From Traditional DP to Notional DC Systems

Axel Börsch-Supan

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Reframing PAYG contributions to "notional savings"

Axel Börsch-Supan

Mannheim Institute for the Economics of Aging (MEA), Mannheim University

National Bureau of Economic Research (NBER), Cambridge, Mass., USA

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Abstract

This paper provides a critical review of the pension reform strategy which turns defined benefits (DB) public pay-as-you-go systems into notional defined contribution (NDC) systems. We show that properly designed NDC public pension systems contain powerful economic and political mechanisms that may facilitate pension reform, but that the distinction between public NDC and DB systems is more ambiguous than usually claimed (JEL: H55, J14, J26).

1. Introduction

The pressures exerted by population aging, amplified by negative incentive effects, make public pension systems unsustainable all over the world and have led to major pension reforms in many countries. These reforms follow a wave like pattern. After a wave with a strong stress on pre-funding, the newest wave of reforms fashion "notional defined contribution" (NDC) systems. Some proponents argue that NDC systems make a large step to solve most major public pension problems in one big stroke (Palmer, 2000; Chlon, Gora and Rutkowski, 1999). Skeptics argue that they add little new but may distract from deeper reform (Disney, 1999; Valdes-Prieto, 2000). This paper's aim is to review this reform strategy, both in economic and political terms, and look at the implementations in Sweden, Italy and Germany. We provide a taxonomy of pension systems and show how blurred the distinction between conventional defined benefit (DB) and NDC public pension systems can become.

Our main results are: Properly designed NDC public pension systems contain powerful economic and political mechanisms that may facilitate pension reform, most prominently transparency and accountability. Cleverly designed DB systems, however, may often do the same job, in some countries even better. Whether NDC public pension systems bring new life into the pension debate is therefore a question of the historical path in each country.

2. Notional Defined Contribution Systems

Notional defined contribution systems were legislated 1994 in Sweden and 1995 in Italy, among other countries. In Sweden, the new system was introduced for all employees with a 15-year transition period. Palmer (2000) provides a good description of the Swedish NDC system and its transition. In Italy, the NDC system was introduced as part of the so-called Dini-Reform with a very long transition period. It will be relevant only for workers who are younger than the baby boom generation. Franco and Sator (2003) provide a critical evaluation. While Sweden and

Italy are the most often quoted examples of NDC systems, they have been pioneered in Latvia and Poland, more or less as trial grounds (Rutkowski, 1998).

NDC systems are accounting devices that treat pay-as-you-go (PAYG) systems like defined contribution (DC) systems. Pension benefits are paid out of current contributions like in a conventional PAYG system, but the link between benefits and contributions is individualized and defined by the NDC accounting mechanism.

Like any other DC system, the system starts with the individual contributions to the pension system which are credited to, and accumulated on, individual accounts kept by the pension system. The balance is fictitious (or "notional") since no real capital is accumulated. The accumulated sum represents the fictitious (or "notional") pension wealth.

The balance earns interest at some rate of return. The magnitude of this return is a central parameter of the NDC system. Since no capital is accumulated and the claims on the balance are not traded, there is no natural market-mechanism to determine the rate of return. Viewed from a macroeconomic perspective, the "natural" rate of return for a NDC system is the implicit return of a PAYG system, i.e. the growth rate of the contribution bill. However, some NDC systems – such as the Swedish system – have chosen rates of return which are higher under current circumstances, such as the rate of wage growth.

Upon entering retirement, the notional pension wealth is converted into a lifelong pension according to actuarial rules. The annual pension benefit depends on three variables:

- the notional pension wealth (proportionality guarantees equivalence)

- the interest rate used to compute the annuity (using the implicit rate of return from the PAYG system guarantees equivalence within each birth cohort), and

- life expectancy at retirement (using up-to-date cohort-specific life tables guarantees actuarial sustainability).

The two last elements are often combined and referred to as "annuitization divisors" (or "G-values" in Sweden and Latvia). In Italy, these values have been tabulated. Benefits *B* are then *B = NPW/G,* where *NPW* denotes the notional pension wealth.

Since the benefit computation includes the implicit rate of return from a PAYG system and the expected length of retirement, benefits are linked to demography and employment. This makes NDC systems in principle more sustainable than most conventional DB systems because the expected changes in the demographic and macroeconomic environment will automatically lower benefits. And since the remaining life expectancy at the individually chosen retirement age codetermines benefits, NDC systems are automatically actuarially neutral *at the employed "notional" rate of interest.*

So far, so good. The actual properties of a specific NDC system, however, depend on many design details. First and foremost, the determination of the "notional" interest rate is central since it governs both the demographic and macroeconomic sustainability of the system and the microeconomic incentive effects. Second, it makes a big difference which life tables are used. Third, the extent to which retirees are protected from future shocks is an important parameter potentially conflicting with financial sustainability.

NDC accounting systems do not change the mechanics of PAYG systems, i.e. the necessity to adapt either the contributions or the replacement rate (or both) to changes in the demographic or macroeconomic environment. This is an important point. The current young generation pays the current old generation. The determination of the notional interest rate and the estimated remaining life expectancy amounts to the specification of the link between benefits (represented by some replacement rate) and contributions (represented by some payroll-tax rate). By changing this link, the system can shift the burden of population aging between the younger and the older generation. A pure NDC system cannot mimic a pre-funded system in the sense that the financial burden of a cohorts' worth of pensions will be carried by that same cohort.

The significance of this point is most clearly seen in the sudden transition from a thick baby boom to a thin baby bust generation. If the thick baby boom generation should finance a major part of their retirement income out of their own income, rather out the income of the much thinner baby bust generation, the baby boomers need to give up some consumption early in life and transfer the corresponding resources to their post-retirement period. This requires saving and the build-up of a real capital stock by the baby boomers. A notional capital stock cannot serve this purpose, because the annuities computed from the national wealth accumulated by the baby boomers have to be financed by the contributions of the baby bust generation.

3. A taxonomy of pension systems: where to allocate NDC systems

How close are NDC systems to funded DC systems? How close are they to conventional DB systems? The taxonomy in Table 1 serves to clarify matters. It distinguishes pension systems by four dimensions. The many possible design features add additional complexity to these.

Table 1: Dimensions of pension systems

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(1) Credits for contributions

Base: Life-long..............Best x years……..…...Final salary……..……Flat

Weights: Early vs. later contributions (-> interest)...........Equal (point system)

(2) Accrual of interest:

Rate: r (market)………….......g (wages.)…………$n+g$ (Aaron-Samuelson)

(3) Conversion to benefits:

Conversion: Linear (equivalence)……………………….Concave (redistributive)

Indexation: NDC: B=NPW/G………...….DB: B=f(credits, other; accrual rate)

Actuarial: Neutral at retirement (at the margin)...Flat

Risk: Benefits frozen at retirement…...Indexation rules......Fully adjustable

(4) Funding:

Extent: No fund at all..................Reserve buffer……..….........Fully funded

Collateral: None…….…...Government bonds………...Commercial bonds/stocks

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One of the main features of Table 1 is that all above dimensions provide a continuum of allocations. NDC systems often enforce an extreme position along one dimension, while some conventional DB systems take the other extreme. The middle ground, however, is large, and a few DB systems come close to NDC systems in many dimensions of Table 1.

Stripped down to its economic essence, three mechanisms are the crucial ingredients which make a PAYG system a NDC system:

(1) An accounting mechanism that credits all life-time earnings

(2) A mechanism linking the final balance to the demographic and macroeconomic environment

(3) An actuarial rule converting the final balance into an annuity.

As opposed to funded (or financial) DC plans, however, claims on future benefits in notional DC systems are not collaterized by real capital but rest on government promises.

The first mechanism in Table 1 is realized in NDC systems by crediting all life-time contributions to an individual account, just like funded DC plans. This parallels in many respects the German and French point systems, except that the unit of credit is currency (Euro), not earnings points. These systems substantially differ from pension systems in which only the x best years are credited (at the extreme, only last year's earnings), and from Beveridgian systems that provide flat benefits (e.g., in the UK and the Netherlands). Nonetheless, there is nothing intrinsic in DB systems which prevents them from linking benefits to *all* life-time earnings.

The second mechanism is realized in NDC systems by the notional interest rate. In a funded system, the internal rate of return is r, the market rate of interest. In a PAYG system, the theoretical internal rate of return is $n+g$, where n is the rate of growth of the contribution base, and g the growth rate of labor productivity. In reality, most PAYG-DB systems have a systemic indexation linking benefits at retirement to the current wage level, thereby taking account of labor productivity g. Demography, however, usually enters through discretionary adaptations of the replacement rate to demographic changes (thereby taking account of n). One of the main

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features of NDC systems is the direct and automatic linkage to both wages and demography if the notional interest rate corresponds to the growth rate of the contribution base. In the Swedish NDC system, however, the government chose g as the notional rate of interest, leaving out a direct link of accruing interest to demography.[1] In an aging population, $n+g$ tends to be smaller than g since n is negative, and it is in most circumstances much smaller than r.

In turn, the German DB system after the 2004 reform indexes benefits to earnings growth *and* changes in the system dependency ratio via the so-called "sustainability factor".[2] This approximates the effect of the accumulated interest in a NDC system, in which the internal rate of interest is the growth rate of the contribution bill $(1+n)*(1+g)$. This is easy to see in the stylized case when all contributions (normalized to one unit) are credited upfront. In this stylized NDC case the notional pension wealth after T years is $T*(1+n)^T*(1+g)^T$; the pension benefit is therefore $P=T*(1+n)^T*(1+g)^T/G$ where G denotes the annuity factor. In the German DB system, this average worker earns T earnings points, and during these T years, the average pension value PV will increase with the rate of wage growth (g) and the growth rate of the dependency ratio (n, if the number of pensioners remains constant): $PV_T = PV_0 *(1+n)^T*(1+g)^T$. Hence, the pension benefit is $P= T*PV_0*(1+n)^T*(1+g)^T$, proportional to the NDC value. Quite ironically, therefore, the German DB system comes closer to the idea of a pure NDC system than the NDC system implemented in Sweden.

An important aspect of practical pension policy is how strictly the indexation rules are adhered to. The Swedish NDC and the German DB system attempt to avoid discretionary decisions. In both countries, the benefit rules are written into the law as mathematical formulae.

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[1] Demography enters directly through longevity-dependent annuities, and it bites into the reserve fund. In addition, Sweden has a re-balancing mechanism once these mechanisms fail (see Settergren, 2001).

[2] See Börsch-Supan and Wilke (2003) for details.

This reduces the political risk. So far, this attempt has been fairly successful in Sweden, and, with some notable exceptions between 1999 and 2001, also in Germany. Discretionary deviations have taken place more often in the French point system, and the Italian NDC system leaves ample room for discretionary adaptations to the political climate. The future has yet to show whether the political risk is smaller in NDC systems than in conventional DB systems.

The third mechanism in Table 1 is the essence of the *B=NPW/G* rule. Proportionality between *B* and *NPW* and an actuarial determination of *G* makes NDC systems actuarially neutral. Some conventional PAYG systems have actuarial adjustments, notably the US Social Security system between the ages of 62 and 65. Most DB-type PAYG systems, however, have no or little linkage between annual benefits and retirement age (Gruber and Wise, 1999), while funded DC plans are automatically actuarially neutral, since conversion to an annuity takes place at actual retirement.

NDC systems share this feature of automatic actuarial neutrality – but only in a superficial sense. While the present discounted value (PDV) of benefits computed *at the internal rate of return of the NDC system* is independent of the actual retirement age, workers tend to use higher discount rates when they are computing the PDV in order to make retirement decisions.[3] This difference creates a wedge between actuarial neutrality and the absence of labor supply disincentives. This is an important point: NDC systems are actuarially neutral in the above sense, but they may still create substantial labor supply disincentives.

4. Conclusion: The Pros and Cons of NDC Systems

Our main result so far is that NDC systems are accounting devices with properties which can be (but often are not) introduced in DB systems as well. They provide more transparency and

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[3] Empirically measured personal discount rates tend be even larger than *r*, and this by a substantial margin, see Frederick, Loewenstein and O'Donoghue (2002).

credibility because some features come more "naturally" in a NDC system than through complex formulae in a DB system, but it is often more rhetoric than economic substance which distinguishes NDC and DB systems.

NDC are closer to traditional DB than to funded DC systems. While most PAYG systems have some reserve fund (the Swedish reserve fund amounts to some 5 years, the German to a few days worth of expenditures), the notional balances are not claims against real capital, but against future tax payers. NDC systems are thus *no substitute for pre-funding*. They do not change the basic PAYG mechanism in which the children pay for the pensions of their parents, and they do not create savings unless they generate benefit cuts which in turn induce saving rates.

There are other claims about NDC systems that are not true. NDC systems *do not automatically fulfill the PAYG budget constraint* when economic parameters change if annuities are frozen at retirement and the contribution rate is fixed, since there is no feedback mechanism if longevity of current pensioners increases unexpectedly.

NDC systems are *not automatically sustainable* unless the contribution rate is fixed and the rate of return equals the contribution bill (or the system follows an equivalent trajectory). In most realized NDC systems (e.g., Italy, Sweden, Poland), however, there are ex-post adjustments of benefits to the economic and demographic environment which have the same unsustainable features as they occur in conventional DB systems.

There are many advantages, however. If correctly designed, NDC systems will – to some extent – *automatically respond to changes in the demographic and macroeconomic environment* because benefits are indexed to longevity (due to the annuitization mechanism) and employment (through a correctly computed notional rate of interest).

NDC systems have important microeconomic effects. They create a sense for *actuarial fairness* (because benefits are linked to life-time contributions) and *actuarial neutrality* (because benefits are actuarially linked to retirement age). NDC systems expose redistribution because

any non-contributory credits appear clearly marked on the account statements.

NDC systems change the *rhetoric of pension systems*. They make people *think in accounts*, making the transition to partial funding psychologically easier. By *exposing the dwindling balance of first pillar pensions*, NDC systems may create incentives to save in the second and third pillars. *Thinking in "pension wealth"* eases portability within a country and between countries, enables interpersonal transfers (e.g., between husband and spouse), and eases replacement of survivor pensions by independent pension claims.

NDC systems also *take certain issues out of the political agenda*, easing the pressures against pension reform. They minimize the role of the normal retirement age, permitting a flexible choice between consumption (working longer) and leisure (receiving a lower replace-ment rate). They change the focus of debate from parametric reform to the introduction of "a new system" (while, as we have seen, this is not the case in terms of actual economic substance). A "new system" alleviates parameter change. The usage as a rhetorical device, although not without irony, should not be belittled, and insights among workers and pensioners precipitated by a new rhetoric may have real economic effects, such as later retirement or more saving.

NDC systems are well positioned to manage the *challenge of longevity*. They react to slow *changes in fertility* through the internal rate of return, but not to sudden changes of fertility. Countries in which the younger generation will be overwhelmed by the financial burden of pensions need pre-funding, because only pre-funding enables the members of the older generation to carry a major part of the pension burden themselves. Hence, a combination of NDC reform with a significant extent of pre-funding looks like a fruitful path of future pension reform.

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