

Notional Defined Contribution Pension Systems in a Stochastic Context: Design and Stability

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Around the world, Pay-As-You-Go (PAYGO) public pension programs face serious long-term fiscal problems due primarily to actual and projected population aging, and most appear unsustainable as currently structured. Some have proposed the replacement of such plans with systems of fully funded private or personal Defined Contribution (DC) accounts, but the difficulties of transition to funded systems have limited their implementation. Recently, a new variety of public pension program known as “Notional Defined Contribution” or “Non-financial Defined Contribution” (NDC) has been created and implemented by Sweden, with first payments in 2001. A number of other countries have introduced or are planning to introduce NDC plans, including Italy, Poland, Latvia, Mongolia and the Kyrgyz Republic, and proposed new plans for France and Germany have NDC aspects.

NDC programs differ in detail, but the basic principle is that they mimic Defined Contribution plans without actually setting aside assets as such plans do. Under an NDC program, a notional capital account is maintained for each participant. Balances in this account earn a rate of return that is declared by the pension plan each year; and notional payments into this account are made over the entire life history to mirror actual taxes or contributions. Together with the declared rate of return these notional contributions determine the value of the account at any point in time. After a designated age such as 62, a participant can choose to begin to draw benefits, which is done by using the account to purchase an annuity from the pension plan. The terms of the annuity will depend on mortality at the time the generation turns 65 (for example) and on a rate of return stipulated by the pension plan.

NDC plans are seen as having many potential advantages over traditional PAYGO systems, but our focus in this paper is on just one of these potential advantages, stability. A plan of this sort appears structured to achieve a considerable degree of fiscal stability because the promised rates of return reflect the program’s underlying PAYGO nature, rather than being market-based, and the annuity structure should buffer the system from the costs of rising longevity. Further, in the event that the program’s finances move toward imbalance, a braking mechanism can be incorporated which automatically modifies the rate of return, to help restore the plan to financial health. Given the political difficulties of making frequent changes in PAYGO pension programs, the attractiveness of an inherently stable system is clear.

In this paper, we use a stochastic macro model for forecasting and simulating Social Security finances to examine the behavior of NDC-type public pension programs in the context of the US demography and economy. Given the structure and strategy of the stochastic model, we can study the probability distribution of outcomes (benefit flows and rates of return) for generations (birth cohorts) of plan participants for the NDC program, as well as the overall financial stability of the NDC system.

The study finds that an NDC system similar to that currently in use in Sweden, which bases rates of return on the growth rate of average wages and utilizes a brake to adjust the rate of return during periods of financial stress, ensures effectively against excessive debt accumulation but, very much like a simpler asymmetric brake, leads on average to considerable asset accumulation. Put differently, the asymmetric brake makes a correction in the system when the financial balances of the system move toward increased debt, but no similar correction is made when the financial balances move toward asset accumulation. Only a symmetric brake, which raises rates of return during periods of financial strength, can avoid considerable accumulations of financial assets on some paths.

Other findings from the simulations are (1) the brake can be more gradual than under the Swedish system and still provide a stable distribution of outcomes, (2) an NDC system in which rates of return are based on total rather than per capita economic growth is inherently more stable than the basic NDC system, without reference to the brake mechanism in use, and (3) a considerable share of the volatility in the financial performance of NDC systems is attributable to economic, rather than demographic, uncertainty.

The full working paper is available on our website, www.nber.org/programs/ag/rrc/books&papers.html as paper NB06-09.

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