Shifting Perspectives in Pensions

Marek Góra and Edward Palmer[1]

Key words: pensions, notional account systems, financial account systems, defined contribution, funding, externalities.

JEL classification: D61, D91, G23, H23, H55, J26.

Abstract

This paper uses economic principles to analyse concepts used in the area of pensions. It discusses the issue of an efficient pension system and typical dichotomies: unfunded versus funded, private versus public and defined contribution versus defined benefit. The paper uses the concept of Notional Defined Contribution, as a vehicle for analysis of central issues of pension economics. The concept is discussed in parallel with the concept of Financial Defined Contribution. The authors conclude that a good pension system mixes a portfolio of NDC, which is equivalent to a government bond portfolio and FDC, with a portfolio of non-government instruments.

1. Introduction

Pensions are nowadays a part of mainstream economics, but at the same time the concepts are burdened by an imprecision inherited from a framework developed quite a long time ago, when pensions were an important topic mainly in social policy but received little attention in economics. A critical discussion of the inherited ideas is needed in order to create new concepts corresponding to the current stage of development of pension economics. The focus of this paper is on publicly mandated pension schemes. We reconsider the economic meaning of defined contribution and defined benefit, unfunded and funded, and private and public.

---

[1] Marek Góra is at the Warsaw School of Economics, Mgora@sgh.waw.pl. Edward Palmer is at the University of Uppsala and the Swedish National Social Insurance Board, Edward.Palmer@rfv.sfa.se.

The authors would like to express their appreciation for valuable comments received on an earlier draft of this paper provided by Agnieszka Chlon, Christopher Daykin, Agneta Kruse, Heikki Oksanen, Michal Rutkowski, Anna Ruzik and Gert Wagner. The usual disclaimer holds. The authors express their gratitude to The Center for Economic and Social Research (CASE) in Warsaw for financial support for this project.

Until notional defined contribution (NDC) was given a shape and form in the beginning of the 1990s, pension experts typically categorised pension schemes as private defined contribution, private defined benefit and public defined benefit. In this paper, focusing on the economic nature of pension schemes, we call them financial defined contribution (FDC), financial defined benefit (FDB) and non-financial defined benefit respectively (NDB). FDC and FDB are funded and NDB is unfunded. Until well into the 1990s, non-financial defined contribution, which is what NDC is[2], was generally thought not to be possible. With the passage of the first NDC legislation in Sweden in 1994, NDC had entered the stage. Now NDC has entered the everyday pension vocabulary, although it is not infrequently used to define any non-financial account scheme, which is incorrect.

Since NDC has been given a number of interpretations in the recent literature, we begin in this paper by presenting a precise definition of NDC. Then, we discuss basic economic differences in FDC, NDC, FDB and NDB schemes. There is confusion in the literature because of how this terminology is used, but also because the terminology as it usually is used avoids some of key issues. The questions that need to be asked, but frequently are not, are, is a scheme efficient in minimising externalities and how does it perform in managing risks. Our aim is to present a framework for evaluating pension schemes in this light. We use the concept of NDC as a vehicle to move towards a better understanding of the economic nature of pensions.

Led by the writings of pension experts, well into the 1990s many experts still maintained that the choice for *publicly* mandated pension schemes is limited to two general models. The first is funded and defined contribution, usually associated with private management. The second is unfunded, or pay-as-you-go, defined benefit, with public management. Although funding versus non-funding and private versus public management are both important efficiency issues, this dichotomy, which associates funding with private and unfunded with public management has clouded some of the important issues in pension economics.

[2] The term non-financial DC for NDC is in line with the general philosophy developed in this paper.

People have lined up on either side of the fence to promote the virtues of the one and the failings of the other of the "two" models for publicly mandated schemes. As late as the mid-1990s the vast majority of public mandatory systems were defined benefit and unfunded systems, and most of them were viewed as being in financial trouble, but nevertheless avidly defended by many social policy experts who favoured incremental, parametric reforms of existing systems. At the other extreme, liberal economists advocated privately managed, funded and defined contribution systems, *i.e*. the "other" model, as the panacea.[3]

This seemingly impossible controversy to resolve was turned into a compromise with three pillars by the World Bank in 1994. In this blueprint (The World Bank 1994), the first pillar is a mandatory, sized-down unfunded redistributional non-financial defined benefit (NDB) scheme, and the second pillar is a mandatory FDC scheme. The third pillar consists of contractual or individual private schemes of any type offered by the market. The World Bank recommended this model for its client countries, and in the latter half of the 1990s it has become the dominant model in Latin America. This compromise advocated moving pension systems in the direction of the financial DC model, but did not address the key question of pension economics, namely what is an economically efficient pension scheme, both for the individual and society?

In the meantime, NDC emerged and challenged both of the "two" models. NDC puts forward a new view on pensions based on intuitive economic principles. This paper aims to sharpen the discussion of relevant features of competing models by focusing primarily on the differences between DB and DC, and FDC and NDC as potential candidates for schemes mandated by the government as the principal instrument to redistribute the consumption of workers from years of work to years of retirement.

In the following section we begin by describing and discussing the economic content of NDC. In the third section we discuss the NDC rate of return and in the fourth section we discuss the meaning of private and public. In the fifth section we discuss social goals and the pension system and in the sixth section we discuss management of

[3] This characterizes the debate in the US during the Clinton and, thereafter, the Bush administration.

risks. Section seven deals with the question of what is funding. In the last section we draw conclusions. In an appendix we also discuss briefly how countries have implemented NDC.

2. What is NDC?

A mandatory pension scheme creates a set of rules that allocate income over the individual's lifecycle. An economically efficient mandatory pension scheme is a scheme that does not create economic distortions. We refer to this property as economic neutrality throughout the paper. We define an economically efficient scheme as a scheme where contributions paid during the accumulation phase correspond to premium payments that, together with the return on the account, define the account value at any time.

In an economically efficient scheme, the present value (PV) of contributions at any time, t, equals the present value of benefits:[4]

(1) $PV_t(\text{Contributions}) = PV_t(\text{Benefits})$

Contributions paid correspond to insurance premiums paid during the accumulation phase and for this reason there is no tax wedge originating from the pension system. The scheme is efficient for all generations if (1) always holds.

What is NDC? The box below summarises the NDC scheme. NDC accounts are created by applying a *fixed* contribution rate to earnings, which is the same for all generations. The rate of return in the NDC scheme is the rate that guarantees that individuals over all generations will not have to pay contributions that do not yield a benefit in accordance with equation (1). This steady state condition is in principle satisfied by accrediting individual NDC accounts with a return based on the (instantaneous) rate of growth of the contribution base (Palmer 1999). The description of the NDC scheme is also a description of any typical financial DC scheme, with the exception that the rate of return in a FDC scheme is determined in the financial market.

[4] Góra (2001b) discusses this in greater depth.

In sum, an NDC scheme, like an FDC scheme, is an efficient scheme in the sense described in equation (1).

Description of Notional Defined Contribution (NDC)

- Contributions based on a fixed percent of individual earnings create account values.
- Account balances from the close of the preceding period earn a rate of return based on the growth of the sum of paid contributions.
- Accumulated account values are annuitised at the time of retirement.
- Annuities are calculated on the basis of accumulated capital and life expectancy at the age of retirement.
- Technical (demographic) reserves are created.

An NDC scheme goes one step further than equation (1) and typical FDC, however. An NDC scheme requires converting the account value at retirement into a life annuity. Of course, in a non-financial scheme there is no other possibility of making the benefit payment. There is, nevertheless, a social advantage to putting this liquidity constraint on participants, since the aim of mandatory public schemes is to prevent poverty in old age, among other things by forcing people who otherwise might by myopic or free riders to participate all their lives.

An FDC scheme can deliver a money lump-sum payment at retirement – in accordance with equation (1), although at the risk of creating intergenerational inefficiency if some of the lump-sum money payment is "squandered, " leading to a new unfunded claim – tax – on future workers. Consequently, if an FDC scheme that is a mandatory component of social security offers the lump-sum withdrawal option then it is not 100 percent fully funded.[5] If the FDC scheme delivers an annuity at retirement, then

[5] This is not the case in voluntary FDC schemes, which are contractual agreements between companies and individuals.

this potential difference compared with an NDC scheme is eliminated, and it is only the rate of return that separates them from the point of view of the participant.[6]

FDC schemes have technical reserves to cover the present value of liabilities to participants, and, by definition, these include the reserves needed to finance relatively large cohorts. An NDC scheme also requires reserves to finance relatively large cohorts, i.e. demographic reserves. These will accumulate naturally when relatively large cohorts are working and contributing.[7] These technical reserves need to earn at least the rate of return that accounts earn in the same period. NDC reserves have an exact counterpart in the "demographic reserves" of an FDC scheme (ceteris paribus). Both FDC and NDC schemes are illiquid saving schemes from the point of view of the participant, and, in this sense, also from the point of view of the participant, they deliver the same product. There are potential differences in the externalities they generate, however, which we discuss in the following sections.

Note that NDC, like FDC, is no more than a mandatory life cycle saving program, with no redistributional aims, other than that unisex life expectancy is used in practice in mandatory schemes. Complete separation of social policy from the insurance system makes both the insurance system and social policy decisions more transparent, and social policy can be adjusted as frequently as politicians desire without having to adjust the rules of the pension system. NDC is an autonomous, financially self-sustaining system. Consequently, NDC breaks with the long tradition in social security of lumping together old age, disability and survivor benefits. Disability and survivor benefits become a part of the overall social policy agenda and are financed general tax revenues.

NDC also brings a new idea to the area of public finance. This is because at least since the institutionalisation of Keynesian economics there has been a general consensus among economists that there is no real distinction to be made between tax sources and uses, that from the point of view of the individual all taxes are perceived as being the same, in spite of their uses. This means that there is no particular reason to prefer

[6] In practice, because NDC systems are run in discrete time with indices based on historical data, more is required to maintain stability, as we shall discuss below.

employee contributions to the value added tax as a source of finance for pensions. At the same time social policy scholars, especially in Europe, have argued since the 1960s that what matters to the voters is that even though they are paying large portions of their earnings in taxes, they are also recipients of transfers, for example, childcare, health care and pensions, and the fact that large payments are met by large receipts creates voter satisfaction.

For very different reasons, then, from the 1960s there emerged an implicit consensus among economists and social policy scholars that the source of finance for the pension system does not matter. This conclusion also supports the thinking behind many of the public DB systems. The NDC concept breaks with this idea, and eliminates the large tax wedge implicit in the old way of thinking, creating a pension system that is neutral in its influence on individual behaviour.

To sum up there are three points that are important to emphasise here. The first is that mandatory NDC and FDC schemes should be separated completely from the remaining tax-transfer apparatus of the government, and run as independent insurance schemes, including providing periodic information to participants. This reinforces transparency and the innate neutrality that follows from the concept. The government can still create tax-wedges, but outside the earnings-related pension scheme. The second is that in NDC and FDC schemes the negative incentives involved in general tax-financed DB scheme are avoided in the main insurance system. As we will discuss below, DC schemes can – and should – be supplemented with a DB guarantee supplement for the lifetime poor. Negative incentives may enter in this way, then, at lower income levels because of the use of a minimum guarantee that supplements the DC outcome. This is unavoidable, however, if a country strives after maintaining a minimum standard for the older population. Thirdly, in NDC, as in FDC, discretionary decisions by politicians are not needed, and, in fact, not allowed. In both cases, if parameters such as life expectancy

[7] Note even if there is a trend increase or decline in the population, there will still arise fluctuations owing to larger and smaller birth cohorts.

and the rate of return are subject to political decisions, then these are not defined contribution schemes in the sense of this paper.[8]

Finally, there is a discussion that has arisen in the literature on the difference between DB schemes and NDC schemes, where the claim is that NDC is simply a reincarnation of pay-as-you-go DB. Of course, it is possible to have a *financial* defined benefit (FDB) scheme that in principle is constructed along the lines of DC. If the contribution rate is fixed in an FDB scheme, implying that account is taken to changing demographics in defining benefits, an FDC and an FDB scheme can end up being exactly the same from the point of view of the participant, aside from the possible difference in transparency.

In many of the public DB schemes things are very different from what we have just described. They usually embody either implicit or explicit redistributional mechanisms that give rise to a tax wedge. In fact, often redistribution, instead of being from the rich to the poor, turns out to have unintended - or even worse - undesirable effects. Examples of implicit redistributional DB rules that give rise to tax wedges are rules basing a full benefit on fewer years than life earnings (e.g. 20 or 30-year DB rule for acquiring full benefits), which discriminate against persons with long working careers (and encourage early exit), and/or a DB rules basing the amount of the benefit on the best "x" or last "y" years. These kinds of rules tend to benefit persons with in the first instance short and in the second instance strong career earnings profiles. The typical loser in this DB framework is the wage earner who has a long, relatively flat earnings career – that is more often than not exactly the person that redistribution is supposed to be helping. These are examples of intragenerationally unfair DB schemes that nevertheless have typified mandatory, public DB schemes since the Second World War. Given this wide range of how DB systems have been formulated around the globe, we find the claims of some specialists (e.g. Cichon 1999 and Disney 2000) that NDC is a reincarnation of a PAYGO DB system to be puzzling.

---

[8]A strict interpretation of this condition would be that only currently known data can be used to create the value of life expectancy used in the calculation of the NDC annuity. However, without breaking this condition, an independent body of demographers and technical experts could perform the calculation of a non-political life-expectancy factor, as long as the result is not subject to political discretion.

3. The NDC rate of return

In the NDC system the rate of return automatically stabilizes the system with respect to changes in economic growth just as the financial market rate of return regulates account values in the FDC scheme. In other words, both are determined by factors exogenous to the system. We are used to thinking of the financial rate of return, and everyone is familiar with the concept. How the rate of return functions in the NDC scheme is much less obvious for many.

The rate of return is based on the rate of growth of the covered wage base

(2) $(1+g_t)(1+\lambda_t) = w_tL_t / w_{t-1}L_{t-1}$

where productivity grows at rate g and the labour force at the rate λ. L_t is the cohort of persons currently working, and L_{t-1} is the previous cohort of workers who are pensioners in the current period. $\lambda_t = L_t/L_{t-1}$, i.e. is the rate of change in the labour force current relative to the previous generation; wages of previous and current cohort are w_{t-1} and w_t, respectively, and w_tL_t is the contribution base (contributions actually paid).

The present value of the fund needed to pay any working generation L_t with wage rate w_t, and with NDC fixed contribution rate α when they become pensioners is αw_tL_t. At retirement workers from period t become pensioners in period t+1, and claim a pension P_{t+1} based on their own contributions:

(3) $P_{t+1} = \alpha w_tL_t$

In a mature NDC scheme, the system will be able to give the NDC annuity an NDC rate of return, so that the benefit can be

(4) $P_{t+1} = .\alpha w_tL_t (1+g_{t+1})(1+\lambda_{t+1})$

Resources available to pay the annuity to period t+1 pensioners come from the contributions, C, of workers in t+1:

(5) $C_{t+1} = \alpha w_tL_t (1+g_{t+1})(1+\lambda_{t+1})$

And, clearly contributions in t+1 equal benefit payments in t+1, with the NDC rate of return. This example is relatively simple, and more complicated structures must be examined to see how demographic reserves arise.[9]

The rate of growth of productivity and real wage growth are normally positive, and considerably greater than the change in the labour force. Even in the case where labour force growth is negative, the absolute value of the rate of decline would be expected to be less than the absolute value of the rate of increase in the per capita wage, meaning that the overall NDC rate of return is expected to be positive over time, even with negative labour force growth, which history confirms. Note also that exact financial stability requires that the reserves held for the large working cohort receive the NDC rate of return, which they would if they held an NDC bond. If the reserve fund holds market assets, then the return on these must at least equal the NDC rate of return.

The question arises as to whether the NDC system achieves financial equilibrium under all possible demographic and economic scenarios. In principle, it would if changes in life expectancy and the economic rate of return could be instantaneously factored into capital balances of workers and annuities of pensioners. Since systems work in discrete time and with administrative lags this will not be the case. Precise adjustment with regard to changing longevity, for example, requires either a precise estimate at the time of computation or that annuities be adjusted in accordance with newly emerging information (Palmer 1999), which is the same problem that FDC schemes run into. The extent of the problems that arise depend on how the life expectancy factor and the rate of return are calculated.

An automatic correction mechanism can be introduced to adjust for practical construction faults that can lead to divergence from the financially stable path. Settergren et al. (2000) and Settergren (2001) present a method designed for the Swedish NDC scheme that stabilises the NDC rate of return, when necessary (which may be very

[9] One way to demonstrate how a fund arises is to assume that the labour force is always the same size, but that there are three working-age cohorts (e.g. persons 20-35, 36-50 and 51-65) followed by a cohort of pensioners. For example, with a constant fertility rate, smaller cohorts give birth to fewer children than larger cohorts, and there occurs a "cycle" of alternating small and large cohorts. If there are two large and one small cohort working and a small cohort of pensioners, then a fund will arise, but it will be used when the next large cohort becomes pensioners (Palmer 1999).

seldom), based on the most recent accounting period's assets and liabilities. The advantage of basing the assessment of the financial status of the scheme on current outcome data rather than projections is that to judgmental forecast is needed, and the door is not opened for politics.

The rate of return in an NDC pension scheme corresponds to the rate of return on a government bond, whose rate of return is the rate of growth of the contribution base, or overall government tax base.[10] In a steady state, with constant shares of labour and capital, this would also be the rate of growth of national income, or the Golden Rule rate of return.[11] Although unnecessary in practice, in principle this bond could be created and issued to account holders. It is clear that this bond gives entitlement to future consumption, in the same way that a regular bond traded on the market does.[12] Seen in this perspective NDC is a way to roll public debt forward in time, which is exactly what financial account schemes do too when they buy government bonds.

The important difference between FDC and NDC schemes is that NDC has only one asset, a government bond, whereas financial account schemes can also invest money in all forms of non-government financial instruments. In fact, if there's to be a real difference between FDC and NDC schemes, the financial account system *must* invest in non-government financial instruments.[13] A financial scheme that only purchases government bonds is an NDC scheme, but with higher costs. There would be a difference, however, if the risk of political default is higher in the public NDC scheme. It

---

[10] We recognise that in practice the government may use a number of tax instruments based on various tax bases, but these could all be expressed in terms of the wage base.

[11] The rate of return in the NDC scheme is by nature a diversification of the "portfolio" of all economic activity, not just assets traded in the more sophisticated financial markets. In fact, a major difference between the assets underlying the returns of typical FDC as opposed to NDC schemes is that in reflecting the growth of the economy, NDC also reflects the performance of a large number of less productive investments, not usually financed and traded through the equity markets. The price for this is a lower rate of return. These non-tradable assets can reflect investments in large projects, as in the case of investments in the infrastructure, or small projects, as in the case of small private enterprises. This interpretation also suggests that the rate of return in the equity market is not the appropriate rate of return to be used in judging whether or not the Golden Rule holds in practice.

[12] Note that this idea can be compared to Wicksell's quantity theory of money.

[13] We note that the government can borrow for both consumption and investment. This raises the question of whether the government should borrow to change the time profile of consumption, for example, through investment projects.

is often argued that FDC schemes insulate against political risk (e.g. Diamond 1997). This may or may not be true, however. To see this consider the Argentina's mandated FDC scheme which in 2001 held about 70 % government instruments (monetized Buchanan bonds), with the impending risk of government default.

The return on the investment portfolio should also be the return excluding administrative costs. FDC government bond portfolios have inherently higher costs than the equivalent NDC scheme. There are three reasons for this. The first is the cost of administering the bond sales and purchases. The second is that if the rate of return on the bond(s) is higher than the economic rate of return, which equals economic growth, then the advantage gained by some in having this higher rate of return will have to be paid by others, sometime in the future, when it becomes time to service the debt. This is a cost in the sense that it creates an economic distortion, which is associated with the marginal tax needed to service the debt. There may be a reason to monetize the debt, however. This is if the aim is to create a financial account system using government bond financing as a transitional instrument.

The Chilean financial account system was introduced by purchasing government debt instruments, and for a long time funds held mostly government debt. This is squarely in the spirit of Buchanan's proposal (1968), which entailed issuance of bonds in order to make the pension debt explicit. Moreover, as the high rates of return earned in those early years were above the economic rates, although this causes no problem for the pension system, it implies a higher cost of servicing the government debt in the future, and an additional transitional cost compared to an NDC rate of return. As the Chilean system eventually evolved, it moved progressively in the direction of a real FDC scheme.

A third reason why FDC schemes that invest only in government bonds risk inefficiency has to do with marketing costs. Money spent on competing for customers, over and above the costs of normal administration of account systems, is money spent inefficiently in the sense that the benchmark NDC scheme does not require these extra costs.

Finally, note that NDC and FDC schemes react to changes in the demography in a similar manner, too, through the effects on their specific rates of return. In the NDC

system changes in the number of participants will affect the rate of return when it is based on the development of the contribution base. The financial system is affected in a similar manner through its rate of return as the size of the economy supporting the financial market changes.

4. Private versus public – What does it mean?

In discussions of pension reform it is often argued that what matters is to exchange public schemes for private ones. ”Private pensions” is a frequently used label prescribed as a panacea for the problems confronted by public systems. What is private and what is public, and what is the private attribute that is so desirable? Although this might seem a trivial question upon initial consideration it is far from this. There are at least four issues. These are private versus public management, well-defined contract versus a political promise, direct versus indirect claims and public debt versus private equities. All these issues need further discussion.

The first issue is *private versus public management*. Insurance administration consists of customer services, such as account keeping and provision of information, management of assets and the provision of insurance products. All of these are functions that can be subjected to private or public management, regardless of whether the scheme is an NDC, FDC, or a defined benefit scheme. The criterion usually recommended by economists to choose between private or public management is economic efficiency. However, the relative popularity of private and public sectors, the degree of people’s confidence in these, and tradition also matter.

The second issue has to do with *contracts* between parties specifying the terms of the agreement. Financial accounts with private companies are based on contracts where claims of breach of contract can be adjudicated in a civil court of law. What is the value added for the participant by a civil contract? If the management of a scheme or functions of a scheme are contracted out to one or more private firms this is a reason to have a contract between the participant(s) (or their agent – which could be a government agency) and the private firm(s) that can be adjudicated in a civil court of law, irrespective of whether the scheme is NDC, FDC or DB.

What is important for the participant in a pension scheme is that the conditions of the system are well specified *ex ante*, including how the uncertainties, such as the rate of return and life expectancy, are to be managed. Politicians can always decide to change the rules of the game for all schemes, both public and private. Note, however, that manipulation of NDC accounts is similar to imposing a tax on private schemes. The effect is as clear and equally unattractive.

The third issue has to do with *claims*. Are the claims of participants better protected in private or publicly managed schemes? By definition, parametric changes in mandatory public DB schemes change the content of the contract. Examples are increasing the coverage period required for a full benefit and changing the full benefit age. A DB scheme begins then with what looks like a fixed contract, but owing to circumstances, the contract has to be revised. The question is which contract to revise? Should benefits be cut or contributions increased? Pensioners are interested in maintaining benefits, even if they are "too" costly for the workers. Workers may not agree, and this pits the two segments of society against each other. From the point of view of voters, there will be default regardless of what the government decides. Usually the pensioners are a stronger lobby group than the workers, so promises accelerate and public DB schemes tend to turn into a Ponzi scheme.[14] Public DB schemes can put politicians in a situation where they can easily become the losers – and for this reason are politicians are reluctant to implement change. Nevertheless, due to design, DB schemes must be frequently revised.[15]

DC schemes are not immune to default either, but the nature of the problem is different. The interests of pensioners and workers are no longer in conflict. Default means taxing the account balances – either of workers while working or when they are pensioners. Since account balances are expressed in money terms in NDC and FDC schemes, participants can always identify - in money terms - the consequence of

[14] Workers may even tend to think that contributions come at the expense of profits, since the employer usually administrates the payments. A typical view among economists is that employers shift these costs to employees in the long run, through lower nominal wages or higher price increases, or both. This behaviour is also confirmed empirically (e.g. Palmer and Palme 1988).

[15] This is probably why changing from DB to DC has become so appealing for political powers around the world.

government interventions for their claims. However, one can argue that it is more difficult for governments to default on bonds issued in the market and sold to private funds, as opposed to running an NDC scheme, because the government wants to remain a good customer in the financial market. NDC bonds, whether unissued or issued, are protected only through transparency, but transparency is nevertheless a strong defence when voters know they have a stake in the system. The counter argument is that government can tax the earnings of market funds, as well as the capital balances in an NDC scheme, if it chooses to do so. Summing up, NDC approaches the protection of claims usually associated with a private defined contribution scheme, and surpasses the transparency of both public and private defined benefit systems.

The final issue has to do with *assets*. NDC bonds represent a claim on future contributions. As we have already discussed the only difference between NDC and FDC schemes is that an FDC scheme is a pure financial scheme if it holds non-government assets. Increases in non-governmental assets constitute saving, whereas to the extent that increases in government debt reflect consumption rather than investment they constitute net dissaving. With government bonds kept in FDC portfolios participants have a claim on future consumption through taxation of the next generation, whereas with non-government assets they have a claim on future profits.

Table 1 below summarises the issues discussed here. In three out of four NDC and FDC account schemes can be arranged as public as well as private schemes. The table highlights the similarity between the NDC and FDC, emphasising that the main difference between them is the type of asset involved, or, in practice, the rate of return.

Table 1. NDC and FDC as they are seen in light of the issues discussed

	NDC	FDC
Management	Public or private	Public or private
Contracts	Public or private	Public or private
Claims	Public or private	Public or private
Assets	Public	Public or private

To conclude, using the above framework we can easily understand that what matters is not the difference between private and public. Taken by themselves, management, contracts, claims and the type of assets held are, however, not sufficient to define uniquely what is public and what is private. NDC and FDC account systems turn out to be almost the same, except for the type of assets they can hold. Both can be publicly mandated and be wholly or partially managed in either the public or private sector or both. What does matter is whether or not the system is mandated. A system that is mandated is public by definition, whereas, also by definition, a private system is voluntary. On the other hand, the government can also mandate a voluntary system, which is what is accomplished by offering deductions for private insurance premium payments. A publicly mandated system can be managed by the private sector, and examples are easy to list.

5. Social goals of the pension system

Social goals provide the reason to mandate a pension system. Without some form of publicly mandated social insurance most people would simply wait too long to make financial arrangements for their old age (myopia), while some others would consciously not make sufficient or maybe not any provisions at all for old age (free riding), reckoning on the unwillingness of politicians to let them live in destitution in old age. By mandating adequate social insurance in industrial and post-industrial societies, society protects those who are inside the system and who eventually will have to pay the claims of those who choose not to make their own provisions.[16] A mandatory scheme's primary goal is to provide the working population with a scheme that creates saving when young to provide for consumption when old.

The social goal of preventing poverty in old age is a strong motive for creating annuities in mandated pension schemes, instead of allowing lump sum or short phased withdrawals. The problem is that individuals cannot easily determine themselves how to

[16] In the extremely poor, developing countries a mandate, regardless of whether it is DC or DB, also sets a formal framework into which the informal economy can enter with increasing economic development, although this is no guarantee that they actually will.

create an annuity, since they will have difficulty in making a reasonable longevity forecast. In addition, one of the main reasons usually given in the literature for mandating pension schemes is that people are thought to be myopic. This is just as true of new pensioners, who can easily discount very old age at too high a discount rate. This is why annuities are an efficient social instrument for minimising poverty in old age – everything else equal.

In the NDC and FDC framework there is no redistributive ambition, other than redistribution over the individual's own lifecycle from working years to years of retirement.[17] Instead, the government's redistributive policy is pursued through the use of taxes and transfers financed with general revenues. This includes minimum income support in old age provided, for example, through a guarantee supplement and/or social assistance.

Social policy in the present context can encompass more than the minimum guarantee promised in old age. Social policy makers can transfer sums they consider to be appropriate from the general revenues in the state budget into the NDC or FDC schemes to create account values. They can finance, for example, time spent caring for younger children or sick relatives and military conscription, but also time out of work for insured spells of sickness, unemployment and disability. In this way, insurance and its source of financing and social policy and its means of financing are kept separate, assuring transparency throughout.

There are political economy arguments too for financing transfers through the general budget of a nation. First, general revenues are collected out of a larger tax base than the payroll, and minimising payroll taxes minimises the wedge between labour costs and take-home pay. Second, the contribution rate is linear, while general taxes and other tax sources can be progressive, i.e. a relatively larger part of general revenues comes from the relatively better off, which is important for redistribution.[18]

[17]Although in mandated schemes unisex life expectancy is used to compute the annuity, which ceteris paribus, redistributes resources from men to women, as long as women live longer.

6. Managing the risks

The literature generally recognises five risks.[19] Three are exogenous to the pension scheme, the demographic risk, the macroeconomic risk and financial market risks. Two are endogenous, moral hazard and the political risk. How the pension scheme is designed matters for whether these risks are dealt with more or less efficiently.

Mandatory FDC and NDC contributions are not taxes but premiums paid into savings by individuals. Contrary to this DB contributions are partially taxes, and are usually perceived as taxes. DB schemes require political manipulation to avoid contribution rate increases, and this manipulation can be understood by the voters to be government default on legitimate claims, as we have already discussed above. The alternative is to honour the DB claims and increases the contribution rate. When contribution increases are used to meet macroeconomic or demographic pressures, the result is an increase in the tax wedge, which may have negative ramifications for overall economic growth and labour market efficiency. In many countries the costs of financing old age benefits has become so high that further increases are presently difficult and in the longer run impossible to achieve. These tax increases are usually irreversible, and start an upward spiral. To the extent that these distortions occur they contribute to reducing the growth of the tax base and make the need for future rate increases even more likely. In addition, these tax increases come at the expense of the future consumption possibilities of the younger generation.

Because in NDC and FDC benefits are directly linked to contributions determined by a fixed contribution rate and a rate of return determined by economic (NDC) or financial market (FDC) returns this problem does not arise. FDC and NDC put most of the risk on the worker while he or she is working and presents him or her with the alternative of postponing claiming an annuity in order to receive a higher benefit, for example as life expectancy increases. Generally speaking, both economic and financial growth can be expected during an annuity period, too. What is uncertain, however, is how much economic or financial growth can be factored into an annuity product, and what it

---

[18] See also Góra (2001a).

[19] See also Fox and Palmer (2001).

takes to safeguard such a "promise." The easiest way to minimise the risk of having to decrease a rate of return factored into the annuity product is to factor in a very conservative growth element and then give dividends according to some rule.

An associated problem involved with the need to perform a parametric change in DB schemes every once and awhile is that this provides an opportunity for political bargaining on all terms of the contract. In some political environments this also opens the door for special interest groups to demand that government grant them special privileges. In NDC and FDC the rules are set out clearly and there is no need for intervention on the part of the government, which limits the opportunities to change the terms of the contract.

Moral hazard arises when pension schemes provide paths for early exit from the labour force through the mandatory pension scheme, which reduces the size of the labour force and, hence, GDP and the contribution base. How can moral hazard arise? An example is a DB scheme that requires a fixed number of years for a full life benefit leading to early exit from the labour force of healthy and qualified persons. The consequence is a benefit of a given size during a longer period of retirement subsidised by remaining workers. Of course, even employers may find it to their advantage to encourage employees to take a benefit and exit early if there is no cost for them. In other words, for moral hazard, the important issue is how the system affects the behaviour of the various actors. In FDC and NDC schemes individual decisions to work less, including leaving the labour force relatively early led automatically to a lower benefit – compared to working more and/or postponing retirement.

The rate of return in the NDC scheme is by nature a diversification of the "portfolio" of all economic activity, not just assets traded in the more sophisticated financial markets, to which we have already alluded. Generally speaking, the NDC rate of return reflects the performance of a large number of investments, many of which are not traded in the equity markets (e.g. small enterprises). The price for this can be a rate of return below the financial market rate, and this is part of the explanation of why we observe in many countries (e.g. the US and Sweden) higher rates of return in the formal financial markets during the twentieth century. FDC schemes face a capital market risk, which can be managed by portfolio diversification. Total financial market collapse is

another risk. History shows that the equity market can fall substantially, but also that it eventually rebounds. A mix of NDC and FDC helps to offset the potential financial risk.

There also is a question of the interaction between the growth of an FDC saving scheme and the demand for government debt instruments. A strongly growing mandatory FDC scheme creates demand for debt instruments and makes it easier for the government to run a deficit and at a higher cost to future taxpayers. In the event this occurs, it creates an additional and unnecessary cost compared with an NDC scheme, with the economic rate of interest.

There is another risk, which is perhaps more serious in countries with less developed legal institutions, legal cultures and the effective means to enforce the law. This is the risk of fraud. Systems with financial rather than notional accounts are obviously more open to this problem. In order to cope with this countries in Latin America and Eastern Europe that have introduced mandated FDC have also been compelled to introduce costly measures to provide guarantees, which reduce rates of return, and in some cases have (costly) comprehensive supervisory procedures to detect fraud at an early stage.

Table 2 provides an overview of how the different schemes manage the various risks.

Table 2. Exposure to risks

	DB/Private	DB/Public	FDC	NDC
Demographic	Exposed	Exposed	Less exposed	Less exposed
Macroeconomic	Exposed	Exposed	Exposed	Exposed
Financial market	Exposed	Unexposed	Exposed	Unexposed
Moral hazard	Exposed	Heavily exposed	Unexposed	Unexposed
Political	Less exposed	Heavily exposed	Less exposed	Less exposed

7. Funded versus unfunded – What does it mean?

One of the dichotomies most frequently used in the pension literature is funded versus unfunded. It is useful to think of a continuum from unfunded to fully funded. Funded is usually applied to a situation where there is a financial reserve, but there are examples of schemes ranging from partial to full advanced funding. What *should* we mean by funded?

What is meant by funded depends on whether we focus on the assets behind the scheme or whether we focus on the question of saving. This gives us two concepts. If the first, being backed by assets, is the criterion, an NDC scheme is funded in the same sense as FDC. What separates these two situations is whether the assets are traded assets, as in the case of FDC, or non-traded, as in the case of NDC bonds.

In the second concept of funding FDC premium payments contribute to saving, as long as the fund grows and as long as the underlying financial assets are invested in debt assets not used to finance current public consumption, i.e. go to deferred consumption. NDC is not funded in this sense, however, since the underlying assets are not traded but represent debt rolled over into the future. On the other hand, the part of an FDC fund placed in government bonds is not funded in this sense as long as the debt instruments purchased cover public consumption rather than government investments. This brings us back to the fact that savings in private instruments constitute a claim on future profits, government bonds entail a claim on future revenues of the pension system in the case of NDC, or future tax revenues of the government.

Finally, the issue of funding can also be discussed in another sense. In FDC schemes saving only occurs as long as the increase in the fund exceeds the payments made. With a steady state population this means that in maturity the fully funded scheme corresponds to a demographic reserve fund. In this sense it is as if it were only partially funded. On the other hand an actuarially adjusted, unfunded scheme (either DB or DC) needs demographic reserves. This leads us to believe that there is not such thing as an unfunded scheme in economic terms. Of course, both under and overfunding can arise.

The above arguments lead us to conclude that what is typically called funding and pay-as-you-go are distinguished in economic terms in terms of the externalities they create. In the next section we bring these together.

7. Externalities

Negative externalities can arise due to lack of neutrality in the design of a scheme. For neutrality to hold, a scheme must also be transparent. FDC and NDC schemes are neutral in terms of how they affect incentives to participate – only contributions paid matter. We have already discussed many of the negative externalities normally created in DB schemes. Here we try to bring these thoughts together. In addition, there are positive externalities created by NDC and FDC that also need to be brought into the picture before the story is complete. We begin with the negative externalities.

First, when the link between contributions and benefits is weak, as is the case in many DB schemes, people who are in the position to evade may do so, while those who are in a position where they have to pay are penalised – they have to pay for both themselves and those who evade. FDC and NDC schemes are fair in this sense as they only base benefits on contributions made. Whether FDC and NDC encourage participation is of course another question. This depends on, among other things, the overall economic, legal and administrative environment. However, the incentive to evade is at least neutralised, and is probably reduced.[20]

NDC and FDC schemes are neutral with regard to the individual retirement decisions, since annuities are based on career earnings and life expectancy at retirement. Although DB systems exist that come close to this, we repeat that unless the mandated DB scheme works exactly as a DC scheme in this sense, it can give rise to negative externalities. In calculating the loss in lifetime resources (tax on continuing to work) from not leaving the labour force, people will have economic incentive to retire earlier.[21] People behave rationally by retiring early if this is in their interests, but rational individual decisions in this case are not consistent with the interests of society at large. This externality is a clear example of moral hazard, as we have discussed above under the heading of risk.

---

[20] Góra (2001b).

NDC and FDC can prevent opening the arena for groups of people who will argue that they should have special treatment in the system. There are examples in many countries of groups claiming special rights.[22] Another problem is that what might have appeared to be justifiable when the DB special rights are granted could change with time. For example, the work environment has often provided a reason to claim the right for one group to retire earlier than others, but with a full benefit. Poor work environments should, can and do change, and people can perform new work tasks in the same organisation. However, it is difficult to change special rights once they have been granted. Instead, there will always be new groups knocking at the door of the legislative body presenting their case for why they should have full benefits during a longer period than others. As the exceptions increase in number, what is normal becomes clouded and can easily appear unfair to those for whom the full rules apply.

In the DB world, politicians can be seen as having two constituencies, those who demand special rights and others. Politicians do not, of course, have to pay themselves for the concessions they make, but on the other hand can trade grants of special rights for political support. Those who have to pay are usually not consulted, and usually do not know that they will have to pay. In sum, in the DB world, the optimum strategy for the politician with a life span reaching up to the next election is to distribute rights, unless there is some immediate budget constraint. The problem in the pension context is that politicians are restricted by next year's budget constraint, but seldom by a long-run budget constraint.

In the FDC and NDC saving schemes, the political bargaining process for special groups works differently. If the political system wants to grant something extra to a group, this is still possible, but each decision of this nature carries an explicit price tag. Instead of pushing off payments until the time when people cash in at retirement, DC requires financing from the outset. In FDC and NDC schemes, real money has to be periodically transferred into the schemes to pay for these special rights. In NDC this

---

[21] This is the message of the 12 country examples published in the Gruber and Wise (1999) cross-country study of incentives and retirement.

[22] In Eastern and Western Europe, but in Latin America as well, there is a legacy of granting privileges to many special groups.

money will be held in the reserve fund as it awaits its payment time. This has the effect of creating assets in the same period that the liability is accrued. In sum FDC and NDC pushes the potential for bargaining out of the pension system.

FDC and NDC schemes also control automatically the size of the pension system, providing a remedy to the DB problem of ever increasing commitments and costs created for coming generations. The hidden debt involved in increasing commitments has the effect of slowing down growth, as taxes are increased. This is analysed in a recent OECD study (OECD 2000). In addition, as we have discussed above, the tax wedge implicit in the construction of DB systems has a potential of holding back growth by reducing employment.

In sum, FDC and NDC deal equally well with the negative externalities inherent in DB systems. In this sense, they are neutral in terms of creating negative externalities. The next question is whether positive externalities can be created by either of these systems. The answer is implicit in the common view of why FDC dominates NDC. NDC can only roll a debt forward in time albeit at no cost, while FDC can create real saving. To the extent that the financial account system does not replace or crowd out private initiatives that would have evolved instead, mandated FDC schemes can force a country to save more. In a dynamic, efficient setting where mandatory saving does not replace similar private saving, FDC non-government-bond saving will also contribute to economic growth through financing real investment.

Finally, there is a positive externality of FDC that does not exist in NDC. When a mandated FDC system places savings in government bonds, the effect is similar to that of NDC, except for the fact that bonds in an FDC system can contribute to developing the financial market. If mandated financial schemes invest savings in non-government financial market assets then this promotes financial market development even more strongly. This effect is documented for emerging financial markets.[23]

[23] See Holzmann (1997) for a study of the introduction of the mandatory scheme in Chile.

8. Conclusions

The major conclusion of this paper is that how we view pensions is in a process of shifting. The reengineering of pension systems in the 1990s has led to the design of a new vehicle for efficient accumulation over the life cycle, and the creation of an annuity based on life expectancy. This vehicle is the NDC scheme, which manages risks and eliminates negative externalities achieving the advantages of FDC systems in this respect. NDC schemes fall short of FDC schemes in that they lack the potential of FDC schemes to channel saving into the equity market, and cannot promote financial market development or national saving. On the other hand NDC schemes – as opposed to FDC based on government bonds – do not create a risk of a future need to increase taxes and are more robust to fraud and other ways of misusing pension system money. In all other respects, NDC and FDC schemes are the same.

Part of the logic of DC schemes (NDC and FDC) is the logic of separating the lifetime saving problem of individuals from the social political goals of redistributing income to the lifetime poor and financing other socially motivated transfers. FDC and NDC systems are transparent and economically efficiently. In addition, they fit well together and can provide a mix of the pension portfolio between bond and equity financing. Both NDC and private equities based FDC are financially stable. Combining them can be even more efficient since it smoothes fluctuations in performance of GDP and financial markets.

Appendix. How have countries implemented NDC?

During the 1990s DC schemes - NDC or both NDC and FDC - have replaced DB schemes entirely in four European countries, namely Italy, Latvia, Poland and Sweden.[24] Other countries are considering change in line with this thinking.[25] In the construction of their NDC schemes countries have made some choices that diverge from the model described above. Do these also imply divergences from the principles?

As we have already noted, using the growth of the contribution base as the rate of return on accounts in the NDC scheme is a necessary condition to obtain financial stability. Is this what countries do in practice? The answer is both yes and no. Latvia follows this rule to the letter. Poland levies a tax of 25 % on NDC rate of return, and as a result offers an advantage to FDC schemes in Poland, since these are not taxed.[26] The tax, however, does not cause any risk of financial instability. Italy uses GDP growth, which in the long run may be a good proxy for the growth of the contribution base, but will give rise to financial instability to the extent the divergence is prolonged and non-random, since Italy has no other correction mechanism.

Sweden took a different course (Palmer 2000, 2001). Returns on NDC accounts follow average wage growth, in order to try to maintain equality in the growth of average wages and pensions – everything else equal. However, a per-capita-wage based rate of return would be too high with declining labour force, i.e. number of contributors. This

[24] The principles and formulation of NDC pension schemes has been discussed by a number of authors in conjunction with the introduction of these schemes. See, for example, Palmer (1999), Fox and Palmer (1999) for Latvia, Palmer for Sweden in a series of monographs leading to Palmer (2000) and Palmer (2001), and similarly Góra and Rutkowski for Poland in a series of monographs leading to Chlon, Góra and Rutkowski (1999) and Góra (2001a), and for Italy Tumbarello (1998).

[25] It should be noted that the name NDC becoming popular sometimes is used to denote systems which are subject to discretional decisions, which can be far from NDC neutrality.

[26] One might suggest taxing financial funds similarly, although the best solution would be to tax neither, and wait and tax benefits on an equal basis as they are paid out. Note that Sweden had the problem in introducing its mandatory FDC scheme that private funds are taxed (which has been heatedly debated in Sweden). In order to create "equality" with the NDC scheme, Sweden decided not to tax the FDC accounts in the mandatory scheme, as benefits are also taxed upon realisation.

downside risk is covered by the "balance mechanism" in the Swedish scheme, an index relating current assets to current liabilities that adjusts account values (and benefits) if the ratio of assets to liabilities falls below unity (Settergren 2001). In sum Latvia, Poland and Sweden all follow the "pure" NDC model. In fact, it can be argued that Sweden's balance mechanism puts the final building block into place, as it makes it possible to sweep up after any form of deficiency, according to a well-specified rule – rather than political discretion.

At retirement, account values in the NDC scheme are annuitised, based on life expectancy for persons at the age of the retiree. In principle, schemes can also afford to give these annuities a rate of return also equal to the growth in the contribution wage base. Latvia has chosen price indexation and Poland price plus 20 % of real wage indexation. Both are aiming for economic indexation in the long run. However, in practice, when countries make the transformation from the "old" system to NDC, a major consideration is whether or not they can afford to index all previous commitments with the economic rate of return, and whether it is fair to have one form of indexation for the "old law" pensioners and another for the NDC pensioners. The answer has been no in all four countries. The method chosen has been applied to both old and new law pensioners. We do not discuss here other issues related to transition from the "old" system to either NDC or FDC, although these are important.

The fact that the Poles "tax" their accounts and the Swedes first give a rate of return based on growth in the per-capita contribution base and then adjust for this according to a rule that follows the principle of NDC corresponds exactly with the principle that the net present value of an individual's account value is always equal to the expected value of his/her entitlement, and that any return offered to pensioners is financed within the scheme with a rate of return on NDC assets. To see the latter, simply view the NDC scheme as a scheme holding government bonds covering all liabilities and giving a rate of return equal to the real rate of growth of the contribution base.

Once the life expectancy factor is set it is permanent in all the countries discussed here. An option not chosen, then, would be to change it every year for every pensioned cohort. There are additional technical problems that arise in the actual construction of the

NDC scheme that are non-trivial. The actuarial problems associated with life expectancy are the same in the FDC and NDC schemes. There has to be a method for calculating life expectancy, and there are options for this, each with advantages and disadvantages. One option is to avoid the judgements needed for forecasting by basing the life expectancy estimate only on current data for persons in the relevant age groups. This is the approach chosen by Italy, Poland and Sweden. In the Italian case the factor is not adjusted on a yearly basis as it is in Poland and Sweden. This has the advantage of not being open to manipulation, but the disadvantage that it is likely to underestimate the longevity of cohorts, creating a deficit in the scheme that will have to be covered in the future.

The other option is to produce individual cohort estimates, which is likely to be more correct, but can be claimed to open the system to manipulation. With strict actuarial supervision the manipulation should not be a risk, however. This is the method chosen by Latvia.

Finally, it is important to point out that the transition into NDC is a separate issue in itself, and is too large to discuss here in depth. The countries discussed here have all approached the transition differently. At the point of transition the stock of pensioners is still the same group that was there prior to the reform. The transition starts, then with some future birth cohort of pensioners. Full transition can not be achieved until all pensioners have a benefit according to the new rules. The faster the new cohorts entering retirement are covered by the new rules, the sooner the stability properties of the NDC system will fully prevail. Valdes-Prieto (2000) claims that NDC is not in balance, but he gets this result by assuming that the politicians can choose the rate of return, rather than by setting the rate of return equal to the growth of contributions, which is a criterion for stability, as we have discussed in this paper.

References

Boskin, Michael, Kotlikoff, Laurence J. and John Shoven, 1988. *A Proposal for Fundamental Social Security Reform in the 21st Century*. Lexington Books.

Buchanan, James M., 1968. "Social Insurance in a Growing Economy: A Proposal for Radical Reform", *National Tax Journal*, vol. 21, pp.386-95.

Chlon, Agnieszka, Marek Góra and Michal Rutkowski, 1999. "Shaping Pension Reform in Poland: Security through Diversity", *World Bank Pension Reform Primer*, Washington, D.C.

Cichon, Michael, 1999. "Old Wine in New Bottles?" *International Social Security Review*, vol. 52, no. 4, pp. 87-105.

Diamond, Peter, 1997. "Insulation of Pensions from Political Risk", in Salvador Valdes-Prieto (ed.) The Economics of Pensions, Cambridge University Press.

Disney, Richard, 2000. "Notional Accounts as a Pension Reform Strategy: An Evaluation", *World Bank Pension Reform Primer*, Washington, D.C.

Fox, Louise and Edward Palmer, 1999. "Latvian Pension Reform". Social Protection Discussion Paper 9922. World Bank, Washington, D.C.

Fox, Louise and Edward Palmer, 2001. "New Approaches to Multipillar Pension Systems: What in the World is Going on?", in *New Ideas about Old Age Security* (Robert Holzmann and Joseph E. Stiglitz, eds.). The World Bank, Washington, D.C.

Góra, Marek, 2001a. *Polski sposób na reformę emerytalną*, Izba Gospodarcza Towarzystw Emerytalnych, Warszawa [in Polish][Short English version: "Polish Approach to Pension Reform", *OECD Private Pension Systems*, No.3, pp. 227-246, OECD, Paris].

Góra, Marek, 2001b. "Koszty, oszczędności oraz efekty zewnętrzne związane z wprowadzeniem nowego systemu emerytalnego", Zeszyty BRE Bank – CASE, No.57, ss.7-36 [in Polish].

Góra, Marek and Michal Rutkowski, 1998. "The Quest for Pension Reform, *World Bank Pension Reform Primer*, Washington, D.C.

Gruber, Jonathan and David Wise (1999), *Social Security and Retirement Around the World,* NBER Volume, University of Chicago Press, Chicago.

Hassler, John and Assar Lindbeck, 1997. "Optimal actuarial fairness in pension systems: A note," in *Economic Letters*, Vol. 55, pp. 251-255.

Holzmann, Robert, 1997. "Pension Reform, Financial Market Development and Economic Growth: Preliminary Evidence from Chile", *IMF Staff Papers* 44, No.2, pp.149-178.

OECD, 2000. *Reforms for an Ageing Society*, OECD, Paris.

Palmer, Edward, 1999. “Individual Decisions and Aggregate Stability in the NDC System.” Processed.

Palmer, Edward and Mårten Palme, (1988). "A Macroeconomic Analysis of Employer-Contribution Financed Social Security in Sweden" in *The Political Economy of Social Security*. Ed. by A. Klevmarken and B. Gustafsson. Elsevier Science Publishers. Amsterdam.

Palmer, Edward, 2000. ”The Swedish Pension Reform – Framework and Issues”, *World Bank Pension Primer*, Washington, D.C.

Palmer, Edward, 2001. “Swedish Pension Reform – How Did It Evolve and What Does It Mean for the Future?”, in Feldstein, M and H. Siebert (eds) *Coping with the Pension Crisis: Where Does Europe Stand?* Chicago: University of Chicago Press (forthcoming).

Settergren, Ole, Nils Holmgren, Jonas Leander and Boguslav Mikula 2000 *The Automatic Balance Mechanism in the Swedish Pension System*. RFV Analyserar 2000:1. Stockholm: The National Social Insurance Board.

Settergren, Ole, 2001. "The Automatic Balansing Mechamism of the Swedish Pension System - a non-technical introduction", Wirtschaftspolitische Blätter 4/2001.

Tumbarello, Patrizia, 1998. ”The Italian pension system: A case for notional accounts”, mimeo.

Valdes-Prieto, Salvador, 2000. “The Financial Stability of Notional Account Pensions”, *Scandinavian Journal of Economics*, vol. 102, no. 3, pp. 395-417.

World Bank, 1994. *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth*. Washington, D.C.