

Chapter 12

Market Innovations to Better Allocate Generational Risk

Salvador Valdés-Prieto

In Western nations and Japan, social security payroll taxes are mainly used to pay benefits to middle-class workers. These systems operate like a mandatory old-age annuity-saving scheme paying a rate of return below market rates for similarly long-term and illiquid saving. In many these nations, two issues are of primary concern. First, these social security systems face prospective or actual insolvency, meaning they will be unable to fulfill benefit promises unless benefits are cut or taxes are raised. Second, and much less well known, these systems offer large opportunities for improving risk-sharing and reducing political risk. In this chapter we explore these opportunities and argue that substantial gains are available, without incurring transition costs and without increasing the public debt. These gains could be available to facilitate resolution of systemic long-term insolvency in social security schemes.

Political Risk and Social Security Adjustments

Pay-as-you-go (PAYGO) social security systems are often forced to adapt when subject to demographic, economic, and other shocks. In practice, these changes tend to occur via emergency changes in legislation, with the sponsoring government seeking to restore order while maintaining system-wide control. In such cases, politicians are often forced to consider the demands of critical interest groups and constituencies who influence the political process. Accordingly, politicians confronted with present-focused interest groups are apt to delay dealing with economic and demographic shocks as long as possible, rather than concerning themselves enough with future generations' well-being (Holzmann et al. 2005).

In the past, emergency legislation has been used to alter many system parameters including retirement ages and eligibility rules, benefit formulas, the period over which past earnings are averaged, the indexation of past earnings, the indexing rate for benefits in payment, coverage and levels of payroll taxes, and more. Such parametric changes seem highly unpredictable from the viewpoint of individual workers and pensioners,

transforming the mandatory old-age system into a lottery where parties may experience either huge gains or huge losses, depending on whether they are lucky or take cuts. Such political risk also impinges on national fiscal health, because social security programs tend to loom large relative to government budgets. For this reason, social security insolvency can boost the risk premium required by holders of public debt, which in turn damages taxpayers and beneficiaries of federal transfers in unpredictable ways.

Of course, policy discretion can sometimes be a valuable tool, if used to deal with uncertainty that cannot be pooled at low cost. For example, subsidies for disadvantaged groups which may appear in the future may be developed *ex post*, at the discretion of future legislators. Nevertheless, discretion in social security systems to date often appears to have been more harmful than beneficial, to date. A possible response would be to improve the way that government discretion works. For example, in Sweden, automatic stabilizers were built into benefit formulas for their notional accounts, as a means of preserving the traditional PAYGO financing approach for the old-age system. Yet political risk remains, since such schemes do not attain full financial stability in the face of economic and demographic shocks. Moreover, if government-controlled funds are invested in corporate securities, they can be subject to 'socially targeted' political investment rules which might curtail participant returns. Having the government control the Trust Fund investments may expose a social security system to political and social suasion at the expense of the economy's performance (Cogan and Mitchell 2003).

Evidence on Political Risk. When social security systems run short of financing, interest groups may oppose even minor changes today—even if these changes would improve the system's long-term sustainability (Müller 2003). Reluctance to take on reforms is often sustained by efforts to suppress information about the financial status of social security programs. For example, in the USA, policymakers have habitually truncated the social security liability computation at an arbitrary seventy-five-year horizon, which severely understates the full scope of the problems faces (Gokhale and Smetters 2003; Kotlikoff and Burns 2004). In Europe some governments have actually boosted pension generosity during the 1990s (Boldrin et al. 1999), due to lack of awareness of the financing consequences of doing so.¹

There is also ample evidence that social security benefits are often changed quite arbitrarily, when the political need arises. For instance, the US Congress cut benefits in 1977, reducing promises by 19 percent for workers age 62 in 1980, and by 30 percent for those age 54 and younger in 1980. It also subjected more benefits to taxes, thus dropping replacement rates by about 7 percent, and raised the retirement age which will cut replacement rates by 14 percent when fully phased in. Other nations have seen even sharper cuts, as in the case of retirees in Russia and other

former Soviet Union countries during the 1990s. The Mexican social security system had promised benefits that replaced 40–80 percent of preretirement earnings plus health benefits in the 1970s, but when the 1982 debt crisis struck, the government defaulted on these promises with inflation over 50 percent per annum decimating real payments.² A similar history of fiscal unsustainability explains the benefit cuts behind the 1980 Chilean pension reform, the 1994 Argentinean reform, the 1993 Peruvian reform, and many others. The lottery aspect of political risk is evident in the case of Hungary: after a large shock to real wages and four legislated changes to the indexation of different components of the pension formula 1991–7, the benefits of retirees 1986–90 averaged 20–25 percent higher than those for persons who retired later (Augusztinovics et al. 2002). Holst (2005) calculates that political risk creates a welfare loss equivalent to 2–4 percent of the pension amount in the USA and Germany (Holst 2005).

A Better Representation of Social Security Finances. A symptom of this present focus is the reluctance to publish an annual balance sheet such as that in Table 12-1, illustrating the long-term insolvency problems facing a national social security system. If benefit and tax parameters are such that expected cash flows require the sponsor to provide additional future support to keep the system going, as in the right-hand panel of Table 12-1, the social security program is said to be insolvent.³ Conversely, if the program's assets (the PAYGO asset is defined below) are large enough to cover all anticipated liabilities, the social security program would be said to be solvent. The 'Implicit Fiscal Liability' (IFL) represents the gap—namely the present discounted value of the expected support to be provided by the federal government over the infinite horizon (following Geanakoplos et al. 1999).

The economics literature has shown that PAYGO social security system debt is similar to public debt (Auerbach and Kotlikoff 1987). That is, economically rational participants who contributed in the past perceive

TABLE 12-1 Balance Sheets for Partially Funded Retirement Systems

<i>Solvent Plan</i>		<i>Insolvent Plan</i>	
<i>Assets</i>	<i>Liabilities</i>	<i>Assets</i>	<i>Liabilities</i>
Pension Fund	Payments promised to current members, retired and active	Pension Fund	Payments promised to current members, retired and active
PAYGO Asset		PAYGO Asset	
		Implicit Fiscal Liability	

Source: Valdés-Prieto (2005a).

benefit promises as akin to public debt, both in their household portfolios and in the national public finance balance sheet. Indeed, in a world with no uncertainty, implicit social security debt and ordinary public debt are perfect substitutes; the subsidy received by the initial generation of retirees in a PAYGO plan equals the present value of the net lifetime taxes (see later) that must be levied on future generations (Geanokoplos et al. 1999; Sinn 2000).

While the accrued liability does not depend on whether social security uses pure PAYGO finance, partial funding or full funding, there are differences across countries in the way the benefits are paid for. A partially funded social security system, such as that in the USA, backs part of its accrued liability with a Trust Fund, with the remainder of the liability financed by the promise of two types of hidden or implicit future tax revenue. Let us define the *net lifetime tax* levied by social security on a particular generation, as the difference between the present discounted value of the payroll taxes that this generation expects to pay, and the expected discounted value of benefits that this same generation expects to collect. When this net lifetime tax is positive, the social security program collects a positive cash flow from this generation. It is useful to think of the present value of future net lifetime taxes as an asset, which here we shall call a PAYGO asset (see Table 12-1). A solvent PAYGO-financed system levies a positive net lifetime tax on the average generation, because the payroll tax is *larger* than the expected present discounted value of benefits accrued, when the economy is dynamically efficient. If the system is insolvent, there are *two* implicit taxes: one is the net lifetime tax whose revenue is the PAYGO asset, and the other is the potential new tax needed to finance the Implicit Fiscal Liability (IFL, see Table 12-1), if benefits promises are honored.

Long-term system solvency then requires that the present value of future promised benefits is no larger than the PAYGO asset, without requiring additional revenue support. In the US case, the social security system faces insolvency since the PAYGO asset is approximately \$11 trillion less than the present value of future benefits promised (Cogan and Mitchell 2003). In terms of Table 12-1, the IFL is \$11 trillion if promised benefits are honored. However, under current law, the system may not collect additional revenue beyond the PAYGO asset. What this means is that when the Trust Fund runs out, the system cannot legally continue paying promised benefits. In terms of Table 12-1, if promised benefits are not honored the IFL disappears.

Moving to a Market-Based Social Security System

Compared to politically vulnerable social security systems, we propose that a market-based approach would offer many advantages. The idea would be to establish individual accounts with a rule-based approach to risk allocation,

a concept familiar from financial contracts. As an example, mutual funds regularly stipulate that fund shares will be priced daily at the 'net asset value', a concept that refers to the net value of all securities held by the fund at yesterday's closing price, divided by the number of outstanding shares. Under this rule, capital market risks are shared by participants in proportion to the number of shares each holds. This approach is also what DC pensions do. A different rule-based approach applies to the lifetime real annuity contract sold by life insurance companies. Here the annuitant is generally exempted from bearing investment and inflation risk (assuming the pension benefit is indexed to the CPI); these risks, instead, are absorbed by the insurer's capital and the issuers of the inflation-indexed bonds in which the life insurance company's investments are held.

Of course other risk-sharing rules are possible, but these two have the advantage of having legal support. Rules of this sort also offer transparency which can improve the policy process itself and reduce political risk. Such rules also allow workers to diversify and trade the underlying risks in the financial markets, and to choose among diverse balanced portfolios. And finally, financial regulators would be less subject to conflicts of interest created by being subordinate to the same political coalition that experiences reelection concerns. Nevertheless, a rule-based approach must rely on the accounts to have capital assets backing the promises, which many PAYGO social security systems lack. That is, if financial markets are to take on a risk-sharing role in the case of social security, we must confront the question of where the money comes from to fund the system.

Securitization of Future PAYGO Taxes. Our proposal would devise a new financing mechanism that does not increase the public debt. It does not require decade-long consumption sacrifices because it does not redistribute across generations. This approach involves five steps (Valdés-Prieto 2002, 2005a):

- (1) Determine what additional social security tax would be required over and above the current payroll tax, to honor current benefit promises for an infinite horizon. Also determine how much benefit promises would have to be cut below the current promises (say by reducing the degree of wage indexation of past earnings to calculate initial benefits), to finance a solvent system with the current payroll tax. Choose some combination between these extremes, appealing to the gains of the next steps in the reform.
- (2) In the reformed system, determine the size of average net lifetime taxes as a share of earnings. Convert this rate, currently an *implicit tax on earnings*, into an *explicit* residual payroll tax, and endow the Social Security Trust Fund with property rights over the revenue from this residual payroll tax. The remaining portion of the current payroll tax

would be transformed into contributions to personal saving accounts;

- (3) Securitize the revenue of the residual payroll tax, creating new 'Covered Wage Bill' (CWB) securities. Set their prices in competitive financial markets;
- (4) Change the social security benefit formula to link benefits to the overall financial return achieved by the Trust Fund. The continuation benefits to the initial elderly are almost identical to the current ones. Benefits for initial workers are similar to the current ones because they would initially get portfolios heavily invested in CWB securities. Still, initial workers would benefit from the cut in the political risk they currently bear; and
- (5) Allow each participant to select from a limited set of balanced portfolios and to choose his own asset manager to administer his personal account assets.

In other words, this process involves relabeling the difference between social security projected future benefits versus future taxes as an explicit residual tax, specified as a percentage of covered payroll. The Trust Fund would then be endowed with property rights to the future revenue collected by the residual tax. No new explicit public debt is issued, and no new debt-servicing costs appear. The CWB securities would reflect the value of the residual tax revenue, defined as the dividend on the new CWB securities. This cash flow would be owed by future participants (contributors) rather than the federal government. Finally, there would be no government guarantee on the CWB dividend payout: if the covered wage bill varied for any reason (e.g. due to demographic, productivity, or other shocks), only the owners of the CWB securities would be affected. Holders of CWB securities would take a loss if dividend growth fell below expectations, and they would appropriate any gains when dividend growth was above expectations. The fact that CWB securities would behave like equity protects fiscal stability, i.e. protects beneficiaries of federal transfers and taxpayers.⁴ After relabelling PAYGO as individual accounts, the addition of property rights makes the system fully transparent, cutting political risk and allowing access to financial markets.

In order to implement this strategy, current social security benefit formulas based on workers' years of service and Average Indexed Monthly Earnings (AIME) would be replaced by a rule-based system of personal accounts. Initially, active workers would be issued shares in the Social Security Trust Fund, and its net asset value would be the value of the Trust Fund including the CWB securities, divided by the number of shares outstanding. Contributions by active workers would purchase additional shares, while retirees would sell shares back to finance a pension or to purchase an annuity. Here risks would be shared only among participants

in proportion to the number of shares each held, just as in DC pension plans. Retirees would be given variable annuities backed by CWB securities, so the risks transferred to pensioners would be much smaller than feasible in current financial markets.

Later, individual choice would be feasible; for instance, market-based social security could offer retirees a choice between variable annuities indexed to a portfolio that holds CPI-indexed CWB securities (for maximum stability), or a balanced portfolio offered to active participants. Annuities might pass along to members the risk that the life table itself could change, along the lines of the CREF annuity formula pioneered by TIAA-CREF in the USA. Alternatively a retiree could be offered a fixed annuity from a life-insurance company.

The innovation under this approach is that the social security system offers no guarantees to participants as a group. Of course, workers and retirees may purchase guarantees from issuers of fixed-income securities in the capital market, and participants could be allowed to sell their claims on market-based social security to outside investors, provided that the funds raised would purchase annuities from life insurers meeting solvency conditions. Naturally supervision of life insurers would continue to be necessary, since otherwise insurers might select risky asset portfolios and then hope for a bailout via an implicit government guarantee (Gollier 2005).

One condition that all these arrangements must meet is asset–liability matching. In other words, the value of CWB securities of any given type held in the Trust Fund must equal the value of program liabilities. This ensures that the sum of payouts linked to the returns of each type of CWB security is equal to the combined dividends earned by all the CWB securities of that same type in any state of nature.

Transition Costs. Let us explain why this transition proposal does not increase the public debt and does not require decade-long consumption sacrifices, despite achieving a new situation which appears to be full funding. The label ‘funding’ has been assigned three different meanings, creating some confusion. The first type of funding, also called ‘narrow’ or ‘financial’, is the degree to which benefit promises are backed by assets protected with property rights such as securities and real estate. The degree of narrow funding of an employer pension plan is independent from the paths of national saving and of the public debt (Bernheim and Shoven 1988).

The second type of funding is the degree to which changes in benefit promises translate into changes in national savings, and therefore into changes in consumption, possibly sacrifices, redistributing across generations. This is ‘ultimate’ or ‘broad’ funding, which depends on changes in the stock of voluntary savings (tax-favored and normal financial saving, housing equity), changes in the national debt, nationalizations and

privatizations, and changes in government programs which create inter-generational transfers such as health subsidies for the old and educational subsidies (Lee 1994). Third, consider 'fiscal' funding. This is the degree to which changes in benefit liabilities bring about changes in the net fiscal debt, or affect the riskiness of the payment profile of the net public debt. For this purpose, the 'net public debt' is the standard public debt, minus publicly owned assets, plus the implicit fiscal debt to insolvent health and old-age benefit programs.⁵

The gains from market-based social security come from narrow funding. The consumption sacrifices are caused by increases in broad funding and the fiscally costly 'transition costs' are caused by restructuring of fiscal funding. The transition path analyzed in this paper achieves narrow funding without touching either broad or fiscal funding.

Responding to Aggregate Shocks. The next issue is to specify how the proposed system would adjust if uninsurable shocks strike, which could involve discretionary *ex post* adjustments; adopting prespecified rules *ex ante*; or some blend of the two. In provident funds and DB corporate plans, the fiduciaries are generally given some discretion to adjust parameters *ex post*, so as to preserve solvency, and sometimes this works well but the last decade of DB failures in the USA underscores the risk in this approach.

Alternatively, preset rules can be derived to preserve cash-flow equilibrium, though a problem with such cash-flow rules is that they tend not to respond to predictable events but rather delay action until cash-flow problems materialize. As an example, the Swedish Notional Account program maintains PAYGO financing, while crediting benefit promises to each participant's 'notional' account with a hypothetical interest rate. If the economy maintained a steady growth path, the internal rate of return on social security taxes would equal the growth rate of payroll tax revenue; in reality, however, shocks produce substantial cash flow deficits or surplus that can last for decades and whose accumulated value may attain 8 percent of GDP (Valdés-Prieto 2000). In addition, the Swedish benefit formula deviates from the theoretical ideal by crediting individual accounts with an interest rate that equals the growth rate of average covered wages rather than the growth of payroll tax revenue. In general, a notional account approach is backward rather than forward looking, as it does not attempt to match assets and liabilities on a continuing basis; the latter would require a reliable method to construct projections such as those provided by prices in a competitive financial market. Instead, the Swedish system relies on projections made by a single government bureau which then adjusts benefits in an ad hoc manner. This makes the system subject to political risk all over again.

Some forward-looking rules are in use in financial markets, as in the case of annuities where longevity and investment risks are absorbed by life insurance companies, and by the issuers of bonds in which assets are invested. The DC rule used by mutual funds also meets this objective, as uninsurable aggregate financial shocks are allocated among plan members in proportion to the market value of their claims on the plan.

In the present context, let us consider the case where a panic struck financial markets and knocked down the value of the CWB securities. If all CWB securities were perpetuities, a solvent social security program would not have to sell any of its holdings because all benefits could be paid in full using the dividend payout of CWB securities—which equals the revenue of the residual payroll tax plus the revenue from new contributions. Of course retirees would sell some of their holdings to younger participants every month, and since these trade at prices set in financial markets, a panic there affects the terms of trade. If this change is permanent, a response by participants is not a problem but rather is economically justified.⁶ Similarly, a pure PAYGO system would have to adopt new legislation if news arrived to modify expected payroll tax revenues or benefits. By contrast, a rule-based approach as proposed here offers immediate and objective adjustments that guarantee continued solvency. For example, if longevity were to rise faster than anticipated, holders of variable annuities and the life insurance companies that issued the fixed annuities would take a loss.

If new information were to show that the aggregate future payout of the CWB securities held by younger participants would fall, benefits would have to be cut to restore solvency. Of course provident workers facing this loss would respond both by deferring retirement and raising their saving rates. Therefore, a market-based social security program that allowed flexibility in the contribution rate in response to forward-looking changes could actually reduce risk exposure.

Financial Market Implications

Next we turn to the possible financial market implications of moving to a market-based social security system, and we also discuss ways to organize the new market for asset management services provided to participants.

Access to a More Efficient Portfolio. Initially, the social security program would trade CWB securities sufficient to establish pricing, which would be a small volume relative to the complete stock of CWB securities. This alone would create new financial markets. Subsequently, social security may gradually trade much larger blocks of CWB securities with outside investors.

The literature suggests that real-world investors are often beset by information deficiencies and behavioral quirks making them less skilled than professional asset managers (Mitchell and Utkus 2004). In addition, small

investors pay more for trading than do large institutional investors. For both reasons, having the government participate in financial markets via the CWBs is likely to have important effects. Currently, the portfolio owned by the social security system is undiversified, and it is unlikely to be optimal for all or most workers; accordingly, as Valdés-Prieto (2002 and 2005a) suggests, allowing people to exchange some CWBs for equities could achieve significant diversification gains. Of course, the value of this diversification depends also on the holdings of human capital, housing, and company-based pensions.

Creation of New Markets. It is also likely that the payment profile of CWB securities across states of nature is not spanned by the payment profiles of current financial assets, so if the social security program were to sell small amounts of CWB securities, it would immediately create new financial markets.⁷ Completing the financial markets could generate substantial new value (Shiller 1993), though there is a theoretical possibility that if markets remain incomplete after the new security is introduced, this could make people worse off (Hart 1975).⁸ In practice, we believe that CWB securities would be attractive investments for domestic corporate and occupational pension plans seeking to curtail exposure to inflation risk, because the covered wage bill is protected from inflation (at least in the medium term). Trade of CWB securities between countries would also permit participants to access new international risk diversification, that is to permit trade in aggregate human capital.⁹

Organizing the Asset Management Market. If workers are to be required to save in personal accounts, it would be important to make the market efficient and competitive, and respond to changes in optimal portfolio weights over time. Since most participants are insufficiently financially literate to design balanced portfolios and adjust them over time, some oppose letting individual workers select their own investment options in their personal accounts (Kotlikoff and Burns 2004). An obvious solution would be to pass the responsibility for balancing and updating portfolios to the experts, while ensuring that the experts compete among themselves. For example, asset managers could be required to offer just a handful of *balanced* portfolios and then each participant could be asked to choose a *single* balanced portfolio; this has been implemented in Chile, for instance. Participants would be well protected from the downside risk of investing in equities, because these portfolios would hold significant shares in CWB securities and corporate and government bonds.¹⁰

Competition between the asset managers would allow participants to switch between competing registered asset managers; further, asset management firms could set their own commission levels, with competition preventing commissions from being raised to exorbitant levels. One way to

achieve intense price rivalry and keep cross-selling low would be to rely on large employers, employer associations, and unions to find low-cost asset managers as in the Netherlands and Denmark. Another approach would offer participants a 'bidding service', where participants can identify the asset management company that would charge them the least, identified via bidding contests (Valdés-Prieto 2005*b*). Such a service would create a distribution channel that avoids contacting each participant, while at the same time reducing participants' information costs.

Redistributive Concerns

Next we turn to an assessment of how this plan for market-based social security affects redistribution within and between generations.¹¹ Some have worried that moving away from the current system would undo social security redistribution within cohorts, as they argue that the current old-age benefit formula replaces a larger share of previous earnings for lower than higher earners. But the reality is different: in fact, very little redistribution is achieved by the US social security system. For instance, Gustman and Steinmeier (2000) show that less than 3 percent of current social security payroll tax revenue is redistributed across income deciles. This is because most of the redistribution in the benefit formula is offset within households, since relatively lower-paid wives receive bigger benefits that offset the smaller benefits going to their well-paid husbands. Consequently, adopting individual accounts would not alter the system's degree of redistribution. In fact with a progressive income tax, more redistribution can be achieved by an individual accounts system.¹²

Another issue is whether intergenerational risk-sharing would be improved by market-based social security. On the one hand, the availability of CWB securities in financial markets would allow young participants and other investors to sell guarantees to participants in their 70s and beyond, enhancing intergenerational risk-sharing. Moreover, if the investors included institutions representing even younger persons (e.g. wealthy dynasties altruistic toward the welfare of grandchildren, or wealthy foundations devoted to child welfare), risk-sharing could span 100 years. On the other hand, governments can be thought of as even longer-lived so that PAYGO finance offers the potential for even longer risk-sharing. Yet as we have seen, permitting this implies allowing legislators to make discretionary and unpredictable decisions. We would argue that if market-based social security is coupled with CWB securities, the span of generations covered by financial market trades can replicate that achieved by conventional PAYGO social security, while offering less political risk, a wider set of portfolios, and more individual choice.

A separate issue concerns the possibility that poorer generations might need to be helped by richer generations. This has been accomplished by

Congress under discretionary social security rules by changing the level of prefunding for promised liabilities. That is, poorer generations (e.g. during the Depression) spent more than they paid into the Trust Fund, while richer generations have been forced to build it up. Yet an alternative would be to change the value of the net public debt as well as the present discounted value of promised Medicare benefits. If a government wanted to improve the welfare of future generations, it could always do so by running a budget surplus and using it to purchase CWB securities in the market. The revenue from these bonds could then be used to pay a subsidy to covered labor earnings, or the securities could simply be cancelled and the residual payroll tax cut proportionately. Therefore, the adoption of market-based social security does not constrain intergenerational redistribution in any way.

Credibility of the Mandate to Pay the Residual Payroll Tax

Will future governments be willing to mandate workers to pay the residual payroll tax, if many holders of CWB securities are domestic investors or even foreign investors? There is the notion that the highest credibility that the residual payroll tax will be levied is achieved by allocating the benefits of that revenue to the most powerful interest group. If retirees are assumed to be the most powerful interest group, then to maximize credibility, they and not investors should receive all the revenue from the residual payroll tax (Bovenberg 2005).¹³

However, the historical evidence shows that frequently the promises to retirees have been broken, so their political strength must have been limited. Although retirees have created national political parties in some countries, in many episodes they have borne the brunt of the cost of fiscal crises. Moreover, governments can be pressed into action by entities different from interest groups. Investors in financial markets can put significant constraints on fiscal behavior too, without any need to coordinate among themselves, simply by moving their money out when a government fails to meet its promises. Many governments have opened up the capital account of the Balance of Payments to take advantage of the gains from full participation in the world economy, and this has increased the ability of international investors to move their funds when risk increases.

The contrast between retirees and investors blurs under market-based social security. Older and retired participants are highly likely to keep claims to a big share of the CWB securities, simply because these will be the safest investments available. Therefore, retirees and older workers will contribute their political clout to ensure respect for their property rights over the residual payroll tax paid by the younger workers. This political clout would

combine with the market pressure applied by investors, to keep the government willing to mandate active workers to pay the residual payroll tax.

Now consider the polar opposite objection: because the revenue of CWB securities relies on the willingness of the government to mandate workers to pay the residual payroll tax, CWB securities would be 'owed' by the government. This is a mistake, because the existence of *most* privately owned cash flows relies on the continuing use of force by the government. Corporations keep their machinery because the government is willing to use force to stop thieves, and landlords collect rents because governments are willing to expel intruders. If it appears bizarre to count all these cash flows as 'owed' by the government, then counting CWB securities as fiscal liabilities is equally inappropriate.

Conclusions

We have shown that implementing market-based social security reforms can enhance well-being, by allowing risk diversification and trading in guarantees on the underlying economic and demographic risks. A key benefit of this approach is that participants may gain access to new financial markets rather than having the government impose risk and return portfolios unlikely to be optimal for all participants. Another advantage of a market-based approach to social security is that the system can be better adapted to suit individual needs. For example, if risk tolerance falls with age, participants can move to safer pension portfolios, a practice not permitted when a centrally run PAYGO social security system imposes uniform risk levels on everyone. We also show that between- and within-cohort redistribution can exist under market-based social security.

Covered wage bill securities are a key element of this plan. It is important to underscore the fact that these would be the responsibility of future workers who pay the residual payroll tax to social security so that this residual tax acknowledges the 'legacy debt' implicit in the starting point of a PAYGO system. The role of government would be limited to ensuring the obligation that workers pay the residual payroll tax. Shocks to economic growth or fertility are borne by owners of the CWB securities, because taxpayers do not guarantee the revenue of the residual payroll tax. Similarly, CWB owners appropriate the ensuing gains in the event of better-than-expected economic performance.

In this sense, the new securities are akin to equity and are not part of the public debt. Yet these CWB securities are much safer than equities over the business cycle, because the residual payroll tax backing them is proportional to the covered wage bill which tends to be more stable than profits at horizons shorter than ten years. In addition, nominal wages tend to keep up with inflation in the medium term, as compared to nominal corporate or treasury bonds. Moreover, CWB securities are perpetual (having no

expiry date), so renewal risk and vulnerability to investor panics are minimal. Portfolios containing a substantial share of CWB securities also reduce replacement rate risk (cf. Burtless 2000).

As a final benefit, these CWB securities would permit financial markets to hedge and diversify the risk in aggregate human capital (reflected in the present discounted value of earnings). Indeed CWB securities would permit all GDP to be traded, as espoused by Shiller (1993). The young as a group, who hold substantial human capital, would benefit by choosing a portfolio short on human capital and long in corporate securities, while the old as a group would benefit by choosing a portfolio heavy in human capital (Merton 1983). If market-based social security reduces the equilibrium equity risk premium through this route, higher levels of innovative risk-taking would be supported, and growth rates could increase. In addition, new CWB securities can permit investors to hedge separately shocks to real average earnings, and covered employment (influenced by demographic risks and labor force participation trends). This separation is possible because the revenue of the residual payroll tax can always be decomposed in this way. These gains would be available to facilitate step (1) in the proposal, where parameters are adjusted to resolve the initial insolvency situation.

Endnotes

1. This has been noted by Browning (1975), Tabellini (1991), and Casamatta et al. (2000).
2. Legislation to index the minimum pension to the consumer price index in Mexico was passed only in 1989, *after* the large inflation of the 1980s wiped out the value of most social security benefits.
3. Insolvency is compatible with a cash-flow surplus for a few decades, as with the US social security system; see OASDI (2005).
4. Payouts on CWB securities could be uniform, meaning that a simple pro rata share of the total dividend payout would be received in the future, or they could take other shapes. Valdés-Prieto (2005a) conjectures that one CWB security type would include wage-indexed bonds, while others could be indexed to demography and participation in the covered labor force or to CPI-indexed bonds.
5. For example, if the introduction of individual-account-based social security *de novo* (in a country with no previous social security) and the ensuing accumulation of pension funds, induces the political system to issue new public debt in equal amounts, then the degree of fiscal funding falls as much as when PAYGO financed social security is introduced (Holzmann 2005: 83). If future generations service this 'legacy debt' with an extra payroll tax, then the parallel with balanced PAYGO finance becomes exact.
6. Valdés-Prieto (2005a) argues that properly chosen option contracts such as collars between the portfolios held by active participants and retirees could help insulate prices for twelve months ahead without interfering in the market's valuation of the CWB bonds.

7. Financial innovation is efficient when short sales of the new security are effectively limited by costs, which seems to be the case (Allen and Gale 1994).
8. An important example provided by Dow (1998) considers a single consumption good with asymmetric information. In this example, risk-averse traders use the new market to hedge their positions in a preexisting security, but this reduces liquidity in the old market, and this last effect dominates.
9. For instance, European and Japanese corporate pensions would benefit from buying US CWBs; emerging nation Central Banks might also desire to hold a portion of their international reserves in CWB securities issued by American workers versus nominal bonds. The correlation between shocks to the covered wage bill across countries is likely to be below unity after taking into account real exchange rate risk.
10. A sophisticated participant who preferred more variety, even at higher cost, could allocate voluntary saving and debt to undo the balanced portfolio.
11. An important redistribution question refers to poverty-based assistance for the elderly. This issue is unrelated to market-based social security, because such support is generally provided by a separate tax-financed scheme, as with the US Supplemental Security Income program.
12. Another important issue is integration of disability insurance and survivorship insurance, which would remain mandatory under market-based social security. A capital payment would be made into the individual accounts of beneficiaries equal to the difference between the market price of a set of immediate annuities for the beneficiaries, whose initial amounts are specified by law, and the account balance as of the date of the claim. This means that the accounts would help participants when they need it most. In addition, the indemnity would be larger for those who become disabled relatively young, compared to that for those falling disabled closer to retirement. The premium for this insurance can also be determined by bidding contests. Contrary to Diamond and Orszag (2004), market-based social security can treat the disabled, widows, and orphans as generously as the society deems necessary, and the premium will adjust accordingly.
13. This objection was first raised by Andrea Prat in an *Economic Policy* panel discussion in October 2004 and then refined by Bovenberg (2005). This is my first opportunity to respond.

References

- Auerbach, Alan J. and Laurence J. Kotlikoff (1987). *Dynamic Fiscal Policy*. Cambridge: Cambridge University Press, pp. 150–1.
- Augusztinóvics, Maria, Robert Gál, Agnes Matits, Levente Máté, András Simonovits, and János Stahl (2002). ‘The Hungarian Pension System Before and After the 1998 Reform’, in Elaine Fultz (ed.), *Pension Reform in Central and Eastern Europe* vol. 1. Budapest: International Labour Office, pp. 25–93.
- Bernheim, B. Douglas and John B. Shoven (1988). ‘Pension Funding and Saving’, in Zvie Bodie, John B. Shoven, and David A. Wise (eds.), *Pensions in the U.S. Economy*. NBER: University of Chicago Press, pp. 85–114.
- Boldrin, Michele, Juan J. Dolado, Juan F. Jimeno, and Franco Peracchi (1999). ‘The Future of Pensions in Europe’, *Economic Policy*, 29: 289–320.

- Browning, Edgar K. (1975). 'Why the Social Insurance Budget Is Too Large in a Democracy', *Economic Inquiry*, 13(3): 373–88. (See <http://ideas.repec.org/a/oup/ecinqu/v13y1975i3p373-88.html>)
- Bovenberg, Lans (2005). 'Discussion of Pay-as-you-go Securities', *Economic Policy*, 20(42): 251–5.
- Burtless, Gary (2000). 'Social Security Privatization and Financial Market Risk', Center on Social and Economic Dynamics Working Paper 10. Washington, DC: Brookings Institution.
- Casamatta, Georges, Helmuth Cremer, and Pierre Pestieau (2000). 'The Political Economy of Social Security', *Scandinavian Journal of Economics*, 102(3): 503–22.
- Cogan, John F. and Olivia S. Mitchell (2003). 'Perspectives from the President's Commission on Social Security Reform', *Journal of Economic Perspectives*, 17(2): 149–72.
- Commission to Strengthen Social Security (2001). *CSSS Final Report* http://www.csss.gov/reports/Final_report.pdf/
- Diamond, Peter A. and Peter R. Orszag (2004). *Saving Social Security: A Balanced Approach*. Washington, DC: Brookings Institution Press.
- Geanokoplos, John, Olivia S. Mitchell, and Stephen Zeldes (1999). 'Social Security Money's Worth', in Olivia Mitchell, Robert Myers, and Howard Young (eds.), *Prospects for Social Security Reform*. Philadelphia, PA: University of Pennsylvania Press, pp. 79–151.
- Gokhale, Jagadeesh and Kent Smetters (2003). *Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities*. Washington, DC: American Enterprise Institute Press.
- Gollier, Christian (2005). 'Discussion of Pay-as-you-go Securities', *Economic Policy*, 20(42): 255–7.
- Gustman, Alan and Thomas Steinmeier (2000). 'How Effective is Redistribution Under the Social Security Benefit Formula?' NBER Working Paper No. 7597, March.
- Hart, Oliver D. (1975). 'On the Optimality of Equilibrium When the Market Structure is Incomplete', *Journal of Economic Theory*, 11: 418–43.
- Holst, Roland (2005). 'Policy Risk: Some Evidence, its Relevance and Welfare Costs in Retirement Programs', Department of Economics Working Paper, University of Chicago.
- Robert Holzmann, Richard Hinz, and World Bank Staff (2005). *Old Age Income Support in the 21st Century: an International Perspective on Pension Systems and Reform*. Washington, DC: World Bank.
- Kotlikoff, Laurence J. and Scott Burns (2004). *The Coming Generational Storm: What You Need to Know about America's Economic Future*. Cambridge, MA: MIT Press.
- Lee, Ronald (1994). 'Population Age Structure, Intergenerational Transfers and Wealth: A New Approach with Application to the U.S.', *Journal of Human Resources*, 29(4): 1027–63.
- Merton, Robert C. (1983). 'On the Role of Social Security as a Means for Efficient Risk-Bearing in an Economy Where Human Capital Is Not Tradeable', in Zvi Bodie and John B. Shoven (eds.), *Financial Aspects of the U.S. Pension System*. Chicago, IL: University of Chicago Press, pp. 259–89.
- Mitchell, Olivia S. and Stephen P. Utkus (eds.) (2004). *Pension Design and Structure: New Lessons from Behavioral Finance*. Oxford: Oxford University Press.

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- Müller, Katharina (2003). *Privatizing Old Age Security: Latin America and Eastern Europe Compared*. Northampton, MA: Edward Elgar.
- Old-Age and Survivors Insurance and Disability Insurance Trustees (OASDI) (2005). *Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, March. Washington, DC: USGPO.
- Shiller, Robert J. (1993). *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks*. Oxford: Oxford University Press.
- Sinn, Hans-Werner (2000). 'Why a Funded Pension Is Useful and Why It Is Not', *International Tax and Public Finance*, 7(4–5): 389–410.
- Tabellini, Guido (1991). 'The Politics of Intergenerational Redistribution', *Journal of Political Economy*, 99(2): 335–57.
- Valdés-Prieto, Salvador (2000). 'The Financial Stability of Notional Account Pensions', *Scandinavian Journal of Economics*, 102(3): 395–417.
- (2002). *Políticas y Mercados de Pensiones: Un texto Universitario para América Latina*. Santiago, Chile: Ediciones Universidad Católica.
- (2005a). 'Pay-as-you-go Securities', *Economic Policy*, 20(42): 215–51.
- (2005b). 'Para Aumentar la Competencia Entre las AFP', *Estudios Públicos*, 98 (Otoño): 87–142, Santiago, Chile.