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IS DEFINED CONTRIBUTION A PANACEA FOR DEFINED BENEFIT SOCIAL SECURITY FUNDING PROBLEMS? LESSONS FROM TWO COUNTRIES

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ABSTRACT

Many countries are changing their social security retirement program from a defined benefit (DB) to a defined contribution (DC) basis. Other countries, such as the United States, are discussing the introduction of a DC component. The replacement of a DB social security retirement system by a DC system raises many important social and economic issues. Thoughtful consideration must be given to the choice of criteria for prioritizing objectives and outcomes, as well as in weighing the advantages and disadvantages between different cohorts. For example, if any DB obligations are not fully funded at transition, a double burden will rest with transition generation(s). Moreover, economists tend to assess the value of the system based on measures of economic efficiency and the lack of impediments to a freely operating labor market. But such an assessment may not give adequate recognition to factors such as individual wealth/poverty, an individual's ability to make optimal investment decisions, and transaction costs associated with operating individual accounts. Indeed, some countries have suggested that notional defined contribution (NDC) accounts may be the best way to address such issues.

Focusing on the adoption of a funded DC social security retirement program in Chile and the adoption of a pay-as-you-go NDC social security retirement program by Sweden, this research identifies factors of financial markets, economics, and demographics necessary to enable a move to DC accounts. In addition, it identifies the characteristics of the financial markets necessary to support payments (wealth transfers) to retirees from a DC social security retirement program.

The paper considers the questions of social security funding and plan type (DB vs. DC) and attempts to assess the suitability of certain reform options for the United States. It approaches the issue by identifying the features of each type and the strengths and weaknesses associated with those features. A significant part of this analysis is the illustrative description of two real-world plans, Chilean and Swedish. It then uses the theoretical considerations and the experience of those plans to draw conclusions about reform proposals in the United States, particularly the President's Commission to Strengthen Social Security Model 2.

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1. INTRODUCTION

Many countries with pay-as-you-go defined benefit (PAYGO DB) social security retirement programs are changing to a defined contribution (DC) basis.¹ The change is often motivated by financial pressures to make the system affordable in face of demographic pressures requiring an increase in contribution rates, a reduction in benefits, or both. In 1997 Canada introduced parametric changes to its PAYGO DB system to provide for financial stability for the foreseeable future.² Other countries, such as Chile and Sweden, chose to replace their PAYGO DB systems with a DC system, a structural change. Although a dramatic structural change in the system, especially one that reduces or postpones benefits, may extend financial sustainability, it is also true that often such a major reform is better received politically, because it gives the appearance of having taken dramatic action, than if the required changes were made through tweaks to the existing system's parameters.³ Moreover, a change to DC may be considered to be desirable economically because it may reduce labor market distortions, by making a closer link between contributions and benefits, and increase savings, both of which may lead to enhanced economic growth.

In 1981 Chile replaced its PAYGO DB with a system of fully funded defined contribution (FDC) individual accounts with investments managed by

private investment managers.⁴ A number of other Latin American countries followed Chile's example in modifying their social security programs. In this paper the Chilean system will be used as the example of FDC from which to draw insight.

In 1999 Sweden replaced its PAYGO DB system, primarily with a notional defined contribution system (NDC), which will be another focus of this paper (this system also included supplemental funded individual accounts). Sweden's NDC has been widely discussed even though Sweden is neither the only country nor even the first to adopt NDC.⁵ However, because of its innovative automatic balancing mechanism (ABM),⁶ its system has been selected as the NDC example to analyze.

In 2001 U.S. president George W. Bush established the President's Commission to Strengthen Social Security (PCSSS). The PCSSS proposed three alternative models to modify Social Security to improve its projected financial position (as was required by the principles established by the president when the PCSSS was set up). All of the models incorporated voluntary individual retirement accounts as part of the proposed modifications. Although in 2009 it does not appear that any of these models are likely to be implemented soon, they do provide concrete proposals to analyze in the context of introducing DC social security in the United States to address the financing problems that the U.S. PAYGO DB must face eventually.

¹ According to Whitehouse (2007), of the 53 countries considered, the following had DC or NDC as part of its second-tier mandatory insurance program: Argentina, Australia, Bulgaria, Chile, Colombia, Costa Rica, Croatia, Denmark, Dominican Republic, El Salvador, Estonia, Hungary, Italy, Latvia, Lithuania, Mexico, Peru, Poland, Sweden, and Uruguay. Change continues, and this list should not be considered complete. PAYGO DB is used in this paper to include DB social security systems that maintain a partial reserve and so are not literally PAYGO.

² Parametric reform refers to keeping the same type of system (e.g., DB, DC, NDC) but changing certain parameters such as the contribution rate or the averaging period for benefit calculation. "Structural reform" refers to changing the type of system.

³ Although not all commentators are in agreement, there was support for the structural change that occurred in both Chile and Sweden, at the time of system change.

⁴ Some readers may take exception to referring to the Chilean system as being fully funded, pointing to the existence of recognition bonds and arguing that such bonds are nothing more than government promises. The authors of this paper take the view that government promises are a type of asset and that if there are assets that in total are equal to the amount of the liabilities, then the plan is fully funded. We fully appreciate that some assets may have more risk of default than other assets, but that is an issue of asset quality rather than an issue of whether or not there is full funding.

⁵ Latvia was the first country to adopt (i.e., begin operating) an NDC system.

⁶ When there is a financial deficiency, the ABM operates to reduce benefits until financial balance is restored. Brown (2007) argues that the approach used in the Canada Pension Plan, which requires a temporary increase in contributions and a temporary freeze to pension benefits, is more equitable because it immediately shares the cost of financial imbalance between active and retired participants.

This paper provides insight into the question: Is DC a panacea for DB social security funding problems? Rather than having an abstract general discussion, this paper focuses on two actual implementations, in Chile and Sweden, and a proposal to implement DC accounts in the United States. It begins by providing some relevant, but limited, background with respect to the Chilean and Swedish reforms and the models proposed by the PCSSS. Extensive details on all three countries' actions and proposals are documented elsewhere, so the background provided is only the information deemed necessary to understand the analysis included in this paper. The paper examines the advantages claimed for DC versus PAYGO DB and then looks at certain aspects of the implementation of the Chilean and Swedish reforms with respect to transition issues, investments and administrative costs, treatment of women, and the use of a minimum benefit guarantee. The readiness of the United States to adopt the Model 2 proposals of the PCSSS is assessed based on the observations derived from the examination of the Chilean and Swedish reforms. The paper concludes that although the United States is not yet prepared to implement Model 2, it could be ready to proceed relatively soon after such a decision is taken. However, it is the parametric changes of a redistributive and DB nature that are instrumental in delivering an affordable and humane reform, not the structural change to DC. The paper concludes that based on the implementation experiences in Chile and Sweden, DC is not a panacea for DB social security funding problems.

2. FRAMEWORK

For the last 25 years there has been a notable tendency in many countries for DB pension plans to be replaced by DC plans. This tendency is affecting the thinking on how to address social security funding issues. Many Latin American countries have adopted a FDC approach. Such an approach addresses funding issues by requiring funded accounts; however, the approach faces significant transition problems as current contributors or taxpayers face a double burden of contributing to their social security accounts and paying for previous generations' promises that are continued and that were unfunded. NDC claims to

have most of the advantages of FDC and does not have as immediate a transition problem because it operates on a PAYGO basis. Representatives of the World Bank advocated FDC in 1990s (World Bank 1994) and are advocating NDC now (Holzmann and Palmer 2006). There are advantages in both these approaches, but, it will be argued, there are also disadvantages that can be best addressed through DB approaches.

Funding concerns arise in DB plans when the value of the design features incorporated in the plan exceeds the willingness of the various contributors to pay the required contributions. In a funded DB plan, based on a set of actuarial assumptions, the theoretical level of required contributions is typically known from the inception or from early in the plan's life. In PAYGO DB, the ultimate level of required contributions is hidden, because the plan appears operable as long as contributions are adequate to pay benefits at any time. In a stable population, a level contribution rate is sustainable; however, population aging is a global phenomenon shattering the assumption of a stable population. Consequently, increases in contributions or taxes are necessary to pay the promised pensions. When such increases meet resistance from contributors, the system is said to have funding concerns. FDC and NDC are two approaches to meeting such concerns. Retaining PAYGO DB and raising contributions and/or reducing benefits are other alternatives.

There are many ways to implement social security, for example, by choosing a different type of system (DB, FDC, NDC). Even within a single type of system, different countries have selected different approaches. Consequently, a broad discussion of types of plans often lacks focus, as the proponents of a particular type claim superiority by identifying a particular feature of the other type that is deficient. Frequently the deficiency is due to the way the feature was implemented rather than being a disadvantage inherent in the type of system itself. To provide focus for this discussion, three specific implementation methods are selected and discussed: the Chilean FDC and Swedish NDC, both of which have been implemented, and the PCSSS Model 2 in the United States (which is a proposal). With such a framework, it will be impossible to conclude that DC is superior to DB or vice versa, because it is possible that the superiority exists because of the methods

in which DC has been implemented in the three examples selected. On the other hand, if none of these countries' approaches are entirely satisfactory, some information will be identified that DC approaches must address if they are to be considered a comprehensive solution (a panacea).

Brooks and Weaver (2006) identify six issues that NDC must address. These issues are used to form a list of considerations in assessing the readiness of the United States to adopt DC as described by Model 2:

1. Administrative capacity to collect contributions and maintain adequate records
2. Adoption of incomplete solutions possibly providing a false sense of complacency
3. Using the solution to cover political maneuvering to reduce pensions
4. Need to provide the public with useful, timely, and relevant information to establish realistic retirement income expectations
5. Ability to provide information regarding account balances and the system's financial health that creates confidence that the system is sustainable
6. The importance of balancing the goals of stabilizing or reducing payroll taxes with other objectives such as benefit adequacy.

Attempting to assess item 3 is highly speculative and will not be considered. Item 4 is based on needs, and there is insufficient detail in Model 2 to assess whether the needs will be fulfilled, so this item also is not considered further.

3. BACKGROUND ON REFORMS AND PROPOSALS

3.1 Chile

Chile's system of social insurance was first introduced in 1855 for the armed forces. It underwent many changes over the next century as it was expanded to include workers in other sectors. According to Mesa-Lago (1989, p. 108), "At the beginning of the 1970's, the 'system' was a legislative and bureaucratic labyrinth with hundreds of institutions and programs . . . [and] the principles of unity, uniformity and solidarity did not operate." Moreover, the cost endangered the financial position of the country: "Although Chile's social security system was one of the most

comprehensive . . . it suffered from serious problems, which included high costs (total expenditures reached a record of 17 percent of GDP in 1971), fragmentation, inequality of benefits, and stratification. The system placed a heavy burden on the economy [the payroll tax was 65 percent]⁷ and it required state subsidies that amounted to almost 30 percent of total state revenues" (Borzutsky 1998, p. 36).

Dramatic reform was required to save the country, not just the social security system, from serious financial difficulty. The authoritarian rule of General Pinochet enabled dramatic reform. Key elements of the reform for this analysis were the following:⁸

- The PAYGO DB arrangement was replaced and a five-year period provided for members of the "old" arrangement to exercise some of their accrued rights and transition to the new arrangement.
- A compulsory savings pension with a contribution rate of 10% of earnings with all contributions paid by the employee was introduced. Although "compulsory," many workers are not required to contribute because they are self-employed, or are not under contract in the formal employment sector. An additional (approximately) 3% is paid for disability and survivor insurance and to pay administrative charges.
- Freely competing Pension Fund Administrative Corporations (AFPs), subject to strict regulation, were created for the sole purpose of collecting, investing, and administering the contributions.
- Participants may have their account only with a single AFP.
- The investment returns credited are based on the return achieved by the AFP, but are guaranteed to be in a range around the mean return of all AFPs, as defined by regulation. In 2002 the range of investment options was increased to five, varying from an investment option that is 100% fixed income up to an investment option with 20% fixed income and 80% variable income (equities).

⁷ The 65% figure refers to payroll taxes for all benefits not just retirement benefits.

⁸ For greater detail on any of these points see Cruz-Saco and Mesa-Lago (1998), Chapter 3.

- There is a minimum guaranteed pension, provided the participant has made contributions for 20 years.
- At retirement a programmed withdrawal is permitted, an annuity may be purchased, or some combination of the two. All forms take into account the retiree's sex, age, and number of beneficiaries and include inflation protection. A payment is made by the government in respect of the value of the accrued benefits under the previous PAYGO DB system (a "Recognition Bond"), so all benefits are now on a DC basis.

3.2 Sweden

Sweden's first national pension was introduced in 1913. Before the major reform in 1999, the last major reform had occurred in 1960s with the introduction of the Swedish universal basic and supplementary DB public pension system, which provided pensions delivering replacement rates of 60–65% of pre-retirement earnings for persons retiring at age 65 after 30 years of service. Concerns regarding the required contribution level in the face of slowing economic growth and an aging Swedish population led to proposals in the 1990s for parametric reform. These proposals were rejected by a parliamentary working group, which subsequently presented a compromise program that was adopted (McGillivray 2005) and included the following features:⁹

- A total contribution of 18.5% of earnings, shared (not equally) by employers and employees, of which 16% is used to provide current benefits (but employees receive credit through notional accounts) and 2.5% of earnings, which is contributed to individual accounts and is invested in up to five of the approximately 700 independently managed investment funds available
- Central administration of accounts
- The pension at age 65 after 40 years of service is targeted to replace 60% of pre-retirement income
- The targeted pension assumes 2% annual real growth in the economy and contains certain features to ensure financial stability: a special buffer fund primarily invested in stocks and an

ABM that will reduce current and future pensions as necessary to maintain the financial stability of the system

- A minimum pension indexed to the cost of living is guaranteed by the state for all residents of Sweden
- At retirement the account balances are converted to a pension using a factor that takes into consideration the cohort's remaining life expectancy and the expected average wage growth in the economy (so that indexation is provided), subject always to the ABM
- Those born in 1954 and later receive all their pensions from the NDC. Those born in 1937 or before receive all their pensions from the former DB design. Those born between 1938 and 1953 receive a weighted average based on contributions to both schemes.

3.3 United States

According to the 2001 Trustees Report on the OASDI Financial Status (the most current report at the time of the PCSSS's deliberations), based on a 75-year horizon, the actuarial imbalance of the present law was defined by a -1.86% of payroll deficiency, negative cash flow beginning in 2016, and trust fund exhaustion in 2038 (PCSSS 2001).¹⁰ President Bush directed the PCSSS "to propose Social Security reform plans that will

¹⁰ According to the 2008 Annual Report of the Trustees, these numbers have changed as follows: The projected 75-year actuarial deficit is 1.70% of taxable payroll; projected income will begin to fall short of outlays in 2017, and the fund will be exhausted in 2041. These three measures give different perspectives on the solvency of the system. The deficit as a percentage of payroll over a 75-year horizon gives an indication of by how much contributions should be increased to provide adequate funds to provide benefits over the stated time frame. The other two measures indicate the level of assets available to pay benefits in the year. The first indicates when benefits in the year will exceed cash inflows and accumulated funds will be needed to make some of the benefit payments. The second indicates when there will no longer be any accumulated funds available to pay benefits.

It may seem odd to discuss the PCSSS report and Model 2 in 2009, because it is now a former president's commission and the current president has many more important agenda items than implementing a DC provision in Social Security; however, this paper was originally written in 2006 when DC Social Security was still a relatively hot topic. The authors find that it is easier to discuss a specific DC approach, i.e., Model 2, rather than to have a general discussion of provisions that might be included.

⁹ For greater detail, see Hagberg (2006) and Scherman (2003).

strengthen Social Security and improve its financial sustainability, while meeting several principles:

- Modernization must not change Social Security benefits for retirees or near-retirees.
- The entire Social Security surplus must be dedicated to Social Security only.
- Social Security taxes must not be increased.
- Government must not invest Social Security funds in the stock market.
- Modernization must preserve Social Security's disability and survivors components.
- Modernization must include individually controlled, voluntary personal retirement accounts, which will augment the Social Security safety net." (ibid.)

Within this context, three models were proposed. Model 2 appears to have received the greatest analysis in the literature and will be used in this paper for the purpose of analysis. The key features for this discussion are as follows (ibid.):

- Workers can voluntarily redirect their Social Security payroll taxes up to 4% of payroll to a maximum of \$1,000 annually to a personal account that can be invested by the worker.¹¹
- Initially the available investments would be a limited range of indexed funds including bonds, domestic equities, and foreign equities. When a participant's account exceeds \$5,000, the participant would have the opportunity to transfer to a wide range of privately managed investment funds.
- In exchange for the establishment of the personal account, the traditional Social Security benefits would be offset by the worker's contributions to the personal account compounded at an annual interest rate of 2% above inflation.
- A minimum benefit would be payable to workers with at least 30 years of contributions. Survivor pensions would be enhanced.

¹¹ This is a relatively small percentage of the worker's total Social Security contribution; e.g., in 2008 the maximum Social Security contribution (excluding Medicare) by an employee is 6.2% on earnings up to \$102,000 (and the employer matches this amount), and for a self-employed individual is twice this amount.

- Benefits under the traditional component of Social Security would be price indexed, instead of wage indexed, beginning in 2009.¹²
- Temporary transfers from general revenue would be needed to keep the Trust Fund solvent between 2025 and 2054.
- The calculations assume that those annuitizing their individual accounts will purchase pensions indexed for price inflation.

4. ECONOMIC ADVANTAGES OF DC

Certain beneficial economic aspects are often attributed to DC systems in the literature (e.g., World Bank 1994), especially funded ones, versus PAYGO DB. These include reducing labor market distortions by creating a closer link between contributions and benefits and increasing aggregate savings in the economy.¹³ In theory, improve-

¹² Under current legislation, Social Security benefits are based on the average of the highest 35 years of wages that have been updated to retirement, based on increases in a wage index. These average wages are then subject to different "benefit percentages": 90% on the lowest level, 32% on the next level, and 15% on the third level. Under the proposed reform, the wage updating to obtain average earnings would be unchanged, but the benefit percentages would be multiplied by the ratio of consumer price increases to wage increases, which would likely result in an annual reduction in the benefit percentages, and hence in the benefits compared to the current law. Wage indices typically increase more annually than price indices do, because wage increases include an adjustment for price changes and productivity and merit increases.

¹³ A number of distinctions may be made. For example, one may distinguish between DB and DC, among whether plans are funded, partially funded, or PAYGO, and between whether the design of the benefit formula is redistributive or of an insurance type (Whitehouse 2006). At one end of the spectrum, a funded DC plan with an insurance-type formula is pure (in the sense of nonoverlapping). At the other end of the spectrum, a PAYGO DB redistributive benefit such as a minimum benefit based on need is also pure (i.e., nonoverlapping). However, other distinctions are overlapping in some areas. For example, a PAYGO DB plan of the insurance type may be redistributive, not only because it is PAYGO and uses current contributions to pay current benefits but also because it is DB, providing benefits of greater value than their own contributions to those who live longer and paying for the additional value of these benefits from the contributions of those who die at younger ages. "Market distortions" are a form of behavior different from what theory would predict or expect in a perfectly competitive market. When benefits are not linked directly to contributions, then there is some redistribution, which is not what would be expected in a competitive market. Only FDC does not involve any redistribution. All DB plans are redistributive, in some ways, as are all PAYGO plans. Some DB plans and some PAYGO plans involve more redistribution than other plans of the same type. In this paper it is the type of plan that is discussed.

ments in these two areas should enhance economic growth, although, in practice, it may be difficult to demonstrate a direct causal connection and to quantify it. In this section we evaluate the distortions presented in the literature using evidence from Chile and Sweden and opine on the impact the implementation of Model 2 would have.

Examples of labor market distortions attributed to PAYGO DB systems include the following:

- In the absence of a direct link between contributions and benefits, both employees and employers treat the social security contributions as a tax and behave accordingly. This may result in, for example, evasion, informal economic activity, and greater unemployment.
- Favorable provisions at certain ages or based on years of service may change the pattern of labor force attachment to the workforce: for example, subsidized early retirement provisions may result in an increase in early retirements by healthy, productive workers.

The FDC in Chile should have addressed some of these issues, all of which were present under the PAYGO DB system. Because (after the transition of the old system is complete) only employees contribute to the FDC, employers should not behave as though social security is a tax. Moreover, since most of the employees' contributions (10% of the approximate 13%) are in an account with investments directed by employees, a direct link was created between contributions and benefits; hence, employees should treat these contributions as savings rather than as a tax.¹⁴

¹⁴ There is not universal agreement among economists on the effect of replacing a tax on employers by a compulsory contribution of equal amount paid by employees. Picard and Toulemonde (2000) show that such a replacement is not equivalent if taxes are nonlinear and may not be equivalent in imperfect labor markets. In the case of Chile, the total tax before reform was much greater than the contributions after reform, and the labor markets are imperfect, being characterized by high unemployment and a large informal sector, so the pre- and post-reform treatments are unlikely to be equivalent. If a portion of the contribution is required for redistributive benefits, such as disability benefits, that portion might be viewed as a tax (the 3% of the 13%). Moreover, if employees are liquidity constrained, a mandatory contribution may appear similar to a tax. In this regard, for many, 10% may seem to be a high required contribution.

Nonetheless, significant evasion continues, and there is a large percentage of the working population not contributing to social security. Although the number affiliated has shown remarkable growth from 1.4 million at the end of 1981 to 5.6 million in June 1997, the proportion of affiliates actively contributing has fallen dramatically from 73% in 1982 to 52% in 1990 to 44% in June 1997 (Barrientos 1998). A number of factors may underlie these figures, including the following:

- There may be contractions in economic activity during the observation period.
- The administrative burden on employers associated with social security contribution collection and remittance may lead some employers to discourage or find workarounds to social security participation.
- The presence of the minimum pension for those with 20 years of contribution may influence participants to modify their attachment so that they only record the minimum participation required to qualify for the guaranteed minimum benefit.

The last factor arises from a DB component of the system. The second factor could arise in any system, as could the first. On the basis of the evidence one might conclude that the Chilean FDC has reduced labor market distortions, but the evidence is limited and weak.

With respect to Sweden, the system has just been in place for a relatively short time, so it is too early to draw firm conclusions. However, it appears that there could be both positive and negative labor market impacts:

- Although most of the contributions are recorded as entries in notional accounts but are used to finance PAYGO benefits, there is not as strong a link between benefits and contributions as there is with FDC in Chile, where the contributions are held by AFPs and credited with the investment returns achieved; although the link is at least as strong as it was under the PAYGO DB system.
- In any DC system it is difficult to predict the likely benefit at a future retirement date; however, this is even more difficult in the Swedish NDC, which includes a complex mechanism of benefit adjustment, the ABM, and the calcula-

tion of pensions based on cohort life expectancy. The inability to accurately forecast retirement income may strengthen workforce attachment if individuals are reluctant to leave the workforce for fear of adversely affecting their future retirement income or of having less than an inadequate income as a result of future benefit adjustments. That is, they will work longer to add a risk provision to their target benefit.

- Hagberg (2006) believes that it is inevitable that the pattern of benefit adjustments will be to further reduce benefits. If it becomes evident to participants that the expected benefits are subject to continuing revision, then the link between contributions and expected benefits is weakened, thus making participation in the system overall less attractive. Therefore, evasion, workarounds, and free-riding problems may develop, which are all forms of labor market distortion.¹⁵

The creation of individual accounts under Model 2 would strengthen the link between benefits and contributions, but is unlikely to have much impact on labor market distortions, given how small the proportion of benefits attributable to individual accounts will be, especially during the earlier years.

Regarding the impact on aggregate saving, PAYGO DB is thought to reduce saving initially because benefits granted at inception must be paid for from additional taxes. Some taxpayers will reduce savings in order to pay the additional tax, although, according to Brown (1997), this intuitive impact at the introduction of U.S. Social Security was offset by a behavioral response. Moreover, after introduction of the program, active contributors have less money available for saving because they must pay to provide benefits to retirees. Once the system matures, the effect

on aggregate savings continues to be negative because in a PAYGO system, even though workers incorporate social security benefits in their retirement plans, there are no real savings with respect to social security benefits. Nonetheless, the evidence to support this argument is difficult to obtain. In a report on this subject, the Congressional Budget Office (1998) concluded “Because the exact motivation behind saving is not completely understood it is difficult to determine the effect of Social Security on saving using economic theory alone. Although, on balance, economic theory suggests that Social Security could reduce saving, it cannot establish the magnitude of the effect.”

In an FDC, such as Chile, one would not expect that savings should be reduced (once the transition is complete) because there are savings associated with social security benefits and investments are managed by private-sector AFPs. However, immediately on transition, the pension system created a deficit (associated with the transition) with an average reduction in saving of nearly 3% of GDP (Arenas de Mesa 2005) because the accrued benefits were unfunded and could no longer be provided from future contributions. As the system matures and the benefits earned before reform are financed, it is expected that the savings rate will increase. At inception of the system, it was estimated that social security assets might represent 20% of GDP by 1991. However, because Chile’s financial markets are neither deep nor well developed, the investment regulations placed on AFPs meant that in 1983 approximately 72% of the AFPs’ investment funds were directly or indirectly controlled by the state (Barrientos 1998). Hence the increase in aggregate savings is not as great as expected.

Moving to Sweden and quoting Sunden with respect to NDC, Williamson and Williams (2003) note: “In Sweden, studies suggest the NDC system may have a *negative* effect on the savings rate.”¹⁶ As expected the FDC approach is better than NDC or PAYGO DB regarding aggregate savings, but unless a broad range of investments are

¹⁵ Given the highly homogenous nature of the Swedish culture, such aspects may be slow to appear. Proponents of the Swedish system may argue that fairness is maintained because the same contribution rate applies to all participants (Settergren 2003). But in a PAYGO system, which the Swedish system is, maintaining a level contribution rate and using today’s contributions to pay higher benefits to today’s retirees with the consequence of having to pay lower benefits to today’s contributors when they retire is a form of redistribution. If the redistributive aspects become recognized, the behavioral responses described may arise.

¹⁶ Effects on savings rates are behavioral responses and as such are difficult to predict and explain. A possible explanation why NDC may result in a reduction in savings is that contributors may treat their contributions as savings, but because the funds are used to pay current benefits, there are no actual savings.

permitted and financial markets are well developed, it may not increase savings by the sum of the individual accounts.

What, then, might be expected in the United States if Model 2 were implemented? Since the money invested in individual accounts is a reallocation of the mandatory Social Security contribution, no additional money is being contributed in aggregate to Social Security. However, given that Social Security benefits are being reduced (and such benefits are only partially funded) and fully funded individual accounts are being created, some new savings should result. The amount of the new savings would likely be limited, however, for the following reasons:¹⁷

- The amount that may be allocated to individual accounts is relatively small, 4% of earnings to a maximum of \$1,000, annually.
- Some of the investments of the individual accounts will likely be in government debt that is financing expenditures rather than creating savings; for example, in making financial projections it was assumed that 20% would be invested in U.S. Treasury long-term bonds (PCSSS 2001).
- The behavior of contributors is difficult to predict; for example, some may reduce private savings because they have individual accounts within Social Security.

5. CERTAIN ASPECTS OF DC REFORM

A number of aspects of changing from PAYGO DB to DC warrant further consideration. The preparedness of a nation to accommodate these aspects is a measure of the nation's readiness to adopt a DC system. In this section the aspects are identified, and the readiness of the United States to adopt DC, as defined by Model 2, is assessed.

5.1 Transition Issues

At the time of discontinuance of the PAYGO DB there will be accrued benefits, in respect of prior years of service under the prior plan design, that must be settled over many years into the future.

During the transition an extra burden may be placed on the active contributors because they will be required to contribute (or be taxed) to pay pensions of retirees and also must contribute to earn their own DC credits. The situation is most difficult if FDC is introduced, because contributions must be to the individual accounts and are not available to help finance the transition. Chile addressed this situation in two ways:

- The contribution to the FDC accounts was paid entirely by the employees and was at the 10% level. One might question the adequacy of the benefit that will be provided from this contribution given the breaks in workforce attachment that characterize the Chilean workforce. However, the average rates of return earned, on invested funds, by the AFPs have been very good; for the period 1981–2003 the average annual real rate of return was 10.4% (Arenas de Mesa et al. 2006).
- Recognition bonds were granted in respect of accrued rights under the PAYGO DB system. Initially a social security tax was levied on employers to help pay for the transition, but now these bonds are paid from general revenues. Even though it is now more than 25 years after the reform, there is still a long period before the transition will be complete because the youngest contributors to the PAYGO DB are not expected to retire until 2025. At the time of retirement, the value of the bonds is determined and paid to the AFPs, which represents a significant transfer from the public to the private sector. The viability of the system rests on the strength of the economy and the taxing ability of the government. The deficit represented by these obligations had grown to 1.1% of GDP in 2003, and there are still approximately 900,000 bonds to be settled (Arenas de Mesa 2005). Since the government at the individual's retirement determines the valuation of the bonds, some flexibility exists for policymakers to adjust the valuation basis, if tax revenues are inadequate.

This form of addressing the transition is the most direct and puts the greatest financial pressure on the system and the economy. Another form of direct transition is to legislate that benefits earned by those born after a particular date,

¹⁷ The Congressional Budget Office (2004b) provides an estimate of the increase in national wealth by 2080 and states that in its projections private savings would increase, but it does not state the amount of the increase.

such as 1953 in Sweden,¹⁸ will all be paid as DC and that any DB benefit credits earned previously are effectively canceled or replaced. Although this approach is costless in monetary terms, it may have a significant cost in terms of acceptance of the system by those directly affected. The other transition arrangements in the NDC implemented in Sweden were less direct. The current benefits, many of which were earned under the PAYGO DB, are paid from current contributions. Moreover, through the ABM, the transition costs (in respect of previously accrued DB benefits) can be spread over many future cohorts. This approach provides for a smoother transition.

The Model 2 proposal uses at least two techniques to make the transition:

- By changing in 2009 from wage indexing to price indexing, the benefits earned are reduced substantially. The Actuaries' Memo (PCSSS 2001) stated "This provision alone would increase the size of the long-range OASDI actuarial balance (reduce the actuarial deficit) by an estimated 2.07% of payroll," which is more than the entire deficit.¹⁹
- Temporary transfers from general revenue to the Trust Fund between 2025 and 2054 provide added funds to facilitate the transition.

Several commentators (e.g., Cichon 2005) have noted that, mathematically, NDC adjustments could be achieved by a PAYGO DB plan with a career average pension formula and actuarial reductions and increments to compensate for early and late retirements. A strength of the PAYGO method with adjustments, whether it is NDC or DB, is that it permits the transition to be spread over many cohorts, and it is very difficult to determine the amount of transition costs borne by any cohort. Where funded individual accounts are established, such as in Chile or as proposed by Model 2, there is less flexibility for policymakers,

and the transition must be addressed more directly.

Given the complicated nature of calculating Social Security benefits and the lengthy delay for the effect of this reform on individual Social Security recipients to be fully revealed, it is unlikely that the implications of a change from wage indexing to price indexing on their welfare in retirement will be fully recognized and responded to by many U.S. citizens, at the time the change is adopted. However, the viability of Model 2 rests on transfers from general revenue to the Trust Fund between 2025 and 2054. There is no indication of where these general revenues would come from, whether it would require new taxes or reductions in existing public programs, or both. Without such information, the United States could not be judged to be fully informed and therefore not prepared in full to undertake such a reform. However, given that the transfers are not required to begin for almost two decades, there is time to prepare.

5.2 Investment Choices and Administrative Expenses

When funded individual accounts are created, investment choices are required. In Chile a new financial entity, the AFP, was created solely to administer and to perform the investment management of the funds. Given the underdeveloped nature of the Chilean financial markets, compared to, say, the United States or Canada, it was very important that the AFPs be heavily regulated and closely supervised, to prevent financial behavior that could undermine the whole system. The range of permissible investments was narrow at inception and has gradually been broadened, but it remains tightly regulated. Moreover, the approach of crediting interest within a "corridor" around the mean AFP investment return has had the effect of reducing competition based on performance. Nonetheless, the gross real investment returns achieved have been strong by North American standards.

A significant criticism of the Chilean system is the level of administrative expenses charged. Because firms may not charge an exit fee or impose fees according to the value of assets, the approach commonly adopted is to charge a fee calculated as a percentage of contributions (Con-

¹⁸ At inception of the system, the contribution history for all participants was available; so, although those born after 1953 receive only DC benefits, all their contributions are included.

¹⁹ Technically this reform is to "modify the primary insurance amount (PIA) formula factors (90, 32, and 15) starting in 2009, reducing them successively by the measured real wage growth in the second prior year"; however, it is commonly referred to as "CPI-indexed benefits," and we use this language.

gressional Budget Office 1999), including a flat rate component that makes the fee regressive (Brown 1997). Such a fee is collected only from active contributors. In turn, this has led AFPs to compete for active contributors through sales and marketing efforts, such as by paying attractive commissions to salesman for securing new contributing account holders. In 2004 it was estimated that fees were approximately 1.5% of wages, down from 3.8% of wages in 1983 (Williamson 2005): that is, fees were approximately 15% of contributions.

While Chile used a fully private-sector approach to administration and investment, Sweden centralized administration (a “clearinghouse” approach) and used public and private fund managers. The clearinghouse approach should benefit from economies of scale and reduce administrative expenses. It has been estimated that the cost of maintaining the records is approximately 0.3% of assets and that the largest and most efficient investment funds charge an investment management fee of 0.75% of assets (Favreault et al. 2004). Since the amount of assets under management for a particular investment manager is small, because of both the relatively low contributions and the many investment funds, one would expect relatively high fees.

In evaluating the effect of introducing Model 2, an administrative and investment management fee of 0.3% of assets was assumed (PCSSS 2001). This fee seems low, given the large number of participating employers from whom records must be processed, the relatively small individual account balances, and the intention to broaden the range of private-sector investment choices for accounts exceeding \$5,000. Nonetheless the CSSS heard testimony (Mehle 2001) regarding the Federal Retirement Thrift Investment Board that identifies gross administrative expenses of approximately 0.07–0.09% of assets (after adjustments for forfeitures) and regarding TIAA-CREF (Wolf 2001), which has annual asset charges for variable annuities ranging from 0.34% to 0.64% of total annual assets. It is a matter of conjecture what the fees would be, but it is worth observing that 0.30% of assets (which was used in determining the cost of Model 2) is certainly less than the typical fee charged by mutual funds for individual accounts but more than the fees to operate the Social Security system if individual accounts

were not required. The Congressional Budget Office (2004a) has estimated that fees would reduce the assets available for benefits by 2–30% depending on how the system was established (centralized versus noncentralized), the number of investment choices, and the amount of each contribution (because processing fees tend to be of a fixed amount per transaction not varying by contribution size).

The United States has deep and well-developed financial markets. It has many strong financial institutions with administrative and record-keeping capabilities. However, to achieve investment and administrative charges approaching the 0.30% assumed by the model will require centralized administration and investment products with revised fee structures. The United States is not yet ready with such an administrative structure or product array.

5.3 Treatment of Women and Minimum Benefit

The treatment of women and the minimum guaranteed benefit are closely linked in all three countries. With respect to the United States, Favreault reports that in 2006, 45.3% of women and 18.6% of men received retired worker benefits that did not exceed the aged poverty threshold for an individual (NASI 2009). In large part this link derives from the typical work and earnings pattern of women relative to men, which normally shows a shorter period of workforce attachment in jobs qualifying for Social Security, with periods of service breaks associated with raising children or caring for other family members, and more periods of part-time work (GAO 2003, 2007). The pattern of earnings for women also tends to be different than for men, generally flatter across the career, and the level of earnings tends to be lower than men’s. Given this earnings pattern and history, basing retirement benefits on earnings or contribution history without some adjustment is likely to produce average pensions for women that are less than the average pensions for men of the same age. This is true for both DB and DC benefit designs. Given this limitation, if one assumes that participants in DC plans will make good and timely investment choices and that investment returns on investment choices provided will increase in a relatively regular manner (both

of which are questionable assumptions, particularly in view of the impact of the economic downturn in 2008 and its effect on investment returns), one might argue that women would tend to benefit from a DC design versus the typical DB design for several reasons, such as the following:²⁰

- With a higher percentage of earnings at the earlier part of their career (especially with the growing tendency for women to postpone the age of birth of the first child and to work before the first birth), the social security contributions have longer to accumulate with interest and represent a larger proportion of the aggregate social security benefit.
- Most DB formulas relate the benefit to average earnings in the years before retirement.²¹ The flatter earnings pattern, often with breaks in earnings before retirement for care giving, results in women's pensions receiving a comparatively smaller increase under DB formulas than do men's pensions.

In Sweden, but not in Chile, women's pensions are improved by using a unisex annuity factor to convert the accumulation into a pension (thereby increasing the pension by understating the female life expectancy).²²

However, the most significant factor in improving the situation of women under both the Chilean and the Swedish systems is the presence of the minimum benefit. In both countries recipients of the minimum benefit are mainly women, and the minimum benefit provides a significant enhancement to women's pensions based only on

their account accumulations. It is noteworthy that both the FDC in Chile and the NDC in Sweden provide a minimum guaranteed benefit, which is not a DC approach but a DB approach and which has a positive redistributive effect by increasing earned benefits to the minimum level considered acceptable. Similarly the PCSSS found that the minimum guaranteed benefit included in both Models 2 and 3 improved the treatment of women: "Both models institute new protections against poverty for low-income workers, among whom women are disproportionately represented" (PCSSS 2001).

The disadvantage of a minimum benefit, which is based on a fixed period of contributory service, is that it may create a "poverty trap." There is little incentive to contribute when the minimum benefit equals or exceeds the benefit, which would be accumulated, by contributing for a number of years beyond the minimum required to qualify for the guaranteed benefit. The consequence, however, is that participants may accept the minimum benefit and be living in near poverty.

Another area where the treatment of women has been improved is through the improvement of survivor benefits. In Chile married men are required to take an annuity providing a survivor's pension. Under Model 2 survivor benefits were enhanced to improve the situation of widows. One might argue that the mandating of survivor benefits is a feature of DB designs. In fact, DB plans can be more readily designed to deliver survivor benefits. In a pure DC design, the survivor benefit is based on the funds accumulated and so may bear no relation to the needs of the survivor. These Model 2 reforms could be implemented easily, so the United States could be judged prepared.

An area where a minimum benefit is important is ensuring that disabled contributors earn adequate benefits. This can be handled easily in a PAYGO DB system by providing credit for years of disability in calculating the pension. In DC systems, where benefits are related to account balances, either actual or notional, it is difficult to ensure equitable treatment for disabled contributors. By introducing a minimum benefit, some measure of adequacy can be achieved.

²⁰ There may be other features in DB designs that benefit women, such as permitting the dropout of child-bearing years in determining benefits or providing credit for such years. However, it is possible to design a DC plan, especially in NDC, that provides credit for those years. This section is not intended to provide an exhaustive comparison of all features of the plan types that could be considered more or less favorable to women. It focuses on the need for a minimum benefit, identifies that a minimum benefit is a DB feature, and notes that women are more likely to be in need of a minimum benefit because of their typical earnings pattern and level.

²¹ This is less pronounced in the United States, where Social Security benefits are calculated based on the 35 highest years' earnings.

²² DB plans, which provide the same benefit payout form to women as to men, provide comparatively greater lifetime benefits to women than men.

5.4 Indexing

Individuals can expect to participate in social security systems for very long periods of time. They may begin contributing in their teens or twenties, continue contributing to age 60 or 65, and then receive benefits for another 20 years or longer. Even modest rates of inflation, applied over long periods, can seriously erode purchasing power, (e.g., 3.5% inflation for 20 years cuts purchasing power in half, and in many countries there have been periods during which inflation has exceeded 10%). To provide adequate benefits for an individual's period of retirement, the benefits must be adequate at commencement and must be adjusted to preserve purchasing power.²³ All three countries use (or propose) a different approach.

In Chile annuities must be purchased that provide inflation protection. Since the benefit is determined based on the accumulated funds, the initial pension is reduced to incorporate subsequent indexing, in relation to price increases. During the accumulation period, the theory is that wage rates will rise by more than prices so that contributions will outpace price inflation. Moreover, the rates of return credited are real returns²⁴ (i.e., net of inflation), so the accumulations will grow (on a purchasing power basis even after accounting for inflation).

This approach would work well for someone with a full career's attachment to the workforce who received regular wage increases. Unfortunately, labor force attachment for many workers is weak in Chile, especially for women, so the potential for retirement on low income, albeit indexed low income, is significant. This effect is partially mitigated by the minimum guaranteed benefit that provides a floor of protection for those who have contributed for at least 20 years; however, the mitigating effect is only partial because this floor is at a low level.

²³ To make benefits adequate at commencement, in DB systems it is common to upgrade earnings on which benefits are calculated, e.g., in relation to the change in average wages as in the case of U.S. Social Security. Benefits after retirement may be upgraded in relation to the change in consumer prices, the change in average wages, or some combination.

²⁴ Although there are individual accounts with actual assets being invested, the AFPs determine the rate of return to be credited based on what competitors are crediting, on regulations and on the need for contingency margins in periods of strong returns to make provisions to be able to augment weaker returns in other periods.

Sweden's system is quite different. During the accumulation period, pension rights are indexed to average wage growth per capita. Pensions in payment are indexed (in part) to average price growth per capita using a rule-of-thumb approximation, that is, by reducing the adjustment for average wage growth by 1.6% per year (Scherman 2003). However, for those receiving the minimum guaranteed pension, indexing is by actual price inflation. To the extent that actual price inflation is less than average wage growth less 1.6% per annum, the relative position of those receiving the minimum pension will decline over time.²⁵

Model 2 proposed that the method of calculating the DB component of Social Security be changed to price indexing from wage indexing (Cogan and Mitchell 2003).²⁶ This would be a dramatic change that would have reduced the value of benefits earned beginning in 2009. However, Cogan and Mitchell argue that such a change brings greater equity among workers with similar wage histories but who retire in different years. The minimum benefit provides a minimum floor for the pension. Pensions in payment would be price indexed (as they are at present).

Whether it be price inflation or wage inflation that is to be provided, the real question is: Should individuals in retirement assume the risk that their accumulated balances at retirement will provide adequate income regardless of subsequent economic outcomes, which they do under pure DC, or should the system collectively assume this risk, as is the case for DB? Barr (2004) argues that during the payout period, given the uncertain nature of the inflation shock, only the

²⁵ If the rate of inflation exceeded the rate of average wage growth, then minimum pensions would grow relative to other pensions. However, it is unlikely that the rate of inflation would exceed the rate of wage growth for an extensive period, especially given the strong sense of social solidarity in Swedish culture.

²⁶ R. Pozen proposed a modification to Model 2 using progressive price indexing. Under this proposal, benefits for lower income earners would continue to be indexed by wage growth but benefits for middle and higher income earners would be indexed by a combination of wage growth and price inflation, ultimately being indexed by price inflation only for the highest wage earners. This proposal would provide for solvency on the 75-year actuarial balance measure; although it would require transfers from General Revenue for the years 2030 to 2078. It would result in benefit reductions for middle and higher income earners of up to 50% in some scenarios. See Goss (2005) for more details.

state is in a position to bear the risk. The state may do this explicitly through guaranteeing the benefits, as is the case for the DB Social Security component of pensions under Model 2 in the United States or implicitly by issuing inflation-adjusted real-return bonds that may be purchased by insurers that offer inflation-adjusted annuities as is the case in Chile. In Sweden indexing is provided, although the extent of inflation protection is dependent on the financial balance of the system. When there are financial deficiencies, all types of benefits, including pensions (and inflation protection thereon), may be reduced through the ABM.

To provide inflation protection for the pensions arising from the personal accounts, price-indexed annuities must be available. It appears that the PCSSS assumed that such annuities would be provided by the state through the Social Security system. However, if such annuities are to be provided by the private sector, there will be a need for an adequate supply of inflation-adjusted real-return government bonds. At present this is a thin market.²⁷ The broadening and deepening of the real-return-government-bond market is a requirement before the United States could be judged prepared to implement a truly private account version of Model 2.

6. IS MODEL 2 THE ANSWER?

Using a list of four of the six considerations presented earlier, the readiness of the United States to adopt a DC component may be assessed as follows:

1. Administrative capacity to collect contributions and maintain adequate records: although a central administrative authority with the requisite capabilities is not in place now, one could certainly be established, or the Social Security Administration could be easily adapted.
2. Adoption of incomplete solutions possibly providing a false sense of complacency: Model 2 with its reliance on transfers from Treasury

in the future is in danger of being an incomplete solution providing a false sense of complacency.

5. Ability to provide information regarding account balances and the system's financial health that creates confidence that the system is sustainable: given the need for transfers from Treasury in the future, it may be difficult to provide information that creates confidence in the financial sustainability of the system.
6. The importance of balancing the goals of stabilizing or reducing payroll taxes with other objectives such as benefit adequacy: Model 2, assuming the future transfers from Treasury occur without increased contributions or taxes, will be stabilizing, but with the potential variability of investment results in individuals' accounts, for some individuals, benefit adequacy may be a concern.

Overall, with certain technical changes, the United States could soon be prepared to adopt Model 2, namely, with the creation of a low-cost centralized administrator, introduction of low-fee investment options, and the development of a fuller real-return bond market. However, unless there is an affirmative answer to the question: Is Model 2 the answer to the financial troubles facing U.S. Social Security, the United States may not be ready at a political level. Let us review its key features:

- Replacing wage indexing by price indexing, by itself, moves the DB financial position into surplus. This reform is the single financial change required to address the actuarial deficit and is a DB change.
- Introducing a minimum benefit and enhancing survivor benefits improves the situation of low-wage earners and surviving spouses, the majority of whom are women. These changes are commendable and are DB in nature.
- Temporary transfers from general revenue between 2025 and 2054 keep the Trust Fund solvent. (Although it does not violate the president's principles, it is an aggressive way of addressing a financial imbalance—almost a *deus ex machina*). A sounder plan would not require transfers from general revenue.
- The offset to (or reduction in) Social Security benefits for voluntary saving in individual retirement accounts is calculated at below gov-

²⁷ At present, the market is thin based on supply. One would hope that if the implementation of Model 2 was accompanied by annuitization within the private sector, then the supply of real-return bonds would be increased to meet the demand for this product.

ernment bond rates. This encouragement to establish individual accounts represents a subsidy by future PAYGO contributors, and it has a cost (i.e., more taxes will be required in the future to pay the promised DB benefits). It is not a sound part of a plan to strengthen the financial position of Social Security.

- Individual accounts are established from the existing Social Security contributions. In effect, no new money is added to the system. An administration and investment management structure must be created to administer these accounts that will create an additional cost and may be regressive. Moreover, because no new money has been added to the system, for these accounts to serve a purpose in reducing the financial deficit in Social Security they must be invested to earn returns greater than the returns incorporated in the actuarial valuation of the PAYGO DB Social Security program, that is, the returns on long-term Treasury bonds. To achieve greater returns will require taking greater investment risk, and such risk will be borne by individual account holders, not collectively. In the presence of investment options and different retirement dates and investment histories, individual account holders with similar contribution histories will fare differently, raising issues of inequity and benefit adequacies. Moreover, those who retire at times when markets are depressed, for example, such as during market conditions similar to fall 2008, will receive lower pensions than they may have been planning to receive. Will those who suffer under such a redesign consider that Social Security has been strengthened?

It is peculiar that a principle established by President Bush is that the government must not invest Social Security funds in the stock market, yet a feature of these proposed model modifications is that individuals would be permitted to do this with funds they have contributed to a government-sponsored plan. In these authors' opinion, a centrally managed investment in equities that provides investment support for DB promises is more desirable, both from a social view point and from the perspective of effective risk management, and is likely to produce better overall investment returns than a collection of individual accounts invested in equities at the di-

rection of the account holders (even if the available investment options are limited and carefully selected and monitored).

In summary, the changes proposed by Model 2, excluding the adoption of individual accounts, would address Social Security's financial problems and may be a preferred answer. However, if the adoption of individual accounts were omitted, Model 2 would not meet the prescribed principles (that require individual accounts). This suggests the principles may not be sound, if the objective is to improve the financial position of Social Security. In examining the Chilean and Swedish reforms and the Model 2 proposal in the United States, it would appear that the aspects that make the biggest difference to the financing and the equity of the system could be accomplished in a PAYGO DB framework, through parametric rather than structural reform. Thus, a structural move to DC may not be the answer.

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REFERENCES

- ARENAS DE MESA, A. 2005. Fiscal and Institutional Considerations of Pension Reform: Lessons Learned from Chile. In *A Quarter Century of Pension Reform in Latin America and the Caribbean: Lessons Learned and Next Steps*, ed. Caroline A. Crabbe, pp. 83–125. Washington, DC: Inter-American Development Bank.
- ARENAS DE MESA, A., D. BRAVO, J. R. BEHRMAN, O. S. MITCHELL, AND P. E. TODD. 2006. The Chilean Pension Reform Turns 25: Lessons from the Social Protection Survey. Pension Research Council Working Paper, Wharton School, University of Pennsylvania, Philadelphia.
- BARR, N. 2004. *The Economics of the Welfare State*. 4th ed. Oxford: Oxford University Press.
- BARRIENTOS, A. 1998. *Pension Reform in Latin America*. London: Ashgate.
- BORZUTSKY, S. 1998. Chile: The Politics of Privatization. In *Do Options Exist? The Reform of Pension and Health Care Systems in Latin America*, ed. M. A. Cruz-Saco and C. Mesa-Lago, pp. 35–55. Pittsburgh: University of Pittsburgh Press.
- BROOKS, S. M., AND R. K. WEAVER. 2006. Lashed to the Mast? The Politics of NDC Pension Reform. In *Pension Reform: Issues and Prospects for Non-financial Defined Contribution (NDC) Schemes*, pp. 345–85. Washington, DC: World Bank.

- BROWN, R. L. 1997. In Defense of Pay-as-You-Go (Paygo) Financing of Social Security. *North American Actuarial Journal* 1(4): 1–20.
- . 2007. Actuarial Issues in the Design of an Optimal Social Security System. Available at www.actuaries.org/PBSS/Colloquia/Helsinki/Papers/Brown.pdf.
- CICHON, M. 2005. Balanced Notional Defined Contribution Schemes: A New “Geist” in Old Bottles? *Scandinavian Insurance Quarterly* 2: 174–90.
- COGAN, J. F., AND O. S. MITCHELL. 2003. Perspectives from the President’s Commission on Social Security Reform. *Journal of Economic Perspectives* 17(2): 149–72.
- CONGRESSIONAL BUDGET OFFICE. 1998. *Social Security and Private Saving: A Review of the Empirical Evidence*. Washington, DC: Government Printing Office.
- . 1999. *Social Security Privatization: Experiences Abroad*. Washington, DC: Government Printing Office.
- . 2004a. *Administrative Costs of Private Accounts in Social Security*. Washington, DC: Government Printing Office.
- . 2004b. *Long-Term Analysis of Plan 2 of the President’s Commission to Strengthen Social Security*. Washington, DC: Government Printing Office.
- CRUZ-SACO, M. A., AND C. MESA-LAGO. 1998. *Do Options Exist? The Reform of Pension and Health Care Systems in Latin America*. Pittsburgh: University of Pittsburgh Press.
- FAVREAU, M. M., J. H. GOLDWYN, K. F. SMITH, L. H. THOMPSON, C. E. UCCELLO, AND S. R. ZEDLEWSKI. 2004. Reform Model Two of the President’s Commission to Strengthen Social Security: Distributional Outcomes under Different Economic and Behavioral Assumptions. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- GOVERNMENT ACCOUNTABILITY OFFICE (GAO). 2003. *Women’s Earnings: Work Patterns Partially Explain Difference between Men’s and Women’s Earnings*. GAO-04-35. Washington, DC: Government Printing Office.
- . 2007. Retirement Security: Women Face Challenges in Ensuring Financial Security in Retirement. GAO-08-105. Washington, DC: Government Printing Office.
- HAGBERG, J. 2006. How NDC Social Security Changes the Balance of Risk: The Swedish Example. Unpublished manuscript. Background paper for 28th Congress of the International Actuarial Association, Paris, May 2006.
- HOLZMANN, R., AND E. PALMER. 2006. *Pension Reform: Issues and Prospects for Non-financial Defined Contribution (NDC) Schemes*. Washington, DC: World Bank.
- MCGILLIVRAY, W. R. 2005. Reflections on Notional Defined Contributions Public Pension Schemes. *Scandinavian Insurance Quarterly* 3: 219–28.
- MEHLE, R. W. 2001. Statement by the Honorable Roger W. Mehle, Executive Director, Federal Thrift Investment Board, before the President’s Commission to Strengthen Social Security. Available at www.csss.gov.
- MESA-LAGO, C. 1989. *Ascent to Bankruptcy: Financing Social Security in Latin America*. Pittsburgh: University of Pittsburgh Press.
- NATIONAL ACADEMY OF SOCIAL INSURANCE (NASI). 2009. *Strengthening Social Security for Vulnerable Groups*. Washington, DC: National Academy of Social Insurance.
- PICARD, P. M., AND E. TOULEMONDE. 2000. Taxation and Labor Markets. Econometric Society World Congress 2000, Contributed Papers 0707. Available at <http://ideas.repec.org/p/eem/wc2000/0707.html>.
- PRESIDENT’S COMMISSION TO STRENGTHEN SOCIAL SECURITY (PCSSS). 2001. *Report of the President’s Commission: Strengthening Social Security and Creating Personal Wealth for All Americans*. Available at www.csss.gov.
- SCHERMAN, K. G. 2003. The Swedish Pension Reform: A Good Model for Other Countries? *Scandinavian Insurance Quarterly* 4: 304–18.
- SETTERGREN, O. 2003. Financial and Inter-generational Balance? An Introduction to How the New Swedish Pension System Manages Conflicting Ambitions. *Scandinavian Insurance Quarterly* 2: 99–114.
- SOCIAL SECURITY AND MEDICARE BOARDS OF TRUSTEES. 2008. *The Summary of the 2008 Annual Reports*. Social Security Administration. Available at www.ssa.gov/OACT/TRSUM/trsummary.html.
- WHITEHOUSE, E. 2006. New Indicators of 30 OECD Countries’ Pension Systems. *Journal of Pension Economics and Finance* 5: 275–98.
- . 2007. *Pensions Panorama*. Washington, DC: World Bank.
- WILLIAMSON, J. B. 2005. *An Update on Chile’s Experience with Partial Privatization and Individual Accounts*. Washington, DC: AARP.
- WILLIAMSON, J. B., AND M. WILLIAMS. 2003. *The Notional Defined Contribution Model: An Assessment of the Strengths and Limitations of a New Approach to the Provision of Old Age Security*. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- WOLF, J. A. 2001. Testimony of James A. Wolf President, TIAA-CREF Retirement Services before the President’s Commission to Strengthen Social Security. Available at www.csss.gov.
- WORLD BANK. 1994. *Averting the Old Age Crisis*. New York: Oxford University Press.

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