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**Giving the ageing of the population how can countries afford pay-as-you-go
social insurance pensions?**

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ABSTRACT

The paper examines formation and sustainability of Pay-As-You-Go pension systems within the consequences of the ageing of population. Parametric reforms rather than institutional transformation of Pay-As-You-Go systems into funded pension schemes are advocated. Following the modern theories of family economics and contrary to the mainstream works on the issue, reciprocal causation between pension systems and ageing is stressed. The paper concludes that the World Bank's first pillar adjustment for maintaining the Pay-As-You-Go schemes achieves its objectives only if it is focused on all elements of the Pay-As-You-Go system.

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1. INTRODUCTION

Over the last decades, the world has witnessed dramatic socioeconomic transformations, including intensified trends of an ageing of population, which directly decreases the supply of workforce for labour markets and increases the number of retired people. Social insurance pensions for those groups of population can be either Pay-As-You-Go¹ or funded, however, as Mackenzie et al (1997) indicate the former is most vulnerable to ageing because benefits received by current pensioners are funded by current contributors; whereas in funded schemes “each generation accumulates assets during working life which are used to finance its retirement pensions” (Pemberton 2000, p. 1873). This essay argues that by appropriate adjustments countries with Pay-As-You-Go pensions can further afford to sustain this system regardless of the consequences of ageing. Section 2 gives a brief overview of the historical determinants of Pay-As-You-Go formation and persistence; section 3 explains the economic nature and the challenge of ageing to Pay-As-You-Go system; while section 4 presents tools for Pay-As-You-Go adjustment; section 5 concludes.

2. THE ORIGIN AND PERSISTENCE OF PAY-AS-YOU-GO SYSTEMS

Although it is obvious that the current setting is completely different from that existing in the first half of the twentieth century, analysing the underling factors that defined the formation of pension structures may help in understanding the challenge of ageing for Pay-As-You-Go systems. There is no unequivocal answer as to why some countries prioritised Pay-As-

¹ Some Pay-As-You-Go schemes are administered by the corporations in a private sector. In this case, payment of benefits is dependent on future corporate earnings. However, such schemes are restricted in most counties due to a high risk associated with non-payment (Barr & Diamond, 2006).

You-Go structures while others developed funding systems, however, it is possible to identify a set of reasons that determined the path of development. According to Hannah (1986), modern old-age pension schemes stem from the late nineteenth century, when large private companies and civil service branches established pension policies. In 1889, German chancellor Bismarck enacted the first national and compulsory old age insurance system, where contributions were split among the government, employers and employees (Börsch-Supan et al, 2004).

Nevertheless, most pension systems were formed in the first part of the twentieth century (refer to the appendix), when the interrelation of three decisive factors had a major influence.

Firstly, this period was associated with sharp inflationary shocks with major redistributive and impoverishing consequences in many then industrialized countries, and as Perroti (2006) argues, a majority of the population in these countries began supporting state-controlled social security policies. However, countries which managed to keep inflation of relatively low levels mostly developed market funding for pension systems. Secondly, according to Pegano and Volpin (2005), decisions on the formation of pension systems were strongly affected by political preferences. In relatively more democratic countries, where the middle class had a significant financial participation, the development of financial markets was preferred, while relatively undemocratic governments chose limiting and controlling of investors activities and thus preferred Pay-As-You-Go systems. Thirdly, as Maddison (1987) observes, high economic growth rates and increasing real wages together with a demographic boom in some countries meant low initial costs of setting and almost inevitably determined the formation of mostly contributory, tax-financed and Pay-As-You-Go pension systems.

Simultaneously, pension systems became a classic case of the concept of path dependency², an idea that “institutions and policies adopted at one point serve to limit the variety of plausible alternatives at latter points” (Graefe 2004, p. 3). Exactly this kind of relationship is described by Tepe (2006), who observes the strong path dependency of Pay-As-You-Go pensions in different welfare regimes within which they have been developed, while Anderson (2004) emphasizes the role of party politics and path dependent development of funding pension schemes in Swedish, Dutch and Danish pension systems. Moreover, according to Myles and Pierson (2001), because governments were making pension promises decades in advance, countries which introduced Pay-As-You-Go systems immediately after the Second World War had very limited options for modifying them fundamentally, undertaking mainly actuarial reforms and partially introducing funded schemes.

3. PAY-AS-YOU-GO SYSTEMS, AGEING AND ECONOMICS

Table 1 in the appendix provides summary information on pension systems in 24 OECD countries, including the percentage of privately funded pension assets over GDP as a rough scale of Pay-As-You-Go systems (OECD Newsletter, 2005). Overall, the variation is remarkable, but it is hard to define what the crossing line from a Pay-As-You-Go to a funding system is. Nonetheless, mandatory public pension³ plans are central to the center of the retirement insurance systems in most of the developed world. Functionally, properly designed Pay-As-You-Go schemes serve as effective mechanisms: (1) to deal with the problems of informational

² Concept of path dependency originally stemmed from David’s (1985) critique on the efficiency assumptions in economics.

³ Although, these schemes, within the particular country, possess some degree of universality, they are not necessarily the same for the different sectors of economy (Kune et al, 1993).

asymmetry, missing markets and uncertainty (Barr, 2006); (2) to eliminate poverty and hardship among the elderly by securing residents of a specified age with, at least, a minimum income for a decent life after retirement (Willmore, 2004); (3) to reallocate incomes on a lifetime basis “by paying pensions to low earners that are a higher percentage of their previous earnings” (Barr & Diamond, 2006); (4) to sustain a macroeconomic outlook in general and labour-market incentives in particular (Milevski, 2006). However, not all of these functions were initial objectives of the system and have been developed gradually.

The definitive period of public pension systems’ formation in developed countries coincided with the beginning of what the United Nations (2001) in its influential study *World Population Ageing 1950-2050* identifies as a “demographic transition”, threatening the sustainability of Pay-As-You-Go systems (Kohout, 2005). For instance, in all countries of the developed world, the old-age dependency ratio – the percentage of the elderly people (65 + years) to the working-age (15 - 64 years) people – was 12% in 1950, 21% in 2000 and is predicted to increase to 44% in 2050⁴ (refer to the appendix) (Bettendorf & Heijda, 2006, p. 2390). However, according to Holzman (1988), from 1950 to 1970 a growing proportion of people reaching retirement age played an insignificant role in rising pension expenditure. The real pressure stemmed from the extension of benefits and eligibility, including the reduction of the retirement age: the process that Graebner (1980) recalls as the “triumph of retirement”.

Since the 1980s ageing has already been responsible for problems associated with Pay-As-You-Go systems. According to Bond et al (1993) it especially intensified with the

⁴ Obviously, no demographic projections may be absolutely certain. According to past experience forecasters generally assume ageing trends to revert to some trend level observed in the past. Therefore, the projections do not consider systematic changes in the relevant parameters (fertility rates, migration, etc) that define demographic development (Lee & Tuljapurkar, 2001).

convergence of three major trends in the second half of the 20th century: (i) the improvement in life expectancy due to a reduction in child mortality rates associated with the development of health services and medical advances in the prevention of fatal diseases in childhood; (ii) the improvement in life expectancy of older people due to increased quality of life after the 1950s and to a lesser extent, the achievements of medical science⁵; (iii) and the long-term downward drift in the birth rate, making the proportion of older people increasingly bigger than proportion of children in the population. If the first two factors are largely self-explanatory, the decline in fertility rates in the context of Pay-As-You-Go pension systems attracts more attention.

Conventional models of population economics treat fertility as exogenous and consider the effect of ageing on inflow and outflow of Pay-As-You-Go systems. In contrast, recent models regard fertility as an endogenous variable affected by Pay-As-You-Go systems (Rosati, 1996). Family economists suggest that the number of children per household is based on a comparison of costs and utility gain that is followed by a decisions on fertility, while cost-benefit analysis consists of transfers from the parents to the young in the form of educational effort, and financial transfers from the young to the parents through a Pay-As-You-Go tax-system (Alders & Broer 2005, p. 1076). Steadily rising wages and better career prospects increase the opportunity costs of having children, while according to Sinn (2004), “the Pay-As-You-Go system serves as insurance against not having children and as an enforcement device for ungrateful children who are unwilling to pay their parents a pension”⁶ (p. 1135). Therefore, since parent fertility decisions affect everybody’s pension benefits and have strong social

⁵ As Mckeown (1979) insists future ageing trends are likely to come from transformations in economic and social environments, rather than from treatment of already occurred diseases.

⁶ We do observe positive correlation between pension funds and fertility rates in OECD countries (Pearson’s $r = .32$), however, relation is moderate and statistically insignificant ($P\text{-Value} = .13$),

externalities, Cremer (2006) advocates a policy of linking Pay-As-You-Go benefits or contributions to individuals' fertility options.

In addition to financial vulnerability, an important issue is Pay-As-You-Go's effect on real economy (Ehrlich & Kim, 2007). Excluding the demographic shocks, the sustainability of Pay-As-You-Go systems in models designed by Samuelson (1958) and Aaron (1966) relies on the annual growth rate of real labour income that is also the growth rate of the national economy, whereas the sustainability of funded pension schemes relies on the interest rate of capital assets i.e. the marginal productivity of capital. The latter rate in neo-classical economic models exceeds the former, creating incentives for transition from Pay-As-You-Go to funding systems, though Brunner (1996) identifies two obstacles for such a transition: "paying for the pensions of the retired and accumulating a sufficient stock of capital from which their own pensions could be financed" (p. 132). In addition, for small open economies due to international externalities Pareto improvement only occurs when all countries chose to switch simultaneously – a process that is highly unlikely to happen and hence is referred as the *isolation paradox* by Pemberton (2000, p. 1874). However, Saint-Paul (1992) also perceives Pay-As-You-Go systems as deteriorating for endogenous economic models where growth is in large determined by aggregate capital stock, because a non-funding Pay-As-You-Go systems discourage people from accumulating private savings and hence impedes economic development.

On the other hand, Kemnitz and Wigger (2000) insist that economic growth models should more intensively take into account human capital investments, which completely change the causal relationship between Pay-As-You-Go systems and Pareto-optimal resource allocation (p. 674). Originally developed by Lucas (1988), this economic growth model is driven by an

increase in productivity. Since human capital fully depreciates for productivity growth after retirement, permanent human capital investment in succeeding generations is required, through the educational decisions of the parents. Therefore, the rate of return in Pay-As-You-Go economics depends not just on the number of workers, but also on productivity growth (Cremer et al, 2006). The Pay-As-You-Go system provides tax-payers with socially optimal incentives to invest in human capital and to support growth-oriented policies and leads to efficient economic growth models since it guaranties that the older generation will receive a stake from younger generations' productivity; whereas in funding systems less time and effort is devoted to human capital accumulation and agents cannot expect to benefit directly from growth policies (Belletini, 1999, p. 796).

4. ADJUSTMENT OF PAY-AS-YOU-GO SYSTEMS

Two sets of options are considered for Pay-As-You-Go pension adjustments to ageing. First, the institutional transformation of Pay-As-You-Go into funded pension schemes; and second, the parametric reforms of the Pay-As-You-Go system. The first option has been examined across many countries. From the beginning of the 1990s this issue became one of the central points of global debate on social security. The World Bank (see *Averting the old age crisis*, 1994) initially strongly advocated the privatisation, however later several distinctive scholars invalidated the main arguments underlying privatization thrust (see Stigletz 2001; Barr, 2006). Nevertheless, the scope of this essay is limited to parametric reforms, which in turn differ according to the countries considered. For example, in rapidly ageing Eastern European

populations, experiencing the same Pay-As-You-Go sustainability problem⁷ in large due to undeveloped governmental institutions and substantial emigration waves of the local population, the first and simplest policy option might be improving administration of existing Pay-As-You-Go Systems⁸ (Aleksandrova & Velokova, 2003). According to the World Bank (2006), the recent administrative reforms in Bulgaria and the Russian Federation were satisfactory, resulting in increased revenues and better client services, while Pay-As-You-Go adjustment projects in Hungary, Latvia and Romania had implementation difficulties.

Emigration problems in transitional countries may turn into age-specific immigration adjustments to the Pay-As-You-Go system in the developed world. Leers et al (2003) insist that immigration may alleviate the gap in intergenerational transfer systems by decreasing the dependency ratio. Furthermore, Razin and Sadka (1999) observe that immigration is beneficial to the elderly since migrants' contributions benefit retirees' pensions, while it does not harm the young population because immigrants increase the tax base and therefore the government's revenues often benefiting the young people in society. Nonetheless, as Marchand and Pestieau (1991, p. 450) warn, emigrants may adapt rapidly to the low fertility rates of the destination country, ageing as the rest of the population do. The objective of a higher number of workers in the economy may be successfully achieved by active labour market policies (ALMP), focusing on monetary incentive programs rather than on public employment schemes (Fertig et al, 2006). In addition, an increased female labour supply is capable of offsetting a shortage of funds for Pay-As-You-Go and as Swedish example shows can lead to increased female participation, with

⁷ Although, their economic development is far worse than in OECD countries.

⁸ Through last decade the World Bank for Pay-As-You-Go purposes assisted Eastern European transitional countries with 3.34 billion dollars.

high fertility rates (Daly, 2000). Nevertheless, as Marchand and Pestieau (1991) rightly note, this option is only capable of postponing the problem because additional workers will eventually retire, becoming a further burden on the system.

One possible scenario for coping with ageing in the Pay-As-You-Go system is a delay the age when workers become eligible for pensions and to allow older people, willing and able to work, to continue working in their jobs well beyond the current retirement age. Seike (2003) defines this policy option as a way to establish “an age-free active society”. The initial steps toward this solution of the problem have been undertaken by several countries. As an illustration, the German government has enforced a policy called “Campaign 50 Plus”, which secures substantial benefits for employers who employ workers over 50, including wage subsidies and retraining (Börsch-Supan et al, 2004). The employment policies in the Netherlands promote part time jobs with special emphasise on the expanding work opportunities for older people (Carey, 2002), while, the United States made probably the earliest attempts to set a flexible retirement age demonstrated in the “Age Discrimination in Employment Act” of 1967 (Bortz, 1972). Simultaneously, Sayan and Kiraci (2001), reviewing the Pay-As-You-Go adjustment in Turkey, support a gradual increase in the minimum retirement age rather than a once-for-all change, because convincing workers to postpone retirement in the near future is not politically feasible (p. 958).

Reducing incentives for early retirement may be executed using several conceptual tools. According to Chand and Jaeger (1996), governments can directly reduce accrual factors that

define replacement rates^{*}, can increase the number of years to which the replacement ratio is applied, or can simply combine both measures, which would mean an immediate reduction of individual pensions. Leibfritz (2003) also advocates an increase in net pension wealth from working an additional year, contrary to paying additional contributions with little or no increase in future pension gains. Modification of the replacement indexation is a good option in this regard (Jousten, 2007). In Japan and partially in France, the indexation rate is linked to nominal or net wages that in turn are defined by changing labour productivity (Capretta, 2007). While this method preserves the gross replacement rate for the elderly, it encourages retirement and does not allow saving of resources for an increasing number of pensioners. The more cost-effective policy involves an indexation replacement rate to consumer price index, which means “an erosion of replacement rates over the lifetime of the pensioner.” However, it leads to straightforward protection from purchasing power loss for pensioners; In other words, this policy associates higher productivity growth with lower replacement rates and thus brings long-term costs down for better financing the growing older (Chand & Jaeger 1996, p. 24).

Ageing could also be a different way of looking at pension policies and incentive for a shift in paradigm that may result in new insights into Pay-As-You-Go systems. For example, the OECD (2000) advocates a modern pension model with comprehensive coverage, sustainable financing and components of private pension funds in public procurement (p. 46). In this regard, probably the most promising new paradigmatic application is Notional Defined-Contribution systems (NDC). Maintaining central elements of the Pay-As-You-Go system, it has been initially tested Latvia, Sweden, Italy and Poland (Plenipotentiary, 1997). With the NDC

^{*} The replacement rate is a person’s pension as a percentage of his or her working income prior to retirement

framework, which makes explicit the actuarial mathematics and trade-offs inherited in any Pay-As-You-Go system, the employees pay a certain percentage of their earnings into notional individual accounts (Lindeman, 2003). Governments also credit these accounts with notional interest rates according to their fiscal capacity that in turn is affected by ageing trends (Barr & Diamond, 2006). After achieving retirement age, individuals' notional accumulations are converted into benefits which reflect the basic actuarial principle of the account (Kruse, 2003). Nonetheless, the most visible solution for maintaining the Pay-As-You-Go system is the implementation of a policy that is focused on all elements of the system. In most cases, separate parametric reforms of Pay-As-You-Go, despite showing considerable scope for eliminating financial gaps, will not be sufficient to maintain balance in the system.

5. CONCLUSION

Overall, despite the intensifying trends of ageing in populations, countries are able and keen to sustain Pay-As-You-Go pension systems for the foreseeable future. Firstly, political choices and historical circumstances that originally determined the creation of public pension systems in the first half of the twentieth century are in modified forms, but still play a major role. In modern democracies, the lack of which is believed to have an effect on the initial formation of the Pay-As-You-Go system, a medium voter, who steadily becomes older, expresses his path dependent commitment to a big welfare state. Secondly, Pay-As-You-Go systems play an important societal role by insuring and redistributing welfare among individuals, and provide incentives for productivity growth, while switching to alternative approaches seems to be costly and no more efficient way to handle those functions, considering that nothing can fully control fertility. And thirdly, although the scenarios for individual

countries vary depending on already achieved demographic structures and on a set of variables that influence the financing of public pensions, all countries possess some mechanisms for systematic adjustment of Pay-As-You-Go systems. However, appropriately conducted reforms – increasing the retirement age, reducing replacement indexation, supporting emigration, etc – in turn could not be achieved without a high awareness of public choice and a transformation of social paradigm in relation to aged individuals and their place in society. The fact that the world is becoming older does not only mean that the number of retirees is increasing. More importantly, it also means the borders between the young and the elderly are becoming blurred.

APPENDIX

Table 1: Summary information on pension systems in 24 OECD member countries

Country	Year of first program	Year of major program	Mandatory funding schemes	Voluntary funding schemes	Funded assets over GDP (2004)	Fertility rates (2003)	Age dependency ratio (2003)
Australia	1908	1941	1992		72.7	1.75	0.48
Austria	1909	1935		x	4.5	1.39	0.47
Belgium	1900	1967		x	4.1	1.61	0.51
Canada	1927	1966		x	52.1	1.52	0.45
Denmark	1891	1964	1964-85		30.0	1.76	0.50
Finland	1937	1956	1956-85		45.3	1.76	0.49
France	1910	1945		x	7.0	1.89	0.53
Germany	1889	1949		x	3.8	1.34	0.47
Greece	1934	1978-85		x	0.0	1.27	0.50
Iceland	1909	1969-70	1986		111.9	1.99	0.53
Ireland	1908	1952		x	42.6	1.98	0.48
Italy	1919	1969		x	2.6	1.29	0.49
Japan	1875	1942-44		x	14.2	1.33	0.49
South Korea	1960	1973	2005		1.7	1.45	0.39
Mexico	1943-44	1943-44	1997		6.3	2.21	0.60
Netherlands	1913	1957		x	106.2	1.75	0.48
New Zealand	1898	1938		x	11.3	1.94	0.51
Norway	1936	1936	2006		6.8	1.80	0.53
Portugal	1919	1935		x	11.2	1.42	0.48
Spain	1919	1939		x	9.0	1.26	0.47
Sweden	1913	1962	2000	x	12.7	1.71	0.54
Switzerland	1946	1946	1982		111.6	1.41	0.48
United Kingdom	1908	1948		x	65.1	1.64	0.52
United States	1896	1935		x	95.0	2.01	0.50

Country	Age-dependency ratio (2050)	Immigration rate (2000)	Growth rate (2003)	Interest rate (2003)	Inflation rate (2003)	GINI coefficient (2000)	Female participation rate (2001)
Australia	41	0.90	3.8	5.10	2.8	30.5	66.2
Austria	51	0.12	0.7	3.40	1.4	25.2	63.3
Belgium	47	0.10	1.1	5.20	1.6	25	58.7
Canada	44	0.60	2	3.60	2.8	30.1	70.5
Denmark	40	0.20	0.4	4.70	2.1	22.5	78.9

Finland	44	0.11	1.9	3.30	0.9	26.1	72.5
France	45	0.08	0.5	3.90	2.1	27.3	58.8
Germany	54	0.36	-0.1	7.00	1	27.7	63.8
Greece	58	0.00	4.3	4.30	3.5	34.5	49.2
Iceland	43	...	4	10.70	2.1	...	82.6
Ireland	39	...	3.7	2.80	3.5	30.4	56.5
Italy	60	0.09	0.3	4.10	2.7	34.7	47.8
Japan	74	...	2.7	1.80	-0.3	31.4	64.4
South Korea	65	...	3.1	2.00	3.6	31.6	55.6
Mexico	34	...	1.3	3.8	4.5	48.0	41.6
Netherlands	43	0.21	-0.9	0.50	2.1	25.1	66.3
New Zealand	40	...	3.6	4.70	1.8	33.7	67.9
Norway	40	0.30	0.4	2.60	2.5	26.1	76.4
Portugal	56	0.12	-1.2	2.80	3.3	35.6	68.3
Spain	63	0.08	2.4	1.80	3	32.9	50.9
Sweden	41	0.17	1.6	3.30	1.9	24.3	75.5
Switzerland	42		-0.4	3.10	0.6	26.7	26.5
United Kingdom	40	0.15	2.2	2.70	2.9	32.6	67.5
United States	34	0.33	3.1	...	2.3	35.7	70.7

Presented data come from: OECD Newsletter (2005); OECD in Figures (2003); OECD Economic Outlook (2001); Perroti (2006); and World Development Indicators (2005).

Table 2: Bivariate correlations matrix between 10 variables theoretically interrelated within Pay-As-You-Go framework in 24 OECD member countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) PENSION FUNDS 04	1.000									
(2) FERTILITY RATE 2003	0.319	1.000								
(3) AGE DEPENDENCY 03	-0.019	0.591	1.000							
(4) AGE DEPENDENCY 2050	-0.464	-0.803	-0.524	1.000						
(5) IMMIGRATION 2000	0.468	0.267	-0.340	-0.412	1.000					
(6) GROWTH 2003	0.082	0.216	-0.043	0.011	0.280	1.000				
(7) INTEREST RATE 2003	0.093	0.175	0.249	-0.155	0.235	0.225	1.000			
(8) INFLATION 2003	-0.163	0.247	0.097	-0.181	0.071	0.215	-0.088	1.000		
(9) GINI 2000	-0.148	0.198	0.301	0.033	0.009	0.289	-0.067	0.591	1.000	
(10) FEMALE PARTIC. 2001	0.105	0.305	0.062	-0.218	0.347	0.127	0.243	-0.148	-0.397	1.000

Calculated data stem from OECD Newsletter (2005); OECD in Figures (2003); OECD Economic Outlook (2001); Perroti (2006); and World Development Indicators (2005). Significant coefficients are bold shifted.

REFERENCES

- [1] Aaron, H. (1966). "The social insurance paradox". **Canadian Journal of Economics and Political Science**. 32, pp. 371-374.
- [2] Aleksandrova, S. and Velokova, A. (2003). "Population ageing in the Balkan countries". **Folia Medica** (Plovdiv). 45 (4), 5-10.
- [3] Anderson, K.M. (2004). "Pension politics in three small states: Denmark, Sweden and the Netherlands". **Canadian Journal of Sociology**. 29 (2), pp. 289-312.
- [4] Barr, N. and Diamond, P. (2006). "The economics of pensions". **Oxford Review of Economic Policy**. 22 (1), pp. 15-39.
- [5] Bellettini, G. (1999). "Is social security bad for growth?" **Review of Economic Dynamics**. 2, pp. 796-819.
- [6] Bettendorfa, L.J.H. and Heijdra, B.J. (2006). "Population ageing and pension reform in a small open economy with non-traded goods". **Journal of Economic Dynamics & Control**. 30, pp. 2389-2424.
- [7] Boldrin, M. and Jiménez-Martín, S. (2003). "Evaluating Spanish Pension Expenditure Under Alternative Reform Scenarios, preliminary draft". In **Social Security Programs and Retirement around the World: Fiscal Implications**. The University of Chicago Press. Available at: <http://www.nber.org/books/intlSS-p3/spain6-29-05.pdf>.
- [8] Bond, J., Coleman, P. and Peace, S. (eds) (1993). **Ageing in society**. Sage Publications.
- [9] Bortz, A. (1972). **Lecture on the history of social security**. Special study No. 1. Available at: <http://www.ssa.gov/history/bortz.html>.
- [10] Börsch-Supan, A.H. and Wilke, C.B. (2004). "The German public pension system: how it was, how it will be." **NBER Working Paper**. No. 10525. Cambridge, MA: National Bureau of Economic Research.
- [11] Brunner, K.B. (1996). "Transition from pay-as-you-go to a fully funded pension system: the case of differing individuals and intergenerational fairness". **Journal of Public Economics**. 60, pp. 131-146.

- [12] Capretta, J.C. (2007). **Global aging and the sustainability of public pension systems. An assessment of reform efforts in twelve developed countries.** A Report of the Aging Vulnerability Index Project. Center for Strategic and International Studies.
- [13] Carey, D. (2002). "Ageing populations: how the Dutch cope?" **The OECD Observer.** Organization for Economic Cooperation and Development, p. 44.
- [14] Chand, S.K. and Jaegar, A. (1996). **Aging populations and public pension schemes.** International Monetary Fund. Occasional Paper No. 147. Washington, D.C.: International Monetary Fund.
- [15] Cremer, H., Gahvari, F. and Pestieau, P. (2006). "Pensions with endogenous and stochastic fertility". **Journal of Public Economics.** 90, pp. 2303–2321.
- [16] Daly, M. (2000). "A fine Balance: women's labor market participation in international comparison", in Scharpf, F.W. and Schmidt, V.A. (eds.). **Welfare and work in the open economy Vol. II.** Oxford University Press, pp. 467-510.
- [17] David, P.A. (1985). "Clio and the economics of QWERTY". **American Economic Review.** 75 (2), pp. 332-337.
- [18] Ehrlich, I. and Kim, J. (2007). "Social security and demographic trends: theory and evidence from the international experience". **Review of Economic Dynamics.** 10, pp. 55-77.
- [19] Fertig, M., Schmidt, C.S. and Schneider, H. (2006). "Active labor market policy in Germany - is there a successful policy strategy?" **Regional Science and Urban Economics.** 36, pp. 399-430.
- [20] Galasso, V. and Profeta, P. (2006). "How does ageing affect the welfare state?" **European Journal of Political Economy.** Available at: <http://www.sciencedirect.com>.
- [21] Glennerster, H. (2003). **Understanding the finance of welfare. What welfare costs and how to pay for it.** The Policy Press.
- [22] Graebner, W. (1980). **A history of retirement: the meaning and function of an American institution, 1885-1978.** Yale University Press.
- [23] Graefe, P. (2004). **Welfare regimes and the third sector: rendering path dependency contingent?** Paper presented the 6th International Conference of the International Society

- for Third-Sector Research, Toronto, July 14. Available at:
<http://www.istr.org/conferences/toronto/abstracts/graefe.pdf>
- [24] Holzmann, R. (1988). **Reforming public pensions**. Paris: OECD.
- [25] Jackson, R. and Howe, N. (2003). **The 2003 aging vulnerability index. An assessment of the capacity of twelve developed countries**. The Center for Strategic and International Studies.
- [26] Kohout, P. (2005). "Population, prophets, pensions, and politics". **Orbis**. 49 (4), pp. 731-742.
- [27] Kruse, A. (200?). **Ageing populations and intergenerational risk-sharing in payg pension schemes**. <http://www.nek.lu.se/NEKAKR>
- [28] Lee, R., and Tuljapurkar, S. (2001). "Population forecasting for fiscal planning: issues and innovations." In Lee, R and Auerbach, A. (eds.). **Demographic Change and Fiscal Policy**. Cambridge University Press.
- [29] Leers, T., Meijdam, L. and Verbon, H.A.A. (2003). "Ageing, migration and endogenous public pensions". **Journal of Public Economics**. 88, pp. 131-159.
- [30] Leibfritz, W. (2003). Retiring later makes sense. **OECD Observer**. 234, October. Available at:
http://www.oecdobserver.org/news/fullstory.php/aid/824/Retiring_later_makes_sense.html.
- [31] Lindeman, D. (2003). **Incentives and design issues in pension reform**. World Bank.
 Available at: <http://www.worldbank.org.cn/English/content/pension6.shtml>.
- [32] Lucas, R.E. (1988). "On the mechanics of economic development. **Journal of Monetary Economics**. 22, pp. 3-42.
- [33] Mackenzie, G.A., Gerson, P., Guevas, A. (1997). **Pension regimes and saving**. International Monetary Fund, Occasional Paper No. 153. Washington, D.C.: International Monetary Fund.
- [34] Maddison, A. (1987). "Growth and slowdown in advanced capitalist economies: techniques of qualitative assessment." **Journal of economic Literature**. 25 (2), 649-698.
- [35] Marchand, M. and Pestieau, P. (1991). "Public pensions: choices for the future." **European Economic Review**. 35, pp. 441-453.
- [36] McKeown, T. (1979). **The role of medicine. Dream, mirage or nemesis?** Basil Blackwell.

- [37] Milevski, M.A. (2006). **The calculus of retirement income**. Cambridge University Press.
- [38] Myles, J. and Pierson, P. (2001). "The comparative political economy of pension reform". In Pierson, P. (ed.), **The new politics of the welfare state**. Oxford University Press.
- [39] OECD (2003) **OECD in Figures – 2003 Edition**. Available at:
http://www.oecd.org/document/62/0,2340,en_2649_201185_2345918_1_1_1_1,00.html.
- [40] OECD (2001). "Fiscal implications of ageing: projections of age-related spending". **OECD Economic Outlook**. 69, pp. 145-167.
- [41] OECD (2000). **Reforms for an ageing society**. Organization for Economic Co-operation and Development. OECD Publications.
- [42] OECD Newsletter (2005). "Pension markets in focus". **Newsletter**. 2, pp. 1-16.
- [43] Office of the Plenipotentiary (1997). **Security through diversity - reform of the pension system in poland**. Warsaw (Office of the Plenipotentiary of Social Security Reform), June.
- [44] Pegano, M. and Volpin, P. (2001). "The political economy of finance". **Oxford Review of Economic Policy**. 17 (4), pp. 502-519.
- [45] Pemberton, J. (2000). "National and international privatisation of pensions". **European Economic Review**. 44, pp. 1873-1896.
- [46] Perroti, E. (2006). "The political origin of pension funding". **C.E.P.R. Discussion Paper**. No. 6100. Centre for Economic Policy Research. Available at:
<http://ideas.repec.org/p/cpr/ceprdp/6100.html>.
- [47] Razin, A. and Sadka, E. (1999). "Migration and pension with international capital mobility". **Journal of Public Economics**. 74, pp. 141-150.
- [48] Rother, P.C., Catenaro, M., and Schwab, G. (2002). **Ageing and pensions in the Euro area. Survey and projection results**. Available at:
<http://www.ecomod.net/conferences/ecomod2002/papers/rother.pdf>.
- [49] Rosati, F.C. (1996). "Social security in a non-altruistic model with uncertainty and endogenous fertility". **Journal of Public Economics**. 60, pp. 283-294.
- [50] Saint-Paul, G. (1992). "Fiscal policy in an endogenous growth model". **Quarterly Journal of Economics**. 107, pp. 1243-1259.

- [51] Samuelson, P. (1958). "An exact consumption-loan model of interest with or without the social contrivance of money." **The Journal of Political Economy**. 66, page 467-482.
- [52] Sayan, S. and Kiraci, A. (2001). "Parametric pension reform with higher retirement ages: a computational investigation of alternatives for a pay-as-you-go-based pension system." **Journal of Economic Dynamics & Control**. 25 pp. 951-966.
- [53] Seike, A. (2003). "Pension reforms toward an aging society." **The Japanese Journal of Social Security Policy**. 2 (1), pp. 1-5.
- [54] Social Security Administration (1997). **Social security program throughout the world 1997**. Washington, D.C., Government Printing Office.
- [55] Sinn, H.W. (1998). "The pay-as-you-go pension system as a fertility insurance and enforcement device". **CES Working Paper**. No. 154.
- [56] Sinn, H.W. (2004). "The pay-as-you-go pension system as fertility insurance and an enforcement device". **Journal of Public Economics**. 88, pp. 1335-1357.
- [57] Tanzi, V. and Schuknecht, L. (2000). **Public spending in the 20th century. A global perspective**. Cambridge University Press.
- [58] Townsend, P. (1957). **The family life of old people**. Routledge and Kegan Paul.
- [59] United Nations. (2001). **World population ageing: 1950-2050**. Department of Economic and Social Affairs. New York, 2001.
- [60] Willmore, L. (2004). "Population ageing and pay-as-you-go pensions." **Ageing Horizons – Oxford Institute of Ageing**. Issue 1.
- [61] World Bank (2006). **Pension reform and the development of pension systems**. An evaluation of World Bank assistance. Washington, D.C.
- [62] Wiedmer, T., (1996). "Growth and social security." **Journal of Institutional and Theoretical Economics**. 152, pp. 531–539.
- [63] World Bank (2005). **World Development Indicators 2005**. CD version.