases, I retained and built around the existing structure of the current pension system, as I felt it could be used as a foundation for a reformed pension system that would meet Armenia's needs.

- The first suggested reform strategy focused on significantly improving the overall design and structure of the solidarity system, including introduction of notional accounts. It did not specifically introduce a multi-pillar pension system, but did pave the way for an eventual introduction of a mandatory accumulation system.
- The second strategy quickly introduced a mandatory accumulation system, but retained the solidarity system as a significant component of the overall pension system.

Both strategies focused on bringing the overall replacement ratio to 40%, the minimum level required by the ILO. The issue of how to further increase the target replacement ratio was not addressed.

During a meeting with the Central Bank in August 2005, I became aware that the Central Bank and some other institutions in the government had a bolder vision of the needed reforms to the Armenian pension system. They wanted to increase the overall level of pension benefits more quickly than under the two scenarios I had suggested and they wanted to give a much more prominent role to the mandatory accumulation system. They proposed two scenarios that were revised based on discussions with me. Both create a large mandatory accumulation system that provides the majority of the future retirement benefits. The first scenario retains the solidarity system as a pension insurance system, while the second converts it from an insurance system to a social welfare system.

As pointed out in my previous reports, the current solidarity system gives almost the same benefits to everyone regardless of pay and years of contributions. As a result, it is more like a social welfare program than a social insurance program. In order for social insurance to function effectively, benefits must be related to contributions made. Those who pay more – due to higher pay or longer service – should receive higher benefits. Therefore, the government has two reasonable options. They should either reform the solidarity system so benefits and contributions are closely related or they should convert the solidarity system into a social welfare system. Both these options are illustrated by the two scenarios in this report.

- **Scenario 1: Partial transition to mandatory accumulation, keep solidarity for all.** In this scenario, the mandatory accumulation system supplements the existing solidarity system and it eventually provides the majority of the old-age retirement benefits. However, the solidarity system maintains an important role. It assures a minimum old-age pension and also finances the disability and survivor benefits. Notional accounts are introduced, but are used primarily to smooth the transition from the current system to the new system and are not an integral part of the ultimate pension system.
- **Scenario 2: Full transition to mandatory accumulation and from solidarity pensions to solidarity social welfare paid from the general budget.** The structure and size of the mandatory accumulation system is the same as in the first scenario. However, in this scenario the solidarity system is converted from a social insurance program to a social welfare program. Most employer and employee contributions to the solidarity system are quickly eliminated and the solidarity system is no longer used for financing pension benefits for future disability and survivor pensioners or for old-age pension benefits for those under age 50 on the reform effective date. Instead, old-age pensions for

this group are provided from a combination of a flat social welfare benefit payable from the State budget and benefits from the mandatory accumulation system. The solidarity system continues to pay benefits to all existing pensioners and to those workers age 50 and above on the reform effective date following retirement.

The balance of this report will provide a complete description and analysis of each scenario, including its benefits, required contributions, short and long-term finances and rationale. I have also identified possible variations that could be explored for each scenario.

In all scenarios, I have assumed the effective date of the mandatory accumulation system and the introduction of notional accounts occurs on January 1, 2008. Until that date, I have assumed that the current contribution and benefit formulas remain in place, including the recent increase in the flat portion of the employer contribution formula from 5,000 to 7,500 dram, and the planned increases in the base and supplemental benefits in 2006 through 2008 as shown below:

- 2006: B = 4,250; V = 180
- 2007: B = 4,500; V = 210
- 2008: B = 5,000; V = 240

For this analysis, I have used my own estimates of:

- Number of contributors by age and sex
- Wage fund of contributors by age and sex
- Distribution of the total wage fund by wage groups.

This is necessary to assure consistency of these results with prior reports and analysis, and due to lack of time to obtain more accurate information prior to the due date of this report. It is important for the government of Armenia to obtain more accurate data prior to finalizing their financial projections and overall pension reform design so that the financial models can be as accurate as possible.

2. DETAILED DESCRIPTION OF THE CENTRAL BANK SCENARIOS

This section of the report describes each of the two options in more detail. It explains the differences from the current system and the rationale for each of the major design changes.

2.1. SCENARIO 1: GRADUAL TRANSITION TO MANDATORY ACCUMULATION, KEEP SOLIDARITY

Under this scenario, the solidarity system, financed through SSIF, remains a permanent part of the reformed pension system. I would characterize this scenario as a blend of the two options (solidarity + notional accounts, and solidarity + mandatory accumulation) outlined in my September 2005 paper. The primary features of this option compared with the current pension system are:

- *Effective date.* The reformed pension system is introduced on January 1, 2008. This allows time to establish the required administrative and financial infrastructure to support notional accounts and the mandatory accumulation system
- *Wage cap.* A wage cap of 250% of the national average wage is introduced for calculating contributions to the solidarity system. A separate wage cap of 10 times the national average wage is used for the mandatory accumulation system
- *Employer contributions.* The formula for calculating employer contributions after the date of reform is 7,500 dram plus 6% of wages between 20,000 AMD and the wage cap. This is the formula that would apply if the system began in 2005. Since the reformed system will not begin until 2008, these limits will all be indexed for changes in the national average wage between now and the time the system begins.

This formula is a compromise between the one in the current solidarity system and the flat 9,000 dram formula I proposed in my September 2005 report. The employer contribution formula in the current pension system for each worker is 7,500 dram + 15% of wages between 20,000 and 100,000 dram + 5% of wages in excess of 100,000 dram. This formula charges the employer too much for average and high-paid workers. In the two scenarios I proposed in my September 2005 report, I suggested a flat employer contribution of 9,000 dram per worker. However, this contribution formula is

particularly harsh for employers with many low paid workers. In an effort to find a compromise, I am proposing a formula of 7,500 dram plus 6% of wages between 20,000 AMD and the wage cap (which would be approximately 125,000 dram if introduced in 2005). This formula produces roughly the same revenue as the proposed flat 9,000 dram formula. However, it retains the structure of the current contribution formula and improves the incentives for employers to hire low-paid workers.

- *Employee contributions:* Employee contributions are increased to 15% of pay and must go into either notional accounts (on a temporary basis) or the mandatory accumulation system, as further outlined below. The purpose of the large increase in employee contributions is to significantly increase the target replacement ratio to about 65% over time.
- *Solidarity system remains permanently and target replacement ratios are increased.* The current base and supplemental benefit formulas and planned increases remain in place through 2008. In 2008, the supplemental benefit amount is increased to produce a 25% average replacement ratio for a worker with 30 years of service. In addition, benefits for all existing pensioners are recalculated using the new formula. The “B” and “V” factors in the formula will be indexed to nominal wages each year and benefits for all existing pensioners will be recalculated each year
- *Introduction of age groups and options.* Existing workers on the reform effective date are partitioned into three groups – those under 35, between 35 and 49, and 50 and older (young, middle-aged and older workers).
 - Those under 35 must put employee contributions of 15% into the mandatory accumulation system
 - Those who are 35-49 have an option. They can choose to put their 15% contribution into either notional accounts or the mandatory accumulation system for the first 10 years of the new system. After that, all contributions must go to the mandatory accumulation system
 - Those 50 and older must put their 15% contribution into notional accounts in the solidarity system.
- *Introduction of notional accounts.* They are used to finance additional pension benefits for older workers and as an option for financing of additional pension benefits for middle-aged workers during the first 10 years of the reform
- *Introduction of mandatory accumulation system.* This will be used to finance additional pension benefits for young and middle-aged workers. Older workers will not participate
- *Disability and survivor benefits are improved.* The exact mechanism for improving benefits has not yet been determined. However, benefits will be based on projected service the worker would have had at retirement rather than just service to date of disability or death. For purposes of my analysis, I have assumed benefits will increase over time to 40% of pay. Both disability and survivor benefits will continue to be paid from the solidarity system.

The tables below give more detail regarding the pension reform design under Scenario 1 and shows the required contributions to and benefits from all pillars of the reformed pension system.

Scenario 1		
	Employer	Employee
CONTRIBUTIONS TO THE REFORMED PENSION SYSTEM		
Portion to Solidarity		
Under 35	7,500 plus 6% of salary between 20,000 AMD and the salary cap. Limits indexed to nominal wages	0%
35-49	7,500 plus 6% of salary between 20,000 AMD and the salary cap. Limits indexed to nominal wages	Worker option: 15% to either notional accounts or accumulation for first 10 years , then must be in accumulation

Scenario 1		
	Employer	Employee
50+	7,500 plus 6% of salary between 20,000 AMD and the salary cap. Limits indexed to nominal wages	15% to notional accounts
Salary cap	125,000 AMD	125,000 AMD
Portion to Mandatory Accumulation System		
Under 35	Zero	15%
35-49	Zero	Worker option: 15% to either notional accounts or accumulation for first 10 years , then must be in accumulation
50+	Zero	0%
Salary Cap	Not applicable	500,000 AMD
OLD-AGE PENSION BENEFITS FROM THE REFORMED PENSION SYSTEM		
Benefit from Solidarity (Base, Supplemental and Notional Accounts)		
Under 35	Base = 5,000 and Supplemental = 350 in 2008, indexed to wages thereafter	None
35-49	Base = 5,000 and Supplemental = 350 in 2008, indexed to wages thereafter	Notional account balance (if any) divided by life expectancy factor
50+	Base = 5,000 and Supplemental = 350 in 2008, indexed to wages thereafter	Notional account balance divided by life expectancy factor
Target replacement ratio	25% from base and supplemental	40% with 30 years of participation
Pension indexing	Wage	Wage
Benefit from Mandatory Accumulation System		
Under 35	None	Accumulated account balance used to buy annuity or for periodic withdrawals
35-49	None	Accumulated account balance used to buy annuity or for periodic withdrawals
50+	None	None
Target replacement ratio	Not applicable	40% with 30 years of contributions
Pension indexing	Not applicable	Inflation

2.2. SCENARIO 2: FULL TRANSITION TO MANDATORY ACCUMULATION SYSTEM AND FROM SOLIDARITY PENSIONS TO SOLIDARITY SOCIAL WELFARE PAID FROM THE GENERAL BUDGET

The second Central Bank scenario is significantly different than Scenario 1 or either of the two options from my September 2005 report because it moves a substantial portion of the solidarity system financing to the budget immediately, and eventually completely phases out SSIF financing of all pension benefits. It also provides the majority of benefits for younger workers and new labor force entrants from a mandatory accumulation system. The primary features of this option are:

- *Effective date.* The reformed pension system is introduced on January 1, 2008. This allows time to establish the required administrative and financial infrastructure to support notional accounts and the mandatory accumulation system

- *Wage cap.* A wage cap of 250% of the national average wage is introduced for calculating contributions to the solidarity system. A separate wage cap of 10 times the national average wage is used for the mandatory accumulation system
- *Eventual elimination of pension benefits from solidarity system.* Instead of receiving a benefit from the solidarity system, a social welfare pension equal to 25% of the national average wage will be paid directly from the State budget for those under 50 on the date of reform, and for all future disability and survivor pensions
- *Solidarity system benefits frozen on date of reform.* Employees will not earn any additional benefits under the solidarity system benefit formula after the reform effective date. Responsibility for paying benefits already earned will be transferred to the State budget
- *Introduction of age groups and options.* Existing workers are partitioned into three groups – those under 35, between 35 and 49, and 50 and older (young, middle-aged and older workers). Employer and employee contribution and sources of benefit vary by age group as described below.
- *Employer contributions by age group*
 - *50 and over.* Same as Scenario 1
 - *Under 50.* 5,000 dram per employee, indexed to nominal wages. Funds benefits for existing pensioners on the date of the reform. This contribution will eventually be eliminated
- *Employee contributions by age group*
 - *50 and over.* To notional accounts in solidarity system
 - *Under 50.* To mandatory accumulation system
- *Benefits from solidarity system by age group*
 - *50 and over.* Same as Scenario 1
 - *35-49.* None
 - *Under 35.* None
- *Benefits from mandatory accumulation system by age group*
 - *50 and over.* None
 - *Under 50.* Based on account balance in mandatory accumulation system account at retirement
- *Benefits from State budget*
 - *50 and over.* None
 - *Under 50.* Social welfare pension of 25% of the national average wage paid from the State budget. If accrued benefit in the solidarity system on date of reform is greater, that benefit will be paid from the State budget instead. This is likely for very low paid workers only
- *Disability and survivor benefits.* These benefits will be based on the same formula as old-age benefits. Benefits will be a combination of social welfare pensions and benefits from the mandatory accumulation system. The exact method of calculating pensions requires further discussion. Existing disability and survivor pensioners on the reform effective date will be financed from the solidarity system. New disability and survivor pensions after the reform effective date will be paid from the state budget.

This option is similar but not identical to the Kazakh reform. In my opinion, Armenia's proposal is superior. In Kazakhstan, the entire solidarity system was shut down on the effective date of the reform, and all its liabilities were immediately moved to the State budget. All future benefits for all workers came from the mandatory accumulation system. The government of Kazakhstan guaranteed a minimum benefit paid by the budget to all workers who contributed more than 75% of the time between the effective date of the reform and date of retirement. The minimum benefit guarantee is an unfunded contingent liability of the State budget.

The proposed Scenario 2 in Armenia is superior because the social welfare benefit is paid for everyone from the budget. This liability can be accurately calculated and included as a line item in the budget each year.

This will allow for much better financial management of the pension/social welfare system than is possible under the Kazakh approach.

	Scenario 2		
	Employer	Employee	State Budget
CONTRIBUTIONS TO THE REFORMED PENSION SYSTEM			
Portion to Solidarity			
Under 35	5,000 dram, indexed to increase in nominal wages	0%	Contributions are equal to benefits payable at retirement (see benefits section below)
35-49	5,000 dram, indexed to increase in nominal wages	0%	Contributions are equal to benefits payable at retirement (see benefits section below)
50+	7,500 plus 6% of salary between 20,000 AMD and the salary cap. All limits indexed to nominal wages	15% to notional accounts	None
Salary cap	125,000 AMD	125,000 AMD	Not applicable
Portion to Mandatory Accumulation System			
Under 35	0%	15%	None
35-49	0%	15%	None
50+	0%	0%	None
Salary Cap	Not applicable	500,000 AMD	Not applicable
OLD-AGE PENSION BENEFITS FROM THE REFORMED PENSION SYSTEM			
Benefit from Solidarity (Base, Supplemental and Notional Accounts)			
Under 35	None	None	25% of national average wage at retirement. No service requirement
35-49	None	None	25% of national average wage at retirement. No service requirement
50+	Base = 5000 and Supplemental = 350 in 2008, indexed to wages thereafter	Notional account balance divided by life expectancy factor	None
Target replacement ratio	25% for 30 years of service	40% for 30 years of contributions	25% regardless of years of service
Pension indexing	Wage	Wage	Wage
Benefit from Mandatory Accumulation System			
Under 35	None	Accumulated account balance used to buy annuity or for periodic withdrawals	None
35-49	None	Accumulated account balance used to buy annuity or for periodic withdrawals	None
50+	None	None	None

	Scenario 2		
	Employer	Employee	State Budget
Target replacement ratio	Not applicable	40% for 30 years of contributions	None
Pension indexing	Not applicable	Inflation	Not applicable

3. PROJECTED BENEFITS AND FINANCIAL ANALYSIS

This section of the report shows projected replacement ratios, contribution rates, short and long-term financial projections, internal rates of return and projected mandatory accumulation system assets for each of the two scenarios. Also shown are revised financial projections for the current pension system, reflecting the change in the contribution rate formula.

3.1. CURRENT PENSION SYSTEM

The change in contribution formula significantly improved the long-term financial prognosis for the current pension system. However, all workers now pay even higher contributions in order to receive the same benefits. My June 2005 analysis showed that participants were earning a negative real rate of return on their contributions to the solidarity system. This real rate of return is now even worse and provides even more incentives for evasion than before.

Table 1 shows the contribution rate by wage level to the current pension system after the change in the benefit formula. The contribution percent varies significantly by wage level.

Table 1. Employer and Employee Contributions

Percent of Average Wage	Wage	Contributions			Percent of Salary
		Employer	Employee	Total	
50%	24,500	8,175	735	8,910	36.4%
100%	49,000	11,850	1,470	13,320	27.2%
150%	73,500	15,525	2,205	17,730	24.1%
200%	98,000	19,200	2,940	22,140	22.6%
250%	122,500	20,625	3,675	24,300	19.8%

Tables 2a and 2b show that the long-term prognosis for the current pension system has improved. This assumes that evasion and understatement of earnings does not increase as a result of the change in the benefit formula. The pension system is now solvent until 2048.

Table 2a: Short-Term Financial Projections

	2005	2006	2007	2008	2009	2010
Total Revenue	62.6	84.5	96.4	110.0	124.8	141.1
Total Expenditures	65.3	71.8	78.0	84.7	92.1	100.5
Surplus/Deficit	(2.7)	12.7	18.5	25.3	32.7	40.6
Total Revenue as a % of GDP	3.1%	3.8%	3.9%	4.1%	4.3%	4.5%
Total Expenditures as a % of GDP	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Surplus/Deficit as % of GDP	(.1%)	.6%	.8%	.9%	1.1%	1.3%

Table 2b: Long-Term Financial Projections

	2010	2020	2030	2040	2050	2060
Total Revenue as a % of GDP	4.5%	5.7%	5.6%	5.3%	4.5%	4.1%
Total Expenditures as a % of GDP	3.2%	4.0%	5.2%	5.5%	6.4%	6.9%
Surplus/Deficit as % of GDP	1.3%	1.7%	0.3%	(.2%)	(1.9%)	(2.8%)

Table 3 shows that the real rate of return for participants in the pension system has now become worse at all wage levels.

Table 3. Real Rate of Return on Contributions by Salary

Percent of	Prior Contribution	Current Contribution
Average Wage	Formula	Formula
50%	1.90%	0.61%
100%	-0.16%	-0.97%
150%	-1.48%	-2.07%
200%	-2.46%	-2.93%
250%	-2.87%	-3.28%

3.2. SCENARIO 1

Table 1 shows how the pension benefit and total replacement rate under the proposed pension system varies with years of service at retirement for someone retiring in 2008 and earning the average wage. The proposed solidarity benefit formula in 2008 is used for these calculations, with $B = 5,000$ and $V = 350$, and an assumed national average wage of 67,500 dram. The benefit from the accumulation or notional accounts assumes the notional account and accumulation systems had been in effect throughout the workers entire career and that the pension benefit from the accumulation system or notional account system would have been the same. Note that the target replacement ratio with 30 years of service is 62.1%.

Table 1. Benefits and Replacement Ratios by Years of Service

Years of Service	Base Plus Supplement	Accumulation		Replacement Ratio
		and/or notional	Total	
0	5,000	-	5,000	7.4%
5	5,350	4,226	9,576	14.2%
10	6,400	8,451	14,851	22.0%
15	8,150	12,677	20,827	30.9%
20	10,600	16,909	27,509	40.8%
25	13,750	21,134	34,884	51.7%
30	16,550	25,360	41,910	62.1%
35	19,700	29,585	49,285	73.0%
40	23,200	33,811	57,011	84.5%

Table 2 shows how the pension benefits and total replacement rate under the proposed pension system vary with wage level for someone retiring in 2008 with 30 years of service. The proposed solidarity benefit formula in 2008 is used for these calculations. The benefit from the accumulation or notional accounts assumes the notional account and accumulation systems had been in effect throughout the workers entire career and that the pension benefit from the accumulation system or notional account system would have been the same.

Table 2 Benefits and Replacement Ratios by Wage Level

Percent of Average Salary	Base Plus Supplement	Accumulation		Replacement Ratio
		and/or notional	Total	
50%	16,550	12,680	9,230	86.6%
100%	16,550	25,360	1,910	62.1%
150%	16,550	38,040	4,590	53.9%
200%	16,550	50,720	7,270	49.8%
250%	16,550	63,399	9,949	47.4%

Table 3 shows how pension benefits and replacement ratios grow as the new accumulation and notional account systems mature. In all cases, the worker is assumed to have 30 years of service at retirement. Someone retiring with 30 years of service but no contributions to notional accounts or an accumulation system would receive only the base and supplemental benefits and nothing else, so the total replacement ratio is only 24.5%. On the other hand, someone retiring after making contributions to either notional accounts or the accumulation system for 30 years would receive a total replacement ratio of 62.1%. As in all the other scenarios I have analyzed, it takes 30 years before the system fully matures and the full target replacement ratio is achieved. However, due to the high employee contribution rate to the reformed system, the ILO minimum replacement ratio target of 40% is now achieved less than 15 years after the start of the reform.

Table 3. Benefits and Replacement Ratios as System Matures

30 Years of Total Service at Retirement

Years in Accum/NDC	Base Plus Supplement	Accumulation		Replacement Ratio
		and/or NDC	Total	
0	16,550	-	16,550	24.5%
5	16,550	4,226	20,776	30.8%
10	16,550	8,451	25,001	37.0%
15	16,550	12,677	29,227	43.3%
20	16,550	16,909	33,459	49.6%
25	16,550	21,134	37,684	55.8%
30	16,550	25,360	41,910	62.1%

Table 4 shows the total contributions made to both the solidarity and accumulation systems. These calculations are based on the employer and employee contribution formulas that are assumed to be in effect in 2008 when the reform begins. The various limits in the employer contribution formula are indexed for assumed changes in the national average wage between 2005 and 2008. Employer contributions are much higher as a percentage of salary for the low paid than the high paid. Employee contributions are 15% of wages everyone.

Table 4. Employer and Employee Contributions

Percent of Average Wage	Contributions			Percent of Salary
	Employer	Employee	Total	
50%	10,704	5,063	15,766	46.7%
100%	12,729	10,125	22,854	33.9%
150%	14,754	15,188	29,941	29.6%
200%	16,779	20,250	37,029	27.4%
250%	18,804	25,313	44,116	26.1%

Tables 5a and 5b show the financial results for the solidarity system only, assuming 50% of those 35 to 49 elect notional accounts. It reflects only the portion of total contributions that goes to the solidarity system to finance base, supplemental and notional account benefits, and the benefit payments made from the solidarity system. Appendix 2 contains a detailed explanation of how the contribution rates and new pensioner replacement rates for the solidarity system were calculated. As can be seen, the short-term outlook is favorable, but the longer-term prognosis is worse.

Table 5a: Short-Term Financial Projections

Assumes 50% of Those 35-49 Elect Accumulation System

	2005	2006	2007	2008	2009	2010
Total Revenue	62.6	84.5	96.4	102.7	114.7	127.6
Total Expenditures	65.3	71.8	78.0	96.8	105.5	115.9
Surplus/Deficit	(2.7)	12.7	18.5	5.9	9.1	11.6

	2005	2006	2007	2008	2009	2010
Total Revenue as a % of GDP	3.1%	3.8%	3.9%	3.8%	3.9%	4.0%
Total Expenditures as a % of GDP	3.2%	3.2%	3.2%	3.6%	3.6%	3.7%
Surplus/Deficit as % of GDP	(.1%)	.6%	.8%	.2%	.3%	.4%

Table 5b: Long-Term Financial Projections

Assumes 50% of Those 35-49 Elect Accumulation System

	2010	2020	2030	2040	2050	2060
Total Revenue as a % of GDP	4.0%	3.8%	3.6%	3.5%	3.2%	2.9%
Total Expenditures as a % of GDP	3.7%	5.8%	8.2%	8.5%	9.2%	9.6%
Surplus/Deficit as % of GDP	.4%	(2.0%)	(4.7%)	(5.0%)	(6.0%)	(6.7%)

Tables 5c through 5f show the impact on the short and long-term outlook if 75% or 25% of those ages 30 to 49 elect the mandatory accumulation system. If 75% choose the accumulation system, for example, then less money will be contributed to the solidarity system in the short-run and less benefits will ultimately be paid out. This makes the short-term prognosis worse than the 50% scenario but makes the long-term prognosis somewhat better. The opposite is true for the 25% scenario.

Table 5c: Short-Term Financial Projections

Assumes 75% of Those 35-49 Elect Accumulation System

	2005	2006	2007	2008	2009	2010
Total Revenue	62.6	84.5	96.4	97.4	108.6	120.7
Total Expenditures	65.3	71.8	78.0	96.6	105.3	115.6
Surplus/Deficit	(2.7)	12.7	18.5	0.8	3.3	5.1
Total Revenue as a % of GDP	3.1%	3.8%	3.9%	3.6%	3.7%	3.8%
Total Expenditures as a % of GDP	3.2%	3.2%	3.2%	3.6%	3.6%	3.7%
Surplus/Deficit as % of GDP	(.1%)	.6%	.8%	0.0%	0.1%	0.1%

Table 5d: Long-Term Financial Projections

Assumes 75% of Those 35-49 Elect Accumulation System

	2010	2020	2030	2040	2050	2060
Total Revenue as a % of GDP	3.8%	3.8%	3.6%	3.5%	3.2%	2.9%
Total Expenditures as a % of GDP	3.7%	5.8%	7.9%	8.1%	9.0%	9.6%
Surplus/Deficit as % of GDP	0.1%	(2.0%)	(4.3%)	(4.6%)	(5.8%)	(6.7%)

Table 5e: Short-Term Financial Projections

Assumes 25% of Those 35-49 Elect Accumulation System

	2005	2006	2007	2008	2009	2010
Total Revenue	62.6	84.5	96.4	108.0	120.7	134.5
Total Expenditures	65.3	71.8	78.0	97.0	105.8	116.3
Surplus/Deficit	(2.7)	12.7	18.5	11.0	14.9	18.2
Total Revenue as a % of GDP	3.1%	3.8%	3.9%	4.0%	4.1%	4.3%
Total Expenditures as a % of GDP	3.2%	3.2%	3.2%	3.6%	3.6%	3.7%
Surplus/Deficit as % of GDP	(.1%)	.6%	.8%	0.4%	0.5%	0.6%

*Table 5f: Long-Term Financial Projections**Assumes 25% of Those 35-49 Elect Accumulation System*

	2010	2020	2030	2040	2050	2060
Total Revenue as a % of GDP	4.3%	3.8%	3.6%	3.5%	3.2%	2.9%
Total Expenditures as a % of GDP	3.7%	5.8%	8.6%	8.9%	9.4%	9.7%
Surplus/Deficit as % of GDP	0.6%	(2.0%)	(5.0%)	(5.4%)	(6.2%)	(6.8%)

Table 6a shows the expected contributions and total assets in the mandatory accumulation system for the next 10 years assuming 50% of those ages 35 to 49 elect the accumulation system. This table reflects only those contributions that are made to the mandatory accumulation system. This includes all employee contributions made by those under age 35 on the date of reform and by those who were 35-49 on the date of reform and elected to have their contributions made to the mandatory accumulation system. Results will vary with the percent electing the accumulation system.

*Table 6a: Accumulation System Assets**Assumes 50% of Those 35-49 Choose the Accumulation System*

	Starting Account			Benefit		Ending Account		End of Year
	Balance	Contributions	Interest	Payments	Expenses	Balance	GDP	Assets as % of GDP
2008	-	32.38	1.13	-	2.11	31.41	2,670	1.18%
2009	31.41	37.72	3.52	0.11	2.77	69.77	2,908	2.40%
2010	69.77	43.67	6.41	0.32	3.55	115.98	3,160	3.67%
2011	115.98	50.38	9.88	0.56	4.46	171.22	3,425	5.00%
2012	171.22	57.74	14.01	1.03	5.50	236.44	3,705	6.38%
2013	236.44	65.63	18.85	1.54	6.67	312.70	3,997	7.82%
2014	312.70	74.02	24.48	2.29	7.99	400.92	4,302	9.32%
2015	400.92	82.93	30.97	3.00	9.46	502.36	4,619	10.87%
2016	502.36	92.54	38.40	4.01	11.11	618.19	4,948	12.49%
2017	618.19	102.43	46.86	4.65	12.93	749.89	5,288	14.18%

Table 6b compares the total amount of assets in the mandatory accumulation system as a percent of GDP assuming 25%, 50% or 75% of workers ages 30 to 49 choose the accumulation system. Obviously, higher contribution rates result in greater assets.

*Table 6b: Accumulation System Assets as Percent of GDP**Based on Percent of Those 35-49 Choose the Accumulation System*

Year	End of Year Assets as % of GDP		
	25%	50%	75%
2008	1.00%	1.18%	1.35%
2009	2.05%	2.40%	2.75%
2010	3.14%	3.67%	4.20%
2011	4.30%	5.00%	5.70%
2012	5.51%	6.38%	7.25%
2013	6.78%	7.82%	8.87%
2014	8.10%	9.32%	10.54%
2015	9.48%	10.87%	12.27%
2016	10.93%	12.49%	14.06%
2017	12.44%	14.18%	15.93%

Table 7 shows the relationship between contributions made and benefit received for a worker who contributes to the solidarity system for 30 years, retires at 63 and receives benefits until death. The table shows the theoretical “rate of return” that workers earn on the contributions they make to SSIF. For purposes of this table, the rate of return is based only on the employer contributions that finance the base and supplemental benefits. Notional account benefits are not taken into account. Otherwise, a separate calculation would be needed for each age group at the time of reform, since each has a different number of years remaining until retirement. The steps in the calculation are:

- Project contributions a worker would make each year during his or her working career to finance the base and supplemental old-age benefits
- Calculate the expected base and supplemental benefit payments at retirement
- Calculate the expected benefit to be paid in each future year taking into account indexing and the probability that the pensioner is still alive.
- Calculate the internal rate of return that makes the present value of the contributions in and benefit payments out equal to zero.

This gives a measure of the system’s “fairness.” As can be seen in the table below, only those with high salaries have a negative real rate of return on their contributions to the solidarity system under Scenario 1. These rates of return are far superior to the current plan because the required contributions are much lower and the benefits are higher.

Table 7

Real Rate of Return on Contributions by Salary

Percent of Average Wage	Rate of Return
50%	2.03%
100%	1.34%
150%	0.75%
200%	0.29%
250%	-0.17%

Possible design alternatives include:

- Keeping the 9,000 flat employer contribution formula
- For those 35-49, transitioning from notional accounts to an accumulation system over time according to a fixed schedule with no choices
- For those 35-49, those electing notional accounts would remain in notional accounts until retirement instead of only for the first 10 years
- Introducing incentives to either remain in the current plan or switch to the accumulation system, depending on government policy objectives
- Having a lower or higher target replacement ratio
- Using a different formula calculating contributions to notional accounts or the mandatory accumulation system.

3.3. SCENARIO 2

Table 1 shows how the pension benefits and total replacement rate under the proposed pension system vary with years of service at retirement for someone retiring in 2008 and earning the average wage. The benefit payable from the budget is equal to 25% of the national average wage. The benefit from the accumulation system assumes it had been in effect throughout the workers entire career. Note that the social benefit for someone with 30 years of service exceeds the benefit that would be paid from the solidarity system under Scenario 1 for someone earning the average wage.

Table 1. Benefits and Replacement Ratios by Years of Service

Years of Service	Social Benefit			Replacement Ratio
	from Budget	Accumulation	Total	
0	16,875	-	16,875	25.0%
5	16,875	4,226	21,101	31.3%
10	16,875	8,451	25,326	37.5%
15	16,875	12,677	29,552	43.8%
20	16,875	16,909	33,784	50.1%
25	16,875	21,134	38,009	56.3%
30	16,875	25,360	42,235	62.6%
35	16,875	29,585	46,460	68.8%
40	16,875	33,811	50,686	75.1%

Table 2 shows how the pension benefits and total replacement rate under the proposed pension system vary with wage level for someone retiring in 2008 with 30 years of service. The benefit from the accumulation system assumes it has been in effect throughout the workers entire career.

Table 2. Benefits and Replacement Ratios by Wage Level

Percent of Average Salary	Social Benefit			Replacement Ratio
	from Budget	Accumulation	Total	
50%	16,875	12,680	29,555	87.6%
100%	16,875	25,360	42,235	62.6%
150%	16,875	38,040	54,915	54.2%
200%	16,875	50,720	67,595	50.1%
250%	16,875	63,399	80,274	47.6%

Table 3 shows how pension benefits and replacement ratios grow as the new accumulation system matures. In all cases, the worker is assumed to have 30 years of service at retirement. Someone retiring with 30 years of service but no contributions to the accumulation system would receive only the social benefit from the budget and nothing else, so the total replacement ratio is 25%. On the other hand, someone retiring after making contributions to the accumulation system for 30 years would receive a total replacement ratio of 62.6%. As in all the other scenarios I have analyzed, it takes 30 years before the system fully matures and the target replacement ratio is achieved. However, the ILO target of 40% is achieved after less than 15 years.

*Table 3. Benefits and Replacement Ratios as System Matures**30 Years of Total Service at Retirement*

Years in Accumulation	Social Benefit			Replacement Ratio
	from Budget	Accumulation	Total	
0	16,875	-	16,875	25.0%
5	16,875	4,226	21,101	31.3%
10	16,875	8,451	25,326	37.5%
15	16,875	12,677	29,552	43.8%
20	16,875	16,909	33,784	50.1%
25	16,875	21,134	38,009	56.3%
30	16,875	25,360	42,235	62.6%

Tables 4a and 4b show the contribution to the solidarity system and accumulation systems combined for workers at different wage levels and in different age cohorts. Table 4a shows the contribution rate for workers 50 and over on the reform effective date and Table 4b shows the same numbers for those under 50. These calculations are based on the employer and employee contribution formulas that are assumed to be in effect

in 2008 when the reform begins. The various limits in the employer contribution formula are indexed for assumed changes in the national average wage between 2005 and 2008. Employee contributions are 15% of wages. Results differ by age group because the employer contribution formula differs by age group.

Table 4a. Employer and Employee Contributions

Participant Age 50+ on the Reform Effective Date

Percent of Average Wage	Contributions			Percent of Salary
	Employer	Employee	Total	
50%	10,704	5,063	15,766	46.7%
100%	12,729	10,125	22,854	33.9%
150%	14,754	15,188	29,941	29.6%
200%	16,779	20,250	37,029	27.4%
250%	18,804	25,313	44,116	26.1%

Table 4b. Employer Contributions as a Percent of Pay

Participant Under Age 50 on the Reform Effective Date

Percent of Average Wage	Contributions			Percent of Salary
	Employer	Employee	Total	
50%	6,888	5,063	11,950	35.4%
100%	6,888	10,125	17,013	25.2%
150%	6,888	15,188	22,075	21.8%
200%	6,888	20,250	27,138	20.1%
250%	6,888	25,313	32,200	19.1%

Tables 5a and 5b show the financial results for the solidarity system. It reflects only the portion of total contributions that goes to the solidarity system to finance base, supplemental and notional account benefits, and the benefit payments made from the solidarity system. The short-term deficits are caused by a sharp reduction in contribution rates in 2008, and the need to continue paying benefits to existing pensioners. Appendix 2 contains a detailed explanation of how the contribution rates and new pensioner replacement rates for the solidarity system were calculated. As can be seen, the short-term outlook is unfavorable, but the long-term outlook is better than for Scenario 1. In this scenario, once everyone 50 and over on the reform effective date has retired, future pensioners get no benefits from the solidarity system, and total benefit payments begin to decline sharply.

Table 5a: Short-Term Financial Projections

	2005	2006	2007	2008	2009	2010
Total Revenue	62.6	84.5	96.4	64.6	69.8	76.6
Total Expenditures	65.3	71.8	78.0	94.7	102.1	111.3
Surplus/Deficit	(2.7)	12.7	18.5	(30.1)	(32.2)	(34.7)
Total Revenue as a % of GDP	3.1%	3.8%	3.9%	2.4%	2.4%	2.4%
Total Expenditures as a % of GDP	3.2%	3.2%	3.2%	3.5%	3.5%	3.5%
Surplus/Deficit as % of GDP	(.1%)	.6%	.8%	(1.1%)	(1.1%)	(1.1%)

Table 5b: Long-Term Financial Projections

	2010	2020	2030	2040	2050	2060
Total Revenue as a % of GDP	2.4%	2.3%	1.9%	1.9%	2.0%	2.2%
Total Expenditures as a % of GDP	3.5%	5.5%	3.6%	1.6%	0.5%	0.3%
Surplus/Deficit as % of GDP	(1.1%)	(3.2%)	(1.7%)	0.3%	1.5%	1.9%

Table 6 shows the expected contributions and total assets in the mandatory accumulation system for the next 10 years. This table reflects only those contributions that are made to the mandatory accumulation system. This includes all employee contributions made by those under age 50 on the date of reform

Table 6: Accumulation System Assets

	Starting			Benefit		Ending		End of Year
	Account	Contributions	Interest	Payments	Expenses	Account	GDP	Assets as % of GDP
2008	-	42.18	1.48	-	2.75	40.91	2,670	1.53%
2009	40.91	48.54	4.56	0.11	3.57	90.32	2,908	3.11%
2010	90.32	55.56	8.27	0.32	4.53	149.30	3,160	4.73%
2011	149.30	63.41	12.67	0.56	5.64	219.17	3,425	6.40%
2012	219.17	71.98	17.86	1.03	6.91	301.07	3,705	8.13%
2013	301.07	81.11	23.91	1.54	8.34	396.22	3,997	9.91%
2014	396.22	90.79	30.91	2.29	9.93	505.71	4,302	11.76%
2015	505.71	101.03	38.94	3.00	11.71	630.97	4,619	13.66%
2016	630.97	112.00	48.09	4.01	13.69	773.37	4,948	15.63%
2017	773.37	123.15	58.45	4.65	15.86	934.46	5,288	17.67%

Table 7 shows the expected payments from the State budget for social welfare benefits as a percent of GDP. Payments that are the responsibility of the State budget include all payments to new disabled and survivor pensioners after the date of the reform and all old-age pension payments to those who were under age 50 on the effective date of the reform.

Table 7. Benefits Payable from the State Budget

	2008	2009	2010	2020	2030	2040	2050	2060
Social welfare payments as % of GDP	0.0%	0.1%	0.1%	0.3%	3.1%	4.8%	6.6%	7.4%

The goal of any further design adjustments to Scenario 2 should be to make sure that the sum of the deficit in the solidarity system plus the costs paid directly by the State budget does not exceed 3% of GDP in the short-run and is in balance thereafter. After 15 to 20 years, pension benefit payments from the solidarity system will be quite small, and it would make sense to stop making any pension payments from the solidarity system and transfer the remaining responsibility to the State budget. The contributions that would have gone to the solidarity system should be paid to the State budget instead and should be sufficient to cover the cost of benefits payable from the budget. Possible additional design changes that might be considered include:

- Moving existing disability and survivor pension benefits to the budget
- Putting some portion of employee contributions for those 50 and over into the mandatory accumulation system to reduce the high deficits in the solidarity system that occur around 2020
- Moving the base benefit payable to existing pensioners to the budget.

4. NEXT STEPS

The four pension reform scenarios that have been analyzed in my September 2005 report and this report show the wide range of possible strategies and reform options available to the government of Armenia. At one end of the spectrum is a reformed single-pillar solidarity system with the addition of notional accounts. This option most closely follows the current law. At the other end of the spectrum is a system based mostly on individual accounts in a mandatory accumulation system supplemented by a social welfare pension paid from the State budget. The other two options analyzed fall somewhere in between.

The government of Armenia must first decide where in this spectrum their reformed pension system should fall. After making that decision, it can begin to focus on the options and details of that particular type of reform.

Key questions that must be quickly answered so the government can draft its detailed proposal for pension reform by the end of November include:

- Target total replacement rate for the new system and the portion that should come from social welfare, solidarity and mandatory accumulation
- Timing for introduction of the mandatory accumulation system
- The role of notional accounts in the reformed system. Will they be temporary, permanent or not used at all?
- Whether the current base and supplemental pensions should be eliminated, be paid as part of a social insurance system or be paid as part of a social welfare system
- How disability and survivor benefits will be redesigned and financed. Since the life insurance industry in Armenia is not yet sufficiently developed, either the solidarity system or State budget would need to finance these benefits.

APPENDIX 1. PROST METHOD AND ASSUMPTIONS

Base Year: 2004. This year was selected because this is the most recent year for which data is available and because of the large number of changes made to the pension system during the past few years.

Projection period: 75 years

Macroeconomic Assumptions

	2004	2005	2006	2007	2008	2016	2020	2079
Real GDP Growth	6.0%	6.0%	6.0%	6.0%	6.0%	4.0%	3.0%	3.0%
Real Wage Growth	6.0%	14.2%	8.0%	8.0%	8.0%	5.0%	3.0%	3.0%
Inflation Rate	7.0%	2.2%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Real Interest Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%

POPULATION PROJECTIONS

Population: Starting point is de facto population from the most recent census. This was treated as the correct population for 2002, and was projected forward to 2004 using PROST and then input as the starting population in the model.

Mortality: Actual mortality by age and sex was available for 2002. However, the life years of exposure were not sufficient for the individual age/sex data to be statistically reliable. Consequently, I started with RA-2000 mortality rates from the US. I applied these rates to the Armenian population data from the 2002 census to calculate expected number of deaths in 2002. I then compared this with actual number of deaths in 2002. The RA-2000 mortality rates were then increased separately for males and females by the ratio of actual to expected deaths. I then kept these mortality rates the same for a period of 10 years and decreased the rates to 150% of the RA-2000 rates over a further period of 30 years and then kept the rates the same for the balance of the analysis period. This resulted in an increased in life expectancy of about three years at retirement age. This method assumes the “shape” of the mortality curve is similar to the shape for the US. This assumption should be further examined. [See spreadsheet “Mortality” in the PROST input file]

Fertility: I used the 2002 census and 2002 births by age of mother to calculate fertility rates. I then assumed fertility rates would slowly increase and would eventually reach the same level as in the Soviet period, about 2.1 children per mother. The distribution by age of the mother was assumed to remain the same. In reality, the average age at birth will probably increase [See spreadsheet “Fertility” in the PROST input file]

Migration: The number immigrating and emigrating by age and sex was taken from actual statistics for 2002. Lacking other information, I assumed the same number immigrated and emigrated in 2004 as in 2002. The net emigration was very small. I assumed net emigration decreased to zero over a period of 10 years. [See spreadsheet “Migration” in the PROST input file]

LABOR FORCE, NUMBER EMPLOYED AND NUMBER CONTRIBUTING

Labor Force Participation: I started with the rates from prior analysis as of October 2001. I then increased or decreased those rates by a constant percentage so that the total labor force matched government statistics [See spreadsheet “Macro Statistics” in workbook “Pension System Information and Statistics”]

Unemployment: After change the labor force participation rate to match the number economically active, I then took the unemployment rates from the October 2001 analysis and increased or decreased those by a constant percentage to match the government statistics for employed by age and sex [See spreadsheet “Macro Statistics” in workbook “Pension System Information and Statistics”]

Number of Nominal Contributors (Employed): In PROST, the number in this column should be the number theoretically employed and receiving service credit. Consequently, it is actually the number employed rather than the number contributing. The number employed is calculated for each age and sex cell using the formula, $\text{Employed} = \text{Population} * \text{Labor Force Participation} * (1 - \text{Unemployment})$.

Nominal contributors as % of population: This rate is assumed to stay constant throughout the analysis period, except it is adjusted for women to reflect the increase in retirement ages between now and 2011. The formula is, $\text{Contributors as \% of population} = \text{Labor Force Participation} * (1 - \text{Unemployment})$

Effective number of contributors: This is the number actually making contributions to the pension system. The total number came from information provided by the Social Insurance Fund (SSIF). Note that the value for many factors differs from one report to the next from SSIF. Each number had to be tested for reasonableness and believability. The starting number of contributors was estimated by taking employee contributions and dividing by 0.03 to estimate the wage fund. The wage fund was then divided by the estimated average wage to determine the approximate number of contributors.

Exemption rate: This is the percentage of those employed who are not contributing, either because they are not required to contribute by law or because of evasion. In Armenia, individual farmers are not required to contribute and receive a social pension from the budget only. There are approximately 338,500 farmers, based on information from the SSIF. The remainder of the difference between the theoretical number of contributors and actual contributors is due to evasion. I set the percentage the same for all age and sex cells. This is undoubtedly incorrect. Data from the personified database will be needed to improve the accuracy of this assumption.

REVENUE CALCULATION

Contribution From Employers and Employees (as % of wages): Based on an assumed distribution of contributors by wage groups. Since no wage distribution data is available for Armenia, data from Ukraine was used as a proxy. For each group, I calculated a contribution rate. Then I used a weighted average rate as input to the PROST model. [See spreadsheet “Pay Distribution and Contrib” in the workbook “Contribution and RR Calculations”]

Average wage: From government of Armenia statistics

Collection Rate: This is the ratio of the contributions actually collected from those who are contributing compared to the amount that should be collected. It reflects payment of contributions on less than the true salary. In many cases, employers contribute on a lower wage for each worker rather than on that worker’s actual pay. The design of the pension system encourages this behavior because the worker receives the same benefit regardless of the amount of salary on which contributions are paid. I backed into this number to balance to actual SSIF 2004 financial statements and budgeted revenue for 2005.

Other income as a percent of employer and employee contributions: This factor is calculated from the SSIF 2005 budget. It accounts for contributions from the self-employed. Agricultural workers are no longer required to contribute. [See spreadsheet “SIF P&L History” in workbook “Pension System Information and Statistics”].

NUMBER OF PENSIONERS

Number of old age, disabled and survivor pensioners: Total count is taken from a SSIF report. Number of privileged pensioners is spread over period from standard retirement age minus 5 to end of mortality table (age 100) as a level % of the population. Based on the October 2001 study, the number of female privileged pensioners is assumed to be twice the number of male privileged pensioners. The overall split between males and females is also based on the October 2001 study. The number of regular old-age pensioners spread over period from standard retirement age to 100 as a level % of the population. Disabled pensioners spread from age 18 to 100 as a level % of the population. Survivors spread in two groups as a level % of the population – the first group is from 0-17 and the second from 58 to 100. The ratio of the first survivor group to the second was taken from the October 2001 analysis. Note that the counts shown in the SSIF report are likely too high. However, the initial benefit payment amount will be correct, because it is input. The future number of pensioners will depend on the difference in count between the beginning and end of the year, so the overstatement of new pensioners should be only slightly high. [See spreadsheet “Benefit Payments 2004” in workbook “Pension System Information and Statistics”]

Old age, disabled and survivor pensioners as a % of the population: Divide the initial number by age and sex by population. For males, the percent stays the same. For females, it is adjusted between 2004 and 2011 to reflect the increase in retirement age from 60 to 63.

EXPENDITURES

Amount of pension for current pensioners: The total amount of payments to old-age, privileged, disability pensioners and survivors was taken from the 2004 financial statements of the SSIF and the budgeted payment amount for 2005. The total was split between the various groups based on the percentage split shown in the

SIF financial statements for 2004. The split between males and females is based a report from SSIF as of July 1, 2005. [See spreadsheets “Pensioner Info” in the workbook “Statistics from GOA” and “SIF P&L History” in workbook “Pension System Information and Statistics”]

Replacement Ratios: Calculated by using the assumed wage distribution from Ukraine. For each wage group, the benefit payable and replacement ratio was calculated assuming 35 years of service at retirement. Then a weighted average replacement ratio was calculated and used as input to the PROST model

Pension indexing: Every time the Base and Supplemental benefit factors are increased, benefits for existing pensioners are recalculated. In general, the increases in these factors are designed to keep the average replacement ratio constant as the average wage increases. Consequently, this is functionally equivalent to wage indexing. For 2006-2008, agreed-upon benefit increases are expected to keep the replacement ratio constant. In 2006, the benefit formula for new pensioners is expected to be changed to produce an average 25% replacement ratio. At the same time, benefits for existing pensioners will be increased by the same amount. A special indexing factor was used for 2006 to reflect this benefit improvement.

Retirement Age: The retirement age in PROST is lower than the standard retirement age for both men and women. This is because privileged pensioners retire earlier than standard old-age pensioners and because those with 35 or more years of service are permitted to retire one year early. Retirement ages are set equal to standard age less one for both men and women. The standard retirement age for women is scheduled to increase from 60 to 63 by 2011

Administrative Expenses: A load factor for administrative expenses is calculated from the 2004 SSIF financial statements. This includes expenses for the SSIF staff as well as postal expenses for delivery of pensions. Note that this factor is coded in PROST as a percentage of employer and employee contributions and not as a percent of pension payments. [See spreadsheet “SIF P&L History” in workbook “Pension System Information and Statistics”]

Other expenses: This is also a load factor and is used to account for state employment and state social insurance benefits, which are financed from SSIF revenues. It is a percent of pension payments. [See spreadsheet “SIF P&L History” in workbook “Pension System Information and Statistics”]

APPENDIX 2. CALCULATION OF CONTRIBUTION RATES AND REPLACEMENT RATIOS USED IN THE PROST MODEL FOR NEW PENSIONERS IN THE SOLIDARITY SYSTEM UNDER SCENARIOS 1 AND 2

SCENARIO 1: CALCULATING CONTRIBUTION RATES TO THE SOLIDARITY SYSTEM

- For 2006, the formula for calculating the employer contribution is changed to 7,500 dram plus 15% between 20 and 100,000 dram, plus 5% above 100,000 dram, and remains 3% of pay for the employee. This produces an expected weighted average contribution rate of 26.27%, assuming 95.5% compliance on the salary-related portion of the employer and employee contribution
- In 2008, we assume the reform begins. The employer contribution formula is changed to 7,500 dram (indexed for change in the nominal wage between 2005 and 2008) plus 6% of pay between 50% and 250% of the national average wage. Employer contributions will be lower for everyone than under the current formula.

In 2008, the employee contribution is increased to 15%. Those 50 and older must put this into notional accounts in the solidarity system. Those under 35 must put it into the mandatory accumulation system. Those between 35 and 49 can choose between notional accounts or the mandatory accumulation system. I assumed 50% chose each

These changes taken together reduce the total contribution rate to the solidarity system to 24.52%. Over the next 10 years, as older workers retire and new workers join the system, the contribution rate to solidarity gradually declines to 22.2% by 2017. Contribution rates are lower for new workers than older workers since new workers do not contribute to notional accounts

- Starting in 2018 (10 years after the reform effective date), everyone who was between 35 and 49 on Jan 1, 2008 must put their future contributions in the mandatory accumulation system and only the employer contributes to the solidarity system. However, older workers who have not yet retired continue to make contributions to notional accounts. This reduces the contribution rate to the solidarity system to 19.81% in 2018. As those who were 50 and over on January 1, 2008 continue to retire, the rate continues to slowly decline
- By 2028, everyone who was 50 or older on Jan 1, 2008 is assumed to have left the workforce and everyone is contributing to the mandatory accumulation system. At this point in time, only employers make contributions to the solidarity system and the contribution rates declines to 18.65% and remains there.

Note that contribution rates would vary if:

- More or less than 50% of the 35-49 group elected to join the mandatory accumulation system
- The election made on Jan 1, 2008 applied forever instead of just for the first 10 years following the date of reform.

SCENARIO 1: CALCULATING REPLACEMENT RATIOS IN THE SOLIDARITY SYSTEM

These are the replacement rates that apply to those who retire in a particular year. It is not the average replacement rate for all pensioners.

- On Jan, 1, 2008 the formula for calculating the solidarity benefit is changed to produce an average replacement ratio of 25%. Those who retire during 2008 have a formula with $B = 5000$ and $V = 350$. This same formula is used to recalculate benefits for all existing pensioners. Following my prior recommendations, only the supplemental benefit is increased to get the target replacement ratio from 20% to 25%. This produces an average replacement ratio of 29.2%, assuming 35 years of service at retirement
- For the next 13 years through 2021 (assuming workers retire on average at age 63), the solidarity system replacement ratio increases. These workers were all 50 or older on Jan 1, 2008 and consequently, their 15% contribution will go to notional accounts and increase their solidarity system replacement ratios. Replacement ratios increase from 29.2% to 45.5% in 2021.

- In 2022, everyone who was 50 or older on Jan. 1, 2008 has retired, and those who were 49 on Jan 1, 2008 begin to retire. Their solidarity system replacement ratio will depend on what election they made. If they elect to go immediately to the mandatory accumulation system, then the replacement ratio will be from the Base and Supplemental benefits only. If they elect notional accounts, then they would will participate in notional accounts for 10 years and then go into the mandatory accumulation system. A weighted average must be calculated. This calculation affects replacement ratios for the next 15 years. In 2022, the average replacement ratio drops immediately to 35.4% and remains there through 2036.
- In 2037, those who were 34 on Jan 1, 2008 retire. They were always in the mandatory accumulation system and receive only the Base and Supplemental benefits from the solidarity system. The replacement ratio drops to 29.2% and remains there for the balance of the analysis period.

SCENARIO 2: CALCULATING CONTRIBUTION RATES TO THE SOLIDARITY SYSTEM

- Through 2007, contribution rates are the same as in Scenario 1
- On January 1, 2008, the reform begins and the contribution rate drops immediately to 15.31%. Employers and employees make contributions to the solidarity system for those 50 and older only. Employers contribute a flat 5,000 dram (indexed to notional wages) for those under age 50 and there are no employee contributions for those under 50.
- The contribution rate continues to drop as those 50 and over retire. By 2028, all have retired and the contribution rate is 10% thereafter, entirely from the employer's indexed 5,000 dram contribution.

SCENARIO 2: CALCULATING REPLACEMENT RATIOS IN THE SOLIDARITY SYSTEM

These are the replacement rates that apply to those who retire in a particular year. It is not the average replacement rate for all pensioners.

- The target replacement rates are the same as Scenario 1 through 2021, starting at 29.2% and increasing to 45.5%
- In 2022, those who were 35-49 on Jan 1, 2008 begin to retire. They do not receive Base and Supplemental benefits. Instead, a social welfare benefit is payable from the budget. All employee contributions go to the mandatory accumulation system. Consequently, the replacement ratio is 0% for the balance of the analysis period.

USAID Contractor
Armenia Social Transition Program
PADCO
14 Sundukyan, Yerevan, Armenia
Tel: (374 10) 27-31-75/6/9
Fax: (374 10) 27-27-43
www.padco.am