Pension Reform in Slovakia: Perspectives of the Fiscal Debt and Pension Level

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SUMMARY

The paper deals with two aspects of the pension reform in Slovakia: the balance of the pay-as-you-go pillar and the level of retirement pensions in the new two pillar system. There are three important steps of the pension reform: change of indexation, increase of the retirement age and launch of the fully funded (second) pillar. In regard to the fiscal debt, the two-pillar system is superior to the pay-as-you-go in the long run. Having considered risk of returns, we show that although pensions under the two-pillar system will likely be higher than from the one pillar system, the opposite situation is also possible.

Článok pojednáva o dvoch aspektoch dôchodkovej reformy na Slovensku: deficit priebežného piliera a výška dôchodkov v novom dvoj-pilierovom systéme. Dôchodková reforma má tri dôležité kroky: zmena indexácie dôchodkov, posunutie veku odchodu do dôchodku a zavedenie druhého (sporivého) piliera. Naše výpočty ukazujú, že z hľadiska fiskálneho deficitu je dvojpilierový systém z dlhodobého hľadiska výhodnejší, ako jednopilierový systém. Zohľadniac riziko výnosnosti aktív sme ukázali, že dôchodky v dvojpilierovom systéme budú pravdepodobne vyššie, ako v jendopilierovom systéme. Môže sa však stať aj opak – že jednopilierový systém bude poskytovať vyššie dôchodky ako dvojpilierový.

1. Introduction[1]

Present unfounded pay-as-you-go system in Slovakia covers old-age retirement, disability and survival pensions. Mainly because of high unemployment and low contributions paid on behalf of unemployed by the government, and high contribution evasions, since 1997, the system has generated deficits. The negative demographic development is another reason why the system is not sustainable.[2] Evasions are explained by insufficient property rights to the pension savings, low linkage between contributions and benefits, and increased migration of the labor force.

In April 2003 the government passed the *Principles of the Pension Reform in the Slovak Republic.* The goals of the pension reform were to secure a stable flow of high pensions to the beneficiaries, and sustainability and overall stability of the system. Corresponding legislation, as passed in December 2003, establishes a system based on three pillars:

- mandatory, non-funded 1st (pay-as-you-go) pillar
- mandatory, fully funded 2nd pillar
- voluntary, fully funded 3rd pillar

The contribution rates were set for the 1st pillar at 19.75% (old age 9%, disability and survival 6% and reserve fund 4.75%) and for the 2nd pillar 9%. The total rate is about 0.75% higher than the old one.

The new system is obligatory for those entering the labor market, and optional for existing contributors of age below 52 years[3], who therefore would loose option to return to the old system, but would keep benefits acquired in the old system (they will receive full pension for years participated in the old system, and half a pension corresponding to their participation in the new system). The retirement age was set at 62 for both sexes, and will increase by 9 months every year.[4] Compared to Poland and Hungary, the Slovak 2nd pillar is more substantial. Contribution rates are higher in Slovakia – compared to 7.3% in Poland and 6% (with possible future increase to 8%) in Hungary.[5]

Transitory financial gap in the 1st pillar, due to the introduction of the 2nd pillar (contributions to the 1st pillar will decrease by the amount paid to the 2nd pillar, while the participants of the old system continue receiving their pensions purely from the 1st pillar) will be covered from public resources (e.g. from privatization). In the next section we estimate total amount of necessary public coverage. In the third section we estimate level of old-age pensions in the new system.

[1] We thank Martin Barto and Juraj Kotian from Slovenská Sporiteľňa who provided us with macroeconomic forecasts for our calculations. We also thank Emil Horváth and Marek Lendacký from the Ministry of Labour, Social Affairs and Family for their valuable help. Finally we thank Pavol Brunovský for valuable comments that significantly improved the quality of this paper.

[2] See Thomay (2002) and Goliaš (2003).

[3] Given the retirement age of 62 and a condition to save at least for ten years in the 2nd pillar.

[4] The current retirement age for man is 60 and for women 54, depending on number of her children.

[5] A thorough description of the pension reforms in Hungary and Poland could be found in Palacios and Rocha (1998), Office of the Government Plenipotentiary for Social Security Reform, Warsaw (1997), Benczúr (1999), Simonovits (2000), Chlon - Góra – Rutkowski (1999) and Fultz (2002).

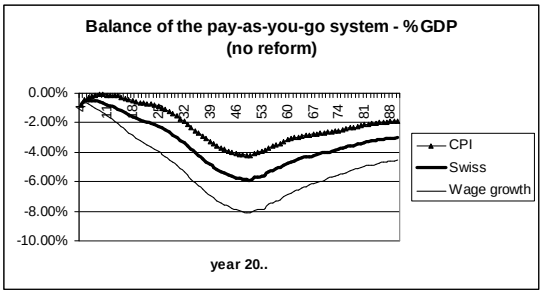
2. Balance of the pay-as-you-go pillar

Rough calculations of the balance of the first pillar (neglecting e.g. disability pensions, unemployment, actual number of old-age pensions) is provided by Thomay (2002), Ministry of Labor, Social Affairs and Family of the Slovak Republic and Patrick Wiese (mimeo). A great inspiration for our estimations was a paper by Holzmann (1997), which also dealt with the deficit caused by the launch of the second pillar. The calculations of the deficit of the Hungarian pension system could be found in Palacios – Rocha (1998).

In the following we estimate costs of the Slovak pension system under various scenarios. We base our estimations on macroeconomic forecasts by Martin Barto and Juraj Kotian (see annex Table 1). The estimated balance does not include any state contributions. We do not consider indexation by wage growth because of considerable pressure on a public finance.

The balance of the first pillar under no reform scenario (see Figure 1) depends on a method of indexation of pensions. We consider three types of the indexation: by nominal gross wage growth, by inflation, or by an average of the two (Swiss indexation). All indexation methods lead to a considerable deficit, which is lower for indexation by inflation, than for indexation by wage growth. This is because we assume positive real wage growth rate.

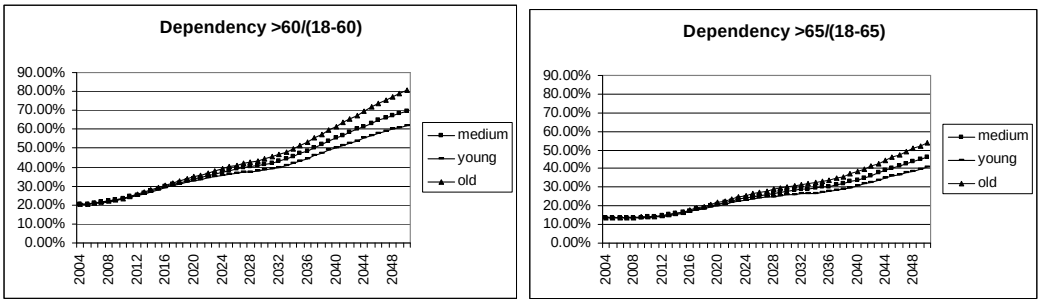
Figure 1. Balance of the pay-as-you-go system (no reform)



A primary reason of increased deficit is that the ratio of pensioners and contributors is rising, while the contribution and the replacement rates are fixed. The ratio of a number of men older than 60 to those 18-60 years old and the ratio of a number of men older than 65 to those 18-65 years old (see Panel 2) clearly indicate that the fiscal deficit could be significantly decreased by higher retirement age. In average, a difference in a deficit between system of retirement age 54-60 (women-man) and 65-65 is 2 to 3% of GDP.

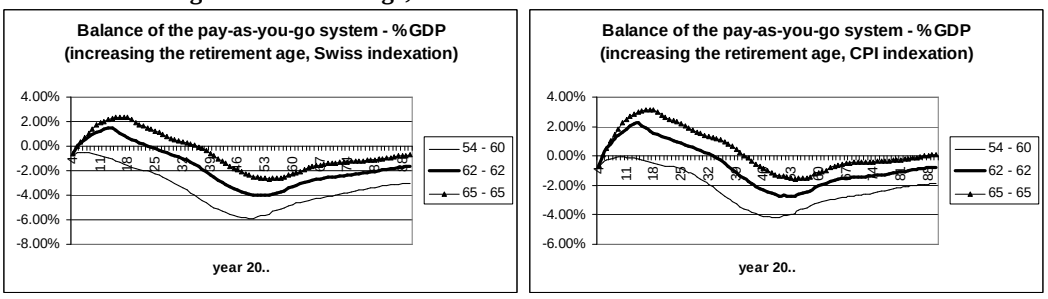
The effect of the retirement age on fiscal deficit is evaluated on two types of indexation. The deficit is higher for the Swiss indexation than for the CPI indexation (see Panel 3), because we assume positive real wage growth. Palacios – Rocha (1998) presented similar results for the Hungarian pension system.

Panel 2. Dependency for >60/18-60 and >65/18-65



Young, old and medium options of the demography evolution. Source: (INFOSTAT)

Panel 3. Increasing the retirement age, Swiss and CPI indexation



Increased retirement age, especially in the country with high unemployment, may further increase unemployment rate and fiscal cost. We have estimated increase in unemployment rate under assumption that 30 or 50% of those who would in the old system retire as 54-60 years old (women-man), become unemployed in the new system (see Table 2). Clearly, as more people remain in the work force, increase in unemployment rate becomes more likely (from 0.1% to 1.5% if 30% were unemployed, and from 0.4% to 3.4% if half were unemployed).

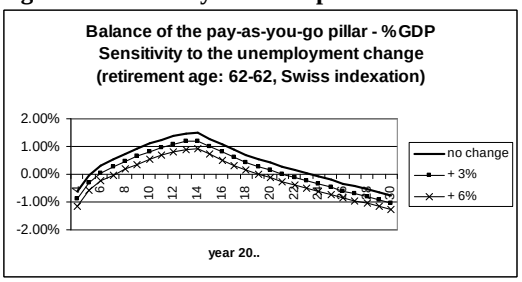
Table 2. Estimation of increase in unemployment rate

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
30%	0.14	0.29	0.43	0.56	0.68	0.82	0.96	1.10	1.24	1.37	1.47
50%	0.39	0.78	1.15	1.44	1.73	2.03	2.34	2.63	2.91	3.19	3.38

Note: under assumption that of 30 or 50% of those, who would retire in the old system, would not find job in the new system.

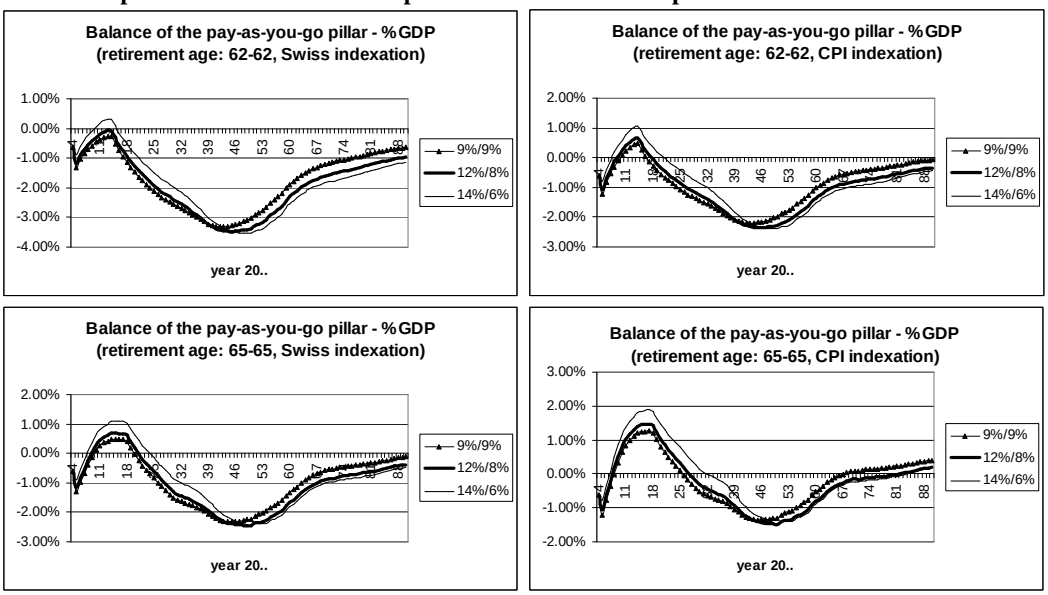
A balance of the 1st pillar seems not very sensitive to estimated changes in unemployment rates (see Figure 4): 1% increase in unemployment rate lowers the balance roughly by 0.1% of GDP.

Figure 4. Sensitivity of the 1st pillar balance to estimated increase in unemployment rate



Second pillar will first create deficit pressures, because some contributors switch their contributions from the 1st to the 2nd pillar. However, once pensions will be paid from the 2nd pillar, expenditures of 1st pillar will decrease, as those who switched will receive lower pensions from the 1st pillar (see Panel 5). It is clear that the higher the level of contributions to the 2nd pillar is, the higher is the initial deficit. However, later the deficit declines, because less pensioners collect pensions from 1st pillar only.

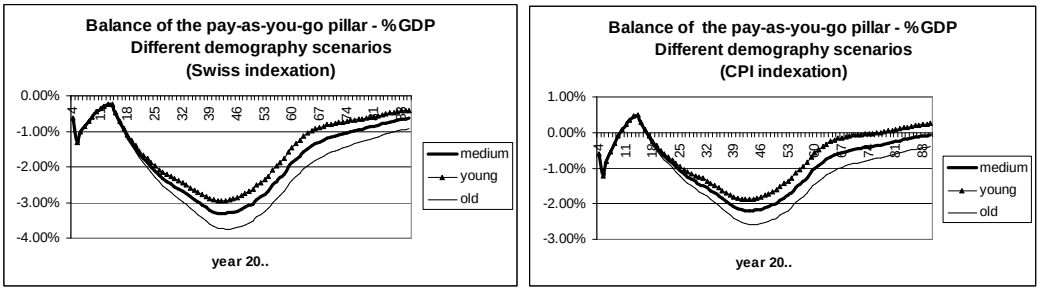
Panel 5. Impact of introduction of 2nd pillar on deficit of the 1st pillar.



Note: retirement age 62-62 or 65-65, Swiss or CPI indexation, and ratio of contributions between 1st and 2nd pillar: 12:8, 14:6 and 9:9 percents. Final version of legislation introduced ratio 9:9.

Demographic evolution and number of those who switch to the 2nd pillar are another important determinants of the 1st pillar deficit. To estimate the impact of demography, we consider contribution ratio 9/9, retirement age 62 years, Swiss or CPI indexation, and three demographic scenarios: the young, medium and old options[6]. Each option has a different dependence ratio[7]. The young option dependence ratio is the lowest (there are less pensioners and more contributors) and the deficit is the lowest, too (see Panel 6).

Panel 6. Different demographic scenarios, Swiss and CPI indexation

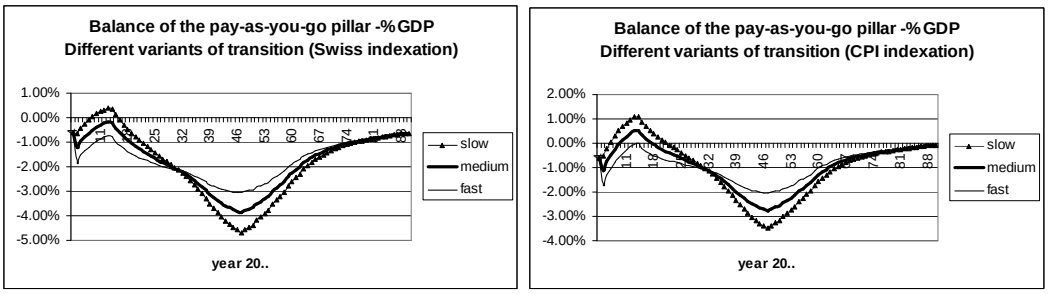


According to the law, people older than 52 will remain in the old system. It is difficult to access now how many people will switch to the new system. In general, we

[6] Source of the three options: INFOSTAT.
[7] Dependence ratio = total number of pensioners / total number of contributors.

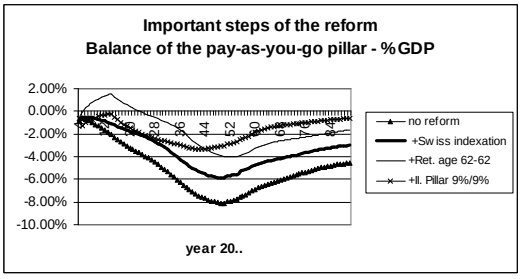
assume that young people will be more likely to switch, than the older ones. In our calculations we assume that all between 18 and 25 years will switch, then percentage of those who switch will linearly decline, and only 5% of 52 years old switch. A sensitivity of the 1st pillar deficit on the number of switchers is estimated by three scenarios of transition from old to the new system: slow (30% of all eligible switch), medium (60%) and fast (90%, see Panel 7).

Panel 7. Different scenarios of transition, Swiss and CPI indexation



The conclusion of our estimations is: balance of the old one pillar system will be significantly improved by change of indexation, increase of retirement age and introduction of the second pillar (see Figure 8). Whereas the change of indexation and increase of the retirement age have an immediate positive impact on the 1st pillar balance, introduction of the 2nd pillar will deteriorate the balance till 2044, and only then bring positive results to the balance.

Figure 8. Important steps of the pension reform



3. The level of pensions paid from the second pillar

There is an extensive literature on the level of pensions, let us mention at least Bodie (1994, 1996 and 2001) and Orszag – Stiglitz (2001). A novelty of our approach is that we consider also the risk of asset returns.

The level of pension benefits is what makes pensioners to care about. To measure it, we calculate a ratio of nominal pensions to nominal gross wages.[8] It seems obvious that retired persons strives to replace wage with pension in order to maintain his or her living standard. The reform of the current pay-as-you-go pillar[9] brings three major innovations: increase of the retirement age to 62 for men and women, new pension formula and Swiss indexation of the pensions. According to the law, the initial monthly pension from the 1st pillar is:

[8] In Slovakia, pensions are not taxed, so comparison to the net wages may seem more appropriate. However, such approach is in general not used, because of unpredictability of future tax policies.
[9] Law number 43/2004, in effect since January 2005 (some provisions since February 2004).

$$P = POMB * N * ADH$$

where *ADH* (Actual Pension Value) is set by the law at 183.58 to provide 50% replacement rate (average initial pension/average gross wage) in the first year of the reform. The law assumes automatic annual valorization of *ADH* by the nominal gross wage growth. *POMB* (Average Personal Wage Point) represents the average of the ratio of individual gross wage to average gross wage over a period of 1994 to the last year of employment. *N* stands for the number of years, in which pension contributions were paid.

We assume average gross wage in Slovakia in 2003 at Sk14,686[10]. Shall the initial pension cover 50% of the average gross wage (i.e. Sk7,343), worker would have to earn national average wage (*POMB*=1) last 40 years. Because *ADH* is indexed by the nominal gross wage growth, the 50% replacement rate should be preserved.

Participants of the two-pillar system will receive full pension for the time they participated in the old system and half a pension for the time they participated in the new system. Therefore, the worker who will participate in the two-pillar system only will achieve a 25% replacement rate. Rights acquired in the old system are recognized by different countries differently: for example in Hungary, the accrual rates of the new first pillar recognize all rights earned under the old system. These rates are the same for all switchers and therefore anyone who switched is effectively forfeiting a part of his/her acquired rights. This grants the government a certain measure of control over the speed of the transition.

Old-age pensions are annually indexed by the average of nominal wage growth and inflation (Swiss indexation). Since the real wage growth is supposed to be positive, this implies that the average of all pensions is smaller than the average initial pension. Currently, ratio of the average pension to the average gross wage is approximately 40%.[11]

The adopted pay-as-you-go pension formula is not sensitive to demographic development. This is different for example from Poland, where the corresponding formula contains average life expectancy at the time of retirement. However, we can not claim that the demography crisis will actually not affect the pension system. Although demography was removed from the formula, we have showed that it is an important factor of the balance of the 1st pillar. Ignorance of demography thus contain political risk that in future, indexation of *ADH* could be changed.

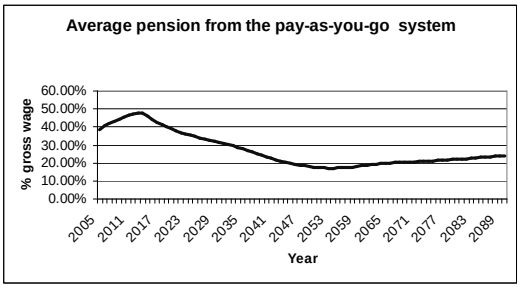
Other ways of controlling deficit is to increase the retirement age (e.g. to 65) or change indexation of pensions (e.g. to CPI indexation). The pension formula sets replacement rate at 25% from the 1st pillar, while another 25% is expected to come from the second pillar. This rates serve as benchmarks for all who are deciding about a switch: if 2nd pillar will earn more than 25% replacement, than the switch is optimal.

However, 25% replacement of the 1st pillar is unfair compared to the 2nd pillar, because the latter does not create deficits to be covered by public finance. The former,

[10] Average gross wage in the third quarter 2003 was Sk14,066. Source: Statistical Office of the Slovak Republic.
[11] Source: Ministry of Labor, Social Affairs and Family of the Slovak Republic.

based on 62-62 retirement age, will lead to deterioration of replacement rate (17% in 2054, see Figure 9) and so will have to be subsidized by public finance.

Figure 9. Average replacement rate of the 1st pillar, assuming its zero deficit.



Note: retirement age 62-62.

The law sets administrative costs of the 2nd pillar at 1% of monthly contributions and 0.07% of the monthly asset value (i.e., 0.84% p.a.). Administrative costs are similar to Poland, where usual charge on monthly contributions is about 5-9% (not regulated by law) and on monthly asset value 0.05% (0.6% p.a.).

In our estimations, we use 9% contributions to the 2nd pillar and administrative costs. Wage growth estimations are depicted in Table 1 in appendix. We assume that retired person buys an annuity for a pension indexed by the level of interest rates. Using these assumptions, the initial replacement rate (initial pension to the last gross wage) is *S/(MV)*, where *S* stands for total savings, *V* for average period of receiving pension (in years) and *M* for the last (annual) gross wage.

According to the medium option of the demographic scenario, life expectancy conditional to reaching the age of 62 was 75 for men and 85 for women in 2000. These figures are likely to increase in the next decades. In our estimations we use 15 to 25 years long period of receiving pension. We assume that saving starts in 2004 and will continue be exempted from taxes.

Finally, we assume three nominal levels of asset returns (minus administrative costs): 4%, 6% and 8%. We estimate that for 8% asset returns, the 2nd pillar achieves the level of the 1st pillar (Table 3; the level of pension from the 1st pillar is not higher than 50% divided by 2, i.e. 25%). Also, for 6% returns, 2nd pillar achieves at least equal results as the 1st pillar. To achieve 50% initial replacement rate, let us remind a person would have to work for 40 years. Thus, a university graduate would have to work at least till 65 years. Currently, this implies to receive pension in average for 15 years.

Table 3. Replacement rates from the 2nd pillar under different asset returns

	Asset returns = 4%			Asset returns = 6%			Asset returns = 8%		
	25	20	15	25	20	15	25	20	15
30	8.6	10.7	14.3	11.1	13.9	18.5	14.7	18.4	24.5
35	9.9	12.4	16.5	13.5	16.8	22.4	18.8	23.5	31.3
40	11.2	14.0	18.7	15.9	19.9	26.5	23.5	29.4	39.2
41	11.4	14.3	19.1	16.4	20.5	27.4	24.6	30.7	41.0
42	11.7	14.6	19.5	17.0	21.2	28.3	25.6	32.0	42.7
43	11.9	14.9	19.9	17.5	21.8	29.1	26.7	33.4	44.5
44	12.2	15.2	20.3	18.0	22.5	30.0	27.8	34.8	46.4
45	12.4	15.5	20.7	18.5	23.1	30.9	29.0	36.2	48.3
46	12.7	15.8	21.1	19.1	23.8	31.8	30.2	37.7	50.3

Note. Row labels denote number of years of paying contributions; column labels number of years of receiving pension.

The pension level is very sensitive to the relation between nominal growth of wages and asset returns. Therefore, we compute initial replacement rate under three assumptions: that asset returns (minus the administration costs) are equal to the nominal growth of wages +0%, 1% and 2% (Table 4). In most cases, performance of the 2nd pillar is as good as, or better than performance of the 1st pillar. When growths of wages and asset returns are equal, the result does not depend on the level of asset returns. For equal growth rates of wages and returns, the resulting replacement ratios are equal, too.

Table 4. Replacement rates from the 2nd pillar, assuming returns equal wage growth + x%.

	Asset returns = wage growth			Asset returns = wage growth plus 1%			Asset returns = wage growth plus 2%		
	25	20	15	25	20	15	25	20	15
30	10.7	13.4	17.8	12.3	15.4	20.5	14.2	17.8	23.7
35	12.5	15.6	20.8	14.7	18.4	24.5	17.5	21.8	29.1
40	14.3	17.8	23.8	17.2	21.6	28.7	21.1	26.3	35.1
41	14.6	18.3	24.4	17.8	22.2	29.6	21.8	27.3	36.4
42	15.0	18.7	25.0	18.3	22.9	30.5	22.6	28.2	37.6
43	15.3	19.2	25.5	18.8	23.5	31.4	23.4	29.2	38.9
44	15.7	19.6	26.1	19.4	24.2	32.3	24.2	30.2	40.3
45	16.0	20.1	26.7	19.9	24.9	33.2	25.0	31.2	41.6
46	16.4	20.5	27.3	20.4	25.6	34.1	25.8	32.3	43.0

Note. Row labels denote number of years of paying contributions; column labels number of years of receiving pension.

The above calculations assume constant asset returns and no risk. Suppose, however, that annual asset returns are normally distributed and return is equal to:

$$r = r_e + \sigma.Z$$

where r_e is expected value of return, Z is a random variable with normal distribution N(0,1), and σ the standard deviation. Then we estimate returns and calculate standard deviations from total returns (including dividends), using the stock indices S&P500 (USA), FTSE (Great Britain), DAX (Germany) and SPI (Switzerland) in January 1981 to June 2003 (Table 5).

Table 5. Returns and standard deviations of the stock indices, %

Index	S&P500	FTSE	DAX	SPI
Return p.a.	13.29	13.47	9.53	10.97
Standard deviation p.a.	15.58	15.07	17.40	16.97

We repeat calculations of pension levels with the same parameters, like in Table 3, and with probabilities of reaching particular pension levels, when contributions were paid for 40 years and invested to stock indices S&P500, DAX or SPI (FTSE has similar average and standard deviation as S&P500 and therefore the results related to this index are skipped). It is clear that investment to S&P500 (FTSE) and SPI will lead to 2nd pillar outperforming the 1st pillar (Table 6). However, investment in DAX makes achievement of 25% replacement rate less likely (probability 0.71 for 15 years of pension receipt and 0.54 for 20 years of pension receipt).

Table 6. Probabilistic distribution of pension levels, investment to different stock indices

%	S&P500			DAX			SPI		
	25	20	15	25	20	15	25	20	15
10	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0
20	0.9	1.0	1.0	0.7	0.7	0.8	0.7	0.8	0.9
25	0.9	0.9	1.0	0.4	0.5	0.7	0.6	0.7	0.9
30	0.8	0.9	1.0	0.3	0.4	0.6	0.5	0.6	0.8
40	0.7	0.8	0.9	0.2	0.3	0.4	0.3	0.5	0.6
50	0.5	0.7	0.8	0.1	0.2	0.3	0.2	0.3	0.5
60	0.4	0.5	0.7	0.1	0.1	0.2	0.1	0.2	0.4
70	0.3	0.4	0.6	0.0	0.1	0.2	0.1	0.2	0.3
80	0.2	0.4	0.5	0.0	0.1	0.1	0.1	0.1	0.2
90	0.2	0.3	0.5	0.0	0.0	0.1	0.1	0.1	0.2

Note. Row labels denote initial replacement rate (ratio of the initial pension to last gross wage); column labels number of years of receiving pension.

Bonds yield lower returns for their lower risk. We use yields of 10-year government bonds (January 1996 - June 2002) emitted in Switzerland, USA, Great Britain and Germany. Our estimates of average yields and standard deviations are presented in Table 7. Neglecting currency risks (CHF, USD, GBP, EUR), we estimate probabilistic distributions of pension levels corresponding to selected bonds (Table 8). It is clear that sufficient level of pension will not be achieved by investment to the CHF bonds. Using the same assumptions as for estimation of returns on stock indices, we conclude that with the exception of GBP, there is only a small chance to outperform the 1st pillar.

Table 7. Returns and standard deviations of bonds, %

	CHF	USD	GBP	EUR(DEM)
average yield	3.95	6.12	8.24	6.38
standard deviation	5.20	6.90	6.45	5.66

Table 8. Probabilistic distribution of pension levels, investment to different bonds

%	USD government bonds			GBP government bonds			EUR government bonds		
	25	20	15	25	20	15	25	20	15
10	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
15	0.3	0.7	1.0	0.9	1.0	1.0	0.4	0.8	1.0
20	0.1	0.2	0.7	0.5	0.9	1.0	0.0	0.3	0.8
25	0.0	0.1	0.3	0.2	0.5	0.9	0.0	0.0	0.4
30	0.0	0.0	0.1	0.1	0.2	0.7	0.0	0.0	0.1
35	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0

Note. Row labels denote initial replacement rate (ratio of the initial pension to last gross wage); column labels number of years of receiving pension.

Pension funds usually hold portfolio comprising bonds and equities. Limits for their weights in portfolio differ across the countries. In Slovakia, each pension company will manage three funds: Growth Fund, Balanced Fund and Conservative fund, each with different limits for investment (see Table 9). Savers may hold assets only in one fund at the same time. Up to 15 years before retirement, the saver may not hold assets in the Growth Fund and up to 7 years in the Balanced Fund, in order to decrease risk that the value of savings substantially falls shortly before the

Table 9. Limits for investment for the pension funds

	Stocks	Bonds and Money Market Instruments
Growth Fund	up to 80%	no limit
Balanced Fund	up to 50%	at least 50%
Conservative Fund	no stocks	100%

retirement.[12] From or estimations is clear, that the 2nd pillar (a combination of asset and bond investment) will likely outperform the 1st pillar.

4. Conclusions

A pension reform was necessary if the country wanted to avoid high deficit of the pay-as-you-go system and ensure decent level of pensions. The reform contains three important steps: change in indexation, increase of the retirement age and launch of the funded pillar. The 2nd pillar will naturally deepen the deficit in the first decades after its introduction, but as more people will start receiving pensions from the 2nd pillar, the deficit of the 1st pillar will decline. The system, then, will be superior to the one pillar system only. Replacement of the Swiss indexation by the CPI one, and an increase of the retirement age to e.g. 65 for men and women would further decrease the deficit.

Shall the 2nd pillar produce decent level of pensions, sufficient part of contributions must be invested to the stocks. Still, there is a considerable probability that pure pay-as-you-go system would outperform the two pillar system.

Finally, adopted pay-as-you-go pension formula and targeted 25% replacement ratio will create a deficit, and thus a pressure on public finance. This could cause political decisions to decrease replacement target of the first pillar. Therefore, when comparing the level of pensions from the pay-as-you-go and funded pillars one should bear in mind that the pensions from the pay-as-you-go pillar are subject to a political risk.

REFERENCES

BENCZÚR, P. (1999): *Changes in the Implicit Debt Burden of the Hungarian Social Security*. National Bank of Hungary Working Paper, August 1999.

BLAKE, D. - CAIRNS, A. - DOWD, K (2003): *Pensionmetrics: Stochastic Pension Plan Design and Value-At-Risk During the Accumulation Phase.* Discussion paper: Gutmann Symposium on Capital Market Based Pension Systems. Vienna, December 2003.

BLAKE, D. - CAIRNS, A. - DOWD, K (2003): *Pensionmetrics 2: Stochastic Pension Plan Design During the Distribution Phase.* Discussion paper: Gutmann Symposium on Capital Market Based Pension Systems. Vienna, December 2003.

BODIE, Z. (1994): *On the Risk of Stocks in the Long Run*. Harvard Business School Working Paper No 95-013, December 1994.

BODIE, Z. (1996): What the Pension Benefit Guaranty Corporation Can Learn from the Federal Savings and Loan Insurance Corporation. *Journal of Financial Services Research*, Volume 10, Number 1, 83-100, March 1996.

BODIE, Z. (2001): *Retirement Investing: A New Approach*. Boston University School of Management Working Paper No. 2001-03, February 2001.

[12] For valuable analysis of several pension plans see Blake (2003).

CHLON, A. - GÓRA, M. - RUTKOWSKI, M. (1999): *Shaping Pension Reform in Poland: Security Through Diversity.* Social Protection Discussion Paper Series, The World Bank, August 1999.

FULTZ, E., ed. (2002): *Pension Reform in Central and Eastern Europe,* Vol. I, Budapest, ILO, 2002.

GOLIAŠ, P. (2003): *Pension Calculations for the PAYG and the Funded Pension System in Slovakia*. Academia Istropolitana Nova, Professional Programme in Applied Economics and Finance, August 2003.

HOLZMANN, R. (1997): *Fiscal Alternatives of Moving from Unfunded to Funded Pensions.* OECD Development Center, Produced as part of the research program on Macroeconomic Interdependence and Capital Flows, August 1997.

INFOSTAT: *Prognóza vývoja obyvateľstva SR do roku 2050,* Akty, Bratislava 2002

KOHOUT, P. (2001): Některé chyby systému penzijních fondú v ČR. *Finance a úvěr*, Vol. 51, No 10, 2001.

KREIDL, V. (1998): Penzijní reforma v ČR. *Finance a úvěr*, No. 48, 1/1998, 36-54.

KREIDL, V. (1997): Reforma penzijního systému. *Politická ekonomie*, 6/1997, 836-61.

M.E.S.A. 10: *Analýza dôchodkového systému na Slovensku*, Bratislava 2001.

MPSVaR SR: *Návrh koncepcie reformy dôchodkového zabezpečenia v SR,* Bratislava, March 2003.

OFFICE OF THE GOVERNMENT PLENIPOTENTIARY FOR SOCIAL SECURITY REFORM, WARSAW (1997): *Security Through Diversity: Reform of the Pension System in Poland*. Warsaw, 1997.

ORSZAG, P.R. - STIGLITZ, J.E. (2001): *Rethinking Pension Reform: Ten Myths about Social Security System.* Presented at the conference on New Ideas about Old Age Security, The World Bank Washington, D.C., September 14-15, 1999, 17-56.

PALACIOS, R. - ROCHA, R. (1998): *The Hungarian Pension System in Transition.* Bokros, L. and Dethier, J. J. eds.: Public Finance Reform during the Transition: The experience of Hungary, The World Bank Washington, D.C., 1998, 177-216.

PIŃERA, J. (1996): *Empowering Workers: The Privatization of Social Security in Chile*, Cato's Letter No. 10, Cato Institute, Washington 1996.

SIMONOVITS, A. (2000): Partial Privatization of a Pension System: Lessons from Hungary. *International Journal of Development, 12, 2000, 519-529.*

THOMAY, M. – ŠVEJNA, I. – ORAVEC, J. (2002): *Koncepcia reformy dôchodkového systému.* The F. A. Hayek Foundation, Bratislava, June 2002

TOMASZEWSKA, E. (1999): *Pension System Reform in Poland.* International Construction Institute Pension Education, Research and Technical Assistance (PERTA) ILO Geneva - June 16, 1999.

Annex.

Table 1. Macroeconomic forecasts (percentage growth).

Year	Gross wages (real)	Inflation rate	Unemployment rate	GDP (real)
2004	0.9	7.6	15.2	1.9
2005	3.4	4.6	14.8	4.4
2006	4.0	3.5	14.4	5.5
2007	4.0	3.5	14.0	4.5
2008	4.0	3.5	13.6	4.5
2009	3.5	3.5	13.2	4.5
2010	3.5	3.5	12.8	4.5
2011	3.5	3.5	12.5	4.0
2012	3.5	3.5	12.2	4.0
2013	3.5	3.5	11.9	4.0
2014	3.5	3.5	11.6	4.0
2015	3.5	3.0	11.4	4.0
2016	3.5	3.0	11.2	4.0
2017	3.5	3.0	11.0	4.0
2018	3.5	3.0	10.8	4.0
2019	3.5	3.0	10.6	3.5
2020	3.5	3.0	10.3	3.5
2021	3.5	3.0	10.0	3.5
2022	3.5	2.5	9.5	3.5
2023	3.5	2.5	9.0	3.5
2024	3.5	2.5	8.5	3.5
2025-90	3.0	2.0	8.0	3.0

Source: forecasts provided by Martin Barto and Juraj Kotian.