

## Welfare and Generational Equity in Sustainable Unfunded Pension Systems

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Actual and projected population aging threatens the financial viability of Pay-As-You-Go (PAYGO) pension programs in many countries. These programs promise a level of benefits that cannot be sustained given current tax rates, so deep structural reforms are expected and in some countries have already occurred. Beyond the problem of fiscal instability, most PAYGO programs are defined benefit programs that may distort decisions about work and retirement, as well as reducing saving and capital accumulation.

Reforms that adjust the general level of taxes or benefits in PAYGO programs can address the problem of fiscal sustainability, but would have little effect on incentives for work or saving. A new kind of pension program, called Notional Defined Contribution or Non-financial Defined Contribution (NDC), is intended to address both fiscal stability and labor supply incentives. Sweden has developed and implemented an NDC system and some other countries have followed suit including Italy, Poland, Latvia, Mongolia and the Kyrgyz Republic. Germany has recently adopted pension reforms that reflect some of the NDC principles, and France is considering doing so.

NDC plans are intended to mimic the structure and incentives of defined contribution plans in that individuals contribute to their own accounts which yield a specified rate of return and are converted into annuities at an age chosen by the individual but above some stated minimum age. The specified rate of return earned by the accounts and paid by the annuity is in principle linked to the growth rate of total wages, which is the sustainable rate of return in a steady state PAYGO system. The terms of the annuity reflect current mortality conditions, so they index automatically to life expectancy and, therefore, are fiscally sustainable despite increasing longevity. Furthermore, the individual accounts establish a clear link between contributions and benefits, thereby reducing or eliminating the labor supply distortions of defined benefit systems. And because NDC systems are PAYGO and do not hold significant assets, they avoid the painful transitional costs to a fully funded system.

In this paper, our goal is to analyze the generational uncertainty and risk sharing properties of NDC systems. We consider a number of actual and hypothetical PAYGO pension structures, including: (1) versions of the U.S. Social Security system in which taxes or benefits are adjusted annually to maintain fiscal balance with zero debt or assets in every period; (2) the actual Swedish NDC system, together with several modifications of it developed in an earlier paper; and (3) the actual reformed German system.

A goal of NDC systems is to deliver a rate of return to contributors that is warranted by the macroeconomic/demographic environment, while maintaining financial stability. Important features of NDC system design are the rate of return paid in the notional accounts, and the design of a “brake mechanism,” if the financial stability of the program becomes imbalanced in some way. Simulating a diversity of future macroeconomic and demographic scenarios, the NDC plan being used in Sweden is

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found to have a lower variance in financial outcomes and a greater smoothness in generational outcomes across future scenarios. The application of an asymmetric brake, which reduces the rate of return in some circumstances but never raises it, apparently plays a key role. An unexpected advantage is in the accumulation of assets, which avoids the application of the brake, and leaves the rate of return more stable – thus the lower variance, and the improved horizontal equity.

The down-side of the NDC system in Sweden is a lower mean rate of return than systems with a symmetric brake in which the rate of return can be increased as well as decreased. Using our expected utility measures, the stability that is gained in the Swedish system is not worth the cost to participants in terms of a reduced mean return. According to this measure, the best program with no risk aversion is the German system. The best programs with risk aversion are the NDC structures with symmetric brakes, rather than asymmetric brakes. In sum, the actual Swedish system provides the most stability and the greatest degree of horizontal equity, but at a cost of a lower mean return.

It is notable that the modifications to the U.S. Social Security system (through increased taxes and/or reduced benefits) are never close to best under any criterion. The distinctive feature of these systems is that in each period they adjust taxes or benefits to achieve perfect balance. Because this balancing is always done cross-sectionally, by proportionally adjusting all tax or benefit schedules, there is no attention to longitudinal outcomes across generations. Ultimately, the decision as to what criterion matters most must be political. We believe, however, that simulations of the kinds we have undertaken can help to inform the design of unfunded public pension systems and clarify the issues at stake in their choice.

The full working paper is available on our website, [www.nber.org/programs/ag/rrc/books&papers.html](http://www.nber.org/programs/ag/rrc/books&papers.html) as paper NB05-08.

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