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The Role of Annuities in a Reformed U.S. Social Security System

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The AARP Public Policy Institute, formed in 1985, is part of the Policy and Strategy Group at AARP. One of the missions of the Institute is to foster research and analysis on public policy issues of importance to mid-life and older Americans. This publication represents part of that effort.

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Foreword

Most of the debate about the future of Social Security has focused on alternate ways to structure the asset accumulation phase of a reformed retirement system: how to ensure that individuals reach retirement age with sufficient wealth to finance their retirement. The most prominent legislative proposals for personal retirement accounts (PRAs) pay little attention to the payout phase, and even those that specify a design for this phase tend to follow the Federal Thrift Savings Plan in not mandating annuitization and not guaranteeing benefits for surviving spouses. Disregarding the design of the decumulation or “payout” phase of a reformed system is risky because this phase will largely determine whether the system delivers a level of retirement income security similar to that provided by Social Security: retirement benefit annuities that are inflation-indexed, last as long as a beneficiary lives, and are free from financial market risk.

In this paper, Jeffrey Liebman comprehensively analyzes the annuitization of individual account assets and how to manage withdrawals from a system of PRAs. He estimates projected benefit levels for diverse demographic groups and analyzes both accumulation and payout decisions for alternate benefit structures for a reformed Social Security system which includes individual account plans.

He finds that while it is possible to provide a level of protection similar to Social Security in a mixed system that includes PRAs, it would be costly and require careful regulation. Fully replicating the features of the current system would require full annuitization into fixed real annuities of worker’s PRAs, mandatory joint-and-survivor annuities for married couples, and having the government function as the annuity provider in order to keep administrative costs low. He cautions that policymakers need to decide whether the benefits of increased choice and higher expected benefit levels justify reducing the amount of protection provided from Social Security. Special care must be taken to design provisions to protect divorced spouses, disabled workers, and other demographic groups who depend heavily on the current system and are at high risk of poverty.

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Executive Summary

Introduction

Most of the public debate about the future of Social Security has so far focused on alternative methods for structuring the asset accumulation phase of a retirement system. However, it is the design of the decumulation or “payout” phase of a reformed system that will largely determine whether a reformed system delivers a level of retirement income security similar to that in the current U.S. Social Security system.

In the current system, retirement benefits are paid in the form of real annuities that are indexed for inflation, last as long as a beneficiary lives, and are free from financial market risk. In contrast, the most prominent legislative proposals for personal retirement accounts (PRAs) generally pay little attention to the payout phase, and even those plans that specify a design for the payout phase tend to follow the Federal Thrift Savings Plan in not mandating annuitization and not guaranteeing benefits for surviving spouses.

Purpose

This report provides a comprehensive analysis and guide to policymakers for thinking about the management of withdrawals from a system of PRAs. In designing the payout phase of a system with PRAs, policymakers face important design choices, and these choices will have a large impact on whether a reformed Social Security system will continue to provide the retirement income security that has been the hallmark of the current system.

Many issues need to be considered and policymakers will need to make many decisions in designing the payout phase of a PRA system. This report addresses these issues and decisions. Specifically, the report addresses questions such as the following:

- 1) Should annuities be mandatory or voluntary?
- 2) If annuitization is mandatory, what portion of the individual account balance should be annuitized?
- 3) How should the disabled, young survivors, and surviving spouses be treated?
- 4) How should market-provided annuities be regulated?

In addition, the report estimates projected benefit levels for various populations under alternative benefit structures for Social Security.

Methodology

The report analyzes the major issues associated with the annuitization of individual account assets. It begins by discussing six important background issues and then analyzes 12 key decisions in the design of a system of PRAs. Based on this analysis, a model is constructed that simulates retirement income for a wide range of demographic groups using alternative

assumptions about annuity program design and analyzing risk and redistribution relationships. The model is capable of analyzing both accumulation and payout decisions for a wide variety of individual account plans. The results presented in this study are for a 2 percent carveout plan in which the traditional Social Security benefit is reduced by 39 percent to bring the system into balance.

Because policy choices on one annuity provision will affect which choices are most appealing on other provisions, the final section of the study sketches three illustrative comprehensive annuitization approaches to the payout phase. The first provides only a minimal level of protection and leaves individuals with substantial choice in how they allocate their accumulated PRA assets. The second provides much stronger protections designed to mimic those of the existing Social Security system as closely as possible. The third describes an approach that relies on innovative financial market products to try to combine both the upside of variable annuities with reasonable downside protections.

12 Key Decisions Facing Policymakers

There are 12 key decisions that policymakers will need to make in designing the payout phase of a PRA system. These decisions interact with each other so that the choice made for one option will often affect the optimal choice for another option. Moreover, choices made about the structure of the accumulation phase will have a strong impact on the design of the payout phase.

- 1) Should annuitization be mandatory or voluntary?
- 2) If annuitization is mandatory, what portion of the individual account balance should be required to be annuitized?
- 3) Should annuities be fixed nominal, fixed real, or variable?
- 4) Should the annuitization include bequest options, and if so, what type?
- 5) How should spouses be treated?
- 6) How should disabled beneficiaries and young survivors be treated?
- 7) When should annuitization occur?
- 8) Should the annuity pricing be uniform, or should there be risk-class pricing?
- 9) Should there be redistribution in the payout phase?
- 10) Should the annuities be government-provided or market-provided?
- 11) How should market-provided annuities be regulated?
- 12) What advanced financial market products might arise to reduce risk?

Principal Findings

In designing the payout phase of PRAs, policymakers face important design choices, and these choices will have a large impact on whether a reformed Social Security system will provide the retirement income security that has been the hallmark of the current system.

First, because the proceeds of PRAs represent a significant share of retirement resources, an individual in a carveout system that did not require annuitization who squandered his account

balance in the first few years of retirement would be left with significantly less retirement income than if he had been required to annuitize the entire proceeds.

Second, plans that require partial annuitization up to a fixed-income level — to ensure that retirement income is above the poverty line, for example — require lower income individuals to annuitize a greater fraction of account balances than higher income individuals.

Third, the current Social Security system provides an inflation-indexed annuity. Requiring individual account holders to purchase inflation-indexed annuities would provide similar protection. Elderly women, with their long life expectancies, would be particularly vulnerable to the declining real benefit levels that would result from fixed nominal annuities.

Fourth, a choice to permit bequest options in annuitization has a number of effects in an individual account system. This option lowers the monthly payment to the retiree, offsets some of the reverse redistribution from low- to high-income groups that occurs because of the correlation between socioeconomic status and longevity, and can lead to adverse selection if selecting a bequest option is voluntary. For example, a 10-year certain option reduces retirement benefit levels by about 3 percent relative to a plan with no bequests.

Fifth, an important design question for personal accounts is whether and how spousal protections will be built into the payout phase. Requiring married retirees to purchase joint-and-survivor annuities with a 67 percent survivor benefit would provide protection similar to the existing Social Security system. A PRA system with account splitting upon divorce would provide divorced secondary earners with both advantages and disadvantages relative to provisions in the current system.

Sixth, in a PRA system, individuals who are disabled are unlikely to accumulate account balances sufficient to finance consumption over their remaining lifetime. As such, special provisions are required for this population. One option would be to keep Disability Insurance (DI) separate from the PRA system and to specifically exclude DI benefits from any cuts made to the traditional Old-Age, Survivors, and Disability Insurance (OASDI) benefit. An alternative approach would be for disabled individuals to remain in the (PRA) system and have their accounts credited each year as if they were employed.

Seventh, because individuals in lower income groups have relatively shorter life expectancies, they receive benefits for fewer years on average, and therefore receive a lower money's worth if annuities are priced uniformly for all retirees. Groups with relatively low life expectancies, such as blacks and workers with less than high school education, receive somewhat higher benefits when annuities are priced on the mortality rate of their own group rather than on population-wide mortality rates. However, it might be illegal or perceived as discriminatory to permit annuity pricing to depend explicitly on race or education. These legal issues need further analysis before policymakers make decisions about the role of annuities in a reformed Social Security system.

Eighth, administrative costs would likely be lower in a government-run system. Moreover, the government may be better able to spread risks and may therefore be able to offer better pricing on annuities than the private sector could. Although government provision is likely to be desirable if annuities are required to be fixed real annuities, the issue is more complicated if variable annuities and other stock-based annuity products are to be used.

Ninth, if annuities are to be privately provided, then it is likely that the scope of government regulation of the annuity market would need to be greatly increased.

Conclusions

It is important that the provisions for the payout phase be in place when a PRA system is first implemented. Although the protections in the current Social Security system were developed gradually over time, these protections almost always consisted of politically popular benefit expansions. In a defined contribution system, in contrast, introducing protections over time will typically require reductions to expected retirement income levels, and will likely be perceived as the government taking money away from account holders. Moreover, if participation in the PRA system is voluntary, it will be impossible for workers to make informed decisions about whether to participate if the details of the system have not been specified.

The analysis in this report indicates that it is possible to provide a level of protection similar to that in the current Social Security system, at additional cost, in the context of a mixed system that includes personal retirement accounts. But doing so requires careful design of the payout phase. To fully replicate the protective features of the current system, full annuitization into fixed real annuities must be required of all workers, married couples must use joint-and-survivor annuities, and the government probably needs to be the annuity provider in order to keep administrative costs low. In addition, redistribution needs to be built into the system to offset the reverse redistribution that occurs under single-price annuitization from the correlation between socioeconomic status and longevity.

It is not obvious, however, that the amount of protection provided by the current Social Security system is optimal. By sacrificing some of that protection and accepting additional longevity risk and financial market risk, workers can gain more control over the timing of their retirement consumption and earn higher expected portfolio returns. In particular, the government could choose to require only a minimum amount of annuitization and to let retirees have full control over the rest of their account balances. The government could also permit retirees to purchase variable annuities that offer higher expected returns along with a greater amount of financial market risk. Policymakers need to decide whether the benefits of increased choice and higher expected benefit levels justify reducing the amount of protection provided from Social Security – the first tier of Americans’ retirement income security.

Finally, in designing the payout phase of a PRA system it is important to analyze its effects, not only on the typical retiree, but also on the full range of workers and dependents who rely on the current system. Special care must be taken to design provisions to protect divorced

spouses, widows, disabled workers, and other demographic groups who depend heavily on the current system and are at high risk of poverty.

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I. Introduction

The current U.S. Social Security system provides important income security to workers, retirees, and their families. Retirement benefits are paid in the form of real annuities that are indexed to inflation, last as long as a beneficiary lives, and are free from financial market risk. Spouse and survivor benefits ensure that the family members of retired workers are provided for and that this protection continues even after the worker's death. Disability benefits and benefits to parents of young children maintain income levels for families who no longer have income from their primary earner. In addition, Social Security's benefit formula redistributes income from those with higher lifetime earnings to those with lower lifetime earnings, although the extent of this lifetime redistribution is partially offset by lower life expectancies for low-income households.

Many of these important sources of income security were not part of the original design of the U.S. Social Security system. Legislation passed in 1939 amended the original 1935 Social Security Act to add benefits for dependents of retired workers and for surviving dependents of deceased workers. Disability insurance was introduced in 1956 and expanded to dependents of disabled workers in 1958. Automatic cost-of-living increases in benefits were introduced in 1972. Thus, the system as we know it today took decades to evolve.

Declining fertility and rising life expectancy imply that changes will eventually need to be made to the U.S. Social Security system. The Trustees of the Social Security Trust Funds project that by 2017, benefit payments will exceed dedicated tax revenue, and that the gap between benefit payments and revenues will rise rapidly in subsequent years.¹ Although a wide range of reforms has been proposed, many plans — including the Individual Accounts (IA) and Personal Security Accounts (PSA) plans of the 1994–1996 Advisory Council, plans proposed by Senators Kerrey and Simpson, Moynihan, Breaux and Gregg, by Congressmen Archer and Shaw, and by President Bush's Commission to Strengthen Social Security — have involved the creation of personal retirement accounts (PRAs) to either supplement or partially replace the traditional defined benefit program.

Some analysts have expressed concern that a Social Security system with PRAs would substantially reduce the income security of U.S. families, particularly those in retirement. These concerns stem in part from the financial market risk present in most PRA plans. However, concerns also arise from the possibility that PRA plans would not contain provisions in the payout phase that would provide protections similar to those in the current system.

¹ Social Security will still be able to pay full benefits to beneficiaries for more than two decades after 2017, by drawing on the assets of the Social Security Trust Fund, which is now projected to be exhausted in 2041. However, in order for Social Security to redeem trust fund assets to make benefit payments, the Treasury must come up with the needed funds out of general revenues.

Most of the public debate about the future of Social Security has so far focused on alternative methods for structuring the asset accumulation phase of a retirement system. In particular, the debate has focused on issues such as whether or not the Old-Age, Survivors, and Disability Insurance (OASDI) Trust Funds should be partially invested in private securities, and whether or not individuals should be permitted or required to contribute to PRAs as a supplement to, or as a partial replacement for, the existing system. As such, substantial attention has been focused on restrictions of portfolio choice, the role of government guarantees, expected future equity returns, and administrative costs of alternative investment systems.

A complete analysis of a retirement income system, however, must consider the asset decumulation phase as well. The debate over the first phase is mostly about how to ensure that individuals reach retirement age with a stock of wealth sufficient to finance retirement consumption. The “decumulation” or “payout” phase determines how this stock of accumulated wealth is actually converted into a retirement income stream. In other words, how do individuals spend down their accumulated wealth to finance retirement consumption in the face of uncertainty about how long they will live? The discussion of how withdrawals from PRAs would be regulated has received less attention in the public debate, despite the fact that this issue is central to ensuring retirement income security.²

This lack of attention to the payout phase is due in part to a lack of awareness of the importance of these issues. But it may also be due to a belief — one that I believe is misguided — that these details do not have to be fully developed at the time a PRA plan is introduced. Instead, the argument goes, there will be plenty of time to figure out the details as account balances accumulate, because it will be decades before people have to depend on PRAs for a substantial share of their retirement income.

A strong political economy argument exists, however, for making sure that provisions for the payout phase are in place when a PRA system is first implemented. Although the protections in the current Social Security system were developed gradually over time, introducing these protections almost always involved politically popular benefit expansions. By contrast, in a defined contribution system, introducing protections over time will typically require reductions in expected retirement income levels. This approach is likely to be perceived as the government taking money away from account holders. For example, requiring joint-and-survivor annuities will reduce monthly payments compared to requiring single-life annuities. Similarly, introducing a requirement that a greater fraction of account balances be converted into an annuity upon retirement could be perceived by some as the government taking people’s money away from them. If participation in the PRA system is to be voluntary as President Bush has proposed, another motivation for specifying the details in advance is that individuals would have difficulty choosing whether to opt into the individual accounts in the absence of such details.

² The Final Report of President Bush’s Commission to Strengthen Social Security is notable for its careful attention to these issues.

Thus, in designing the payout phase of PRAs, policymakers face important design choices, and these choices will have a large impact on whether a reformed Social Security system will continue to provide the retirement income security that has been the hallmark of the current system.

This study aims to clarify the tradeoffs underlying these choices. It begins in Section II, which discusses six background issues:

- 1) What is longevity risk, and why is it important to retirees and policymakers?
- 2) What types of financial and insurance products are available to address longevity risk?
- 3) How is longevity risk treated in the major proposals that have been forwarded as reform options for Social Security?
- 4) What is the state of the existing private annuity market, and is it capable of being the primary annuity provider for a national PRA system?
- 5) How does the structure of the accumulation phase of a PRA system affect the relative attractiveness of various payout-phase options?
- 6) How does the presence of a guaranteed income floor, such as that provided by the Supplemental Security Income (SSI) program, affect the relative attractiveness of various payout-phase options?

Following the discussion of background issues, the study turns in Section III to 12 key decisions facing policymakers in the design of the decumulation phase of a PRA system. This analysis relies on a model created for the study, which estimates retirement benefit levels under different annuitization options for different types of individuals. Specifically, the model jointly analyzes issues of risk and issues of redistribution, thereby showing the effects of different payout strategies on the incomes of different types of individuals under different financial market outcomes. (The model is described in detail in the appendix to this report.) The 12 key decisions are:

- 1) Should annuitization be mandatory or voluntary?
- 2) If annuitization is mandatory, what portion of the individual account balance should be required to be annuitized?
- 3) Should the annuities be fixed nominal, fixed real, or variable?
- 4) Should the annuitization include bequest options, and if so, what type?
- 5) How should spouses be treated? For example, should joint-and-survivor annuities be required? If so, what level of benefit should be provided to the survivor?
- 6) How should disabled beneficiaries and young survivors be treated?
- 7) When should annuitization occur?
- 8) Should the annuity pricing be uniform, or should there be risk-class pricing?
- 9) Should there be redistribution in the payout phase?
- 10) Should the annuities be government-provided or market-provided?
- 11) How should market-provided annuities be regulated?

- 12) Should individuals be permitted (or even encouraged) to use advanced financial market products such as “collars” in an effort to reduce market risk?³

Because decisions made on one design option will often influence the decisions for other design options, it is important to study complete plans for the payout phase rather than solely focus on individual options. Therefore, the final section of the paper analyzes three model plans for the payout phase.

³ A “collar” is a derivative financial market product in which an investor gives up some of the potential upside gain in exchange for a floor on the downside risk. Collars thus cut the upper and lower tails off of the outcome distribution. Technically, a collar is equivalent to purchasing a put option and selling a call option.

II. Background Issues

Before turning to specific policy options for the design of the payout phase of a PRA system, it is helpful to review several background issues.

1. *What is longevity risk, or length-of-life uncertainty, and why is it important to retirees and policymakers?*

Popular discussions about financial preparedness for retirement often focus on the need to accumulate enough wealth so that one can continue to live comfortably in retirement. Investors become used to thinking about how much to save, and how to allocate their retirement portfolio across a myriad of assets. In addition, most households think about the risk of dying before retirement, as evidenced by the fact that most households own life insurance to protect their spouses or families against the risk of income loss.⁴

However, financial planning for retirement is incomplete if one does not consider the important role of *longevity risk*, the financial risk that arises due to uncertainty about how long one will live. For example, in the year 2000, the average 65-year-old man in the U.S. had an expected remaining life of 16.4 years (to age 81). If this length of life were known with certainty, it would be simple for every man this age to allocate his retirement wealth across the remaining 16.4 years of life. However, there is substantial uncertainty around the mean lifespan. For example, 12 percent of these 65-year-olds will die before reaching age 70, while 17.5 percent of them will live to age 90 or beyond. This uncertainty makes financial planning more difficult.

An individual facing length-of-life uncertainty must trade off two risks. The first is that he will live significantly beyond his life expectancy and thus have very little wealth left with which to finance future consumption. One way to solve this problem is to consume very conservatively to ensure money will always be available regardless of how long one lives. But this approach exposes the retiree to a second risk: that of dying with substantial amounts of wealth left unconsumed. The reason this is a risk is that unconsumed wealth represents a lost opportunity to increase one's consumption while alive. Another way to view this is that in the face of uninsured longevity risk, individuals must save more in order to be assured that they do not run out of money in the event that they live much longer than expected. Saving more means reducing consumption earlier in life, which makes them worse off.

There is a reason why policymakers care about longevity risk, above and beyond its impact on individual welfare. If individuals live longer than expected, and have

⁴ Sixty-one percent of American adults own life insurance. Roughly two-thirds of these policies are provided through an employer, and many of the policies provide relatively small amounts of coverage. See *Trends in Life Insurance Ownership Among Americans: The Spiraling Decline Continues* (LIMRA International: Windsor, CT), 1999.

inadequate resources with which to fund their consumption at advanced ages, they will place pressure on publicly funded social assistance programs for the elderly, such as the SSI program.

2. *What types of financial and insurance products are available, either through public programs or private markets, to address longevity risk for individuals and couples?*

Longevity risk can be addressed through the use of simple financial products called life annuities. A life annuity solves the retiree's dilemma of how to allocate resources across an uncertain number of years of life. It does so by allowing the retiree to exchange a stock of retirement wealth for a guaranteed income stream that will be paid as long as the individual is alive, thus removing the risk of living longer than one's resources allow. In its purest form, a life annuity has the potential to pay a higher rate of return than non-annuitized assets in exchange for giving up the right to any annuitized wealth in the event of the insured's death.

A life annuity is generally structured as a contract between the insured individual (or couple, as explained below) and the insurance provider (for example, the government, an employer, or an insurance company). The provider continues to make payments to the insured as long as the insured is alive. By pooling these longevity risks across many individuals, the insurance company essentially uses the assets of those insured individuals who die early to pay a higher rate of return to those individuals who are still alive.

There are many variations on the basic life annuity theme. A very common variation, and one that is particularly relevant to discussions of Social Security reform, involves extending the annuity to cover multiple lives. Whereas single-life annuities pay only until the insured individual dies, joint-and-survivor annuities continue to make (possibly reduced) payments as long as at least one of the covered individuals is alive. For example, a couple could purchase a joint life annuity option with a 75 percent survivor option. This type of annuity would pay out a predetermined amount each month for as long as both members of the couple were alive. Upon the death of either individual, 75 percent of the original payment would continue to be paid to the surviving spouse until his or her death. The survivor income to couple income ratio can vary, as can the assumption that the spouses are treated symmetrically.

The key design element that makes an annuity a *life* annuity is that the payments are contingent upon survival of one or more individuals. There is a wide class of financial products available that are described under the title "annuity," but only a subset of these products is actually life contingent. For example, in the U.S. market for single-premium immediate annuities, approximately half of all policies are not life contingent.⁵ Often, these annuities are "period-certain" annuities that pay a stream of income over a predetermined, fixed period of time, such as 20 years (Brown and Poterba, 2000). These products do not offer insurance against longevity risk.

⁵ LIMRA International (1997).

The main source of life annuity income in the United States is the Old-Age and Survivors Insurance (OASI) program, commonly called Social Security. Once an individual has claimed benefits under the OASI program, the benefits are paid out monthly as long as the individual is alive. Benefits are linked to the Consumer Price Index (CPI), ensuring that the real value of the benefits does not fall over time. In 2000, the OASI program paid out approximately \$350 billion in benefits to nearly 40 million recipients, including dependents and survivors. As such, reforms to the existing OASI system have the potential to reduce significantly the rate of annuitization within the U.S. if the reforms move away from the current mandatory annuitization scheme.

The second largest source of annuity income to U.S. households is private pensions. Historically, defined benefit pension plans provided benefits to retirees in the form of a life annuity. In 1994, for example, more than 40 percent of individuals older than 55 years of age who were retired from private sector jobs reported that they were receiving annuity income from a private pension plan, with aggregate payments of \$70 billion annually (Brown, 2002).

The pension environment, however, has been changing rapidly. Over the past 25 years, there has been a dramatic shift away from traditional defined benefit plans to defined contribution plans, such as 401(k)s. For example, from 1977 to 1996, the number of participants in defined contribution plans grew from 15 million to more than 51 million and now accounts for more than half of all pension plan participants.⁶ The vast majority of defined contribution plan participants do not have access to annuitization through their plan. In addition, those defined benefit plans that still exist are increasingly offering lump-sum options. The net effect of these trends is to reduce the extent of annuitization occurring through private pensions in the U.S. In their analysis of the implications of these trends on annuitization rates, Brown and Warshawsky (2001) conclude that “absent institutional and regulatory changes, overall rates of annuitization will fall in the future, potentially exposing retirees to substantial longevity risk.”

However, Auerbach et al. (1995) emphasize that the annuitized share of the financial resources of the elderly increased dramatically between 1960 and 1990 and now exceeds 50 percent. Expansions in Social Security and federal health benefits over this period explain much of the change. This trend has important macroeconomic implications because financial resources paid out in an annuitized form are generally consumed rather than passed along to future generations as bequests, implying higher levels of consumption and lower levels of saving by current elderly and therefore a smaller capital stock in the future. Kotlikoff and Spivak (1981) further point out that families pool economic resources across generations, and that even small families can substitute by more than 70 percent for annuities in protecting against longevity risk.

Aside from Social Security and private pensions, the market for life annuities in the United States is extremely small. For example, the market for single-premium

⁶ U.S. Department of Labor, *Private Pension Plan Bulletin*, Winter 1999–2000, Tables E1 and E5.

immediate life annuities in the United States is less than 4 billion dollars per year.⁷ This means that very few Americans are voluntarily choosing to purchase annuities on their own. Given the theoretical benefits from reducing longevity risk, this low level of annuitization could be a sign that potential annuitants lack sophistication about financial matters. However, the fact that Americans paid \$94.5 billion in individual life insurance premiums in 1999 (American Council of Life Insurance, 1999) and another \$25.4 billion for group policies suggests that workers are aware of the benefits of insurance against mortality risk and that we should consider other explanations for the small annuity market. One alternative explanation is that Social Security, Medicare, and private pensions provide a substantial amount of annuitized retirement income and that the gain to further annuitization is small. A second explanation is that people place substantial value on the ability to leave bequests to their children (though a fully rational person could both purchase an annuity along with a life insurance policy and accomplish both goals). A third explanation is that people want to have sufficient liquid assets on hand in the form of precautionary savings to enable them to pay for out-of-pocket medical expenses or nursing home care if the need should arise. A fourth potential explanation, which I discuss in more detail below, is that features of the annuity market such as adverse selection and administrative costs lead annuities to be priced at a level that is unattractive to much of the population.

3. *How is longevity risk treated in the major proposals that have been forwarded as reform options for Social Security?*

Over the past decade, numerous Social Security reform proposals have received public attention. One way in which these proposals differ from one another is in their treatment of annuitization.

The 1994–96 Advisory Council on Social Security was the first official group to formally recommend PRAs. While the Council split into three groups in their final recommendations, two of these groups recommended a role for personal accounts. The “Individual Accounts” (IA) proposal mandated a 1.6 percent of payroll personal account, to be funded from additional revenue above the current OASDI payroll tax rate. Upon retirement (after age 62), the individual’s account balance would be converted into an inflation-indexed life annuity. Married individuals would be required to purchase joint life annuities, unless the spouse specifically waived that right. If the individual worker died prior to retirement, the account balance would be bequeathed to the spouse, who would then be required to annuitize the balance at some point after reaching age 60.

The “Personal Security Accounts” (PSA) proposal would have used 5 percentage points of the 12.4 percentage point OASDI tax to create individual accounts. Starting at age 62, individuals would be permitted to withdraw funds from their accounts, and there would be no requirement to annuitize. Annuitization would be one option that individuals could choose from, but not the only one.

⁷ According to LIMRA, total sales of single-premium annuities were \$4.2 billion in 2001. However, a substantial share of these annuities was not life contingent and simply provided payments for a fixed number of years.

Legislation introduced by members of Congress has varied in the attention given to the payout phase of PRA systems. For example, the 1995 Kerrey-Simpson plan spelled out in detail what would happen to account balances if a worker died before reaching retirement, but did not include any discussion of payout options after retirement.⁸ The 1998 Moynihan-Kerrey bill did not specifically address the payout phase either, although there is some language in the bill suggesting that provisions for the Federal Thrift Savings Plan would apply to the accounts set up by this legislation.⁹ The 2000 version of the Breaux-Gregg plan allowed individuals to begin payouts from their accounts at either the same time they began receiving Social Security benefits or earlier if the account balances were sufficient to provide for an annual payment for the rest of the individual's life equal to at least the poverty level.¹⁰ Withdrawals could be used to purchase an annuity or they could be made as equal monthly payments over the life expectancy of the individual; payments would be indexed for inflation. Thus, while recent reform proposals suggest that some members of Congress believe that some amount of annuitization is desirable in PRA plans, even those plans that specifically address the payout phase leave many important policy design options unspecified.

The recent report of President Bush's Commission to Strengthen Social Security recommended a default option of a joint-and-survivor annuity with the survivor receiving two-thirds of the benefit received by the married couple. The report did not specify whether these would be real, nominal, or variable annuities, although the main presentations of retirement income levels under the Commission's plans used variable annuities. Retirees would have the option of taking any account balances above a threshold amount as a lump-sum distribution. The threshold amount selected would ensure that the combination of an individual's defined benefit and regular payout from the PRA would be "safely above the poverty line." Even the amounts below the threshold would not need to be converted to an annuity. Retirees could choose instead to receive gradual withdrawals over their expected remaining lifetime. This gradual withdrawal option would leave open the possibility that people who lived beyond the average life expectancy could experience significant reductions in their standards of living as they exhausted their account balances.

4. *What is the state of the existing private annuity market, and is it capable of being the primary annuity provider for a national PRA system?*

Although the private insurance market has historically provided a substantial amount of group annuitization to retirees through private pension plans, the individual market for life annuities in the United States is very small. As a result, some analysts

⁸ S. 824. 104th Congress.

⁹ S. 1792. 105th Congress 2d Session. The Federal Thrift Savings Plan (TSP) is the main defined contribution pension plan for federal workers. Workers may withdraw their TSP funds as a single lump sum or in regular annual payments. They may also use their funds to purchase a life annuity. Married participants need their spouse's approval for any withdrawal option that does not provide for survivor benefits.

¹⁰ S. 2774. 106th Congress 2d Session.

have expressed concern about the ability of the private market to provide the desired range of annuity products at low cost to retirees in a system of PRAs.

Pricing

Concerns about the cost of privately purchased annuities have arisen from several analyses of the “money’s worth” of privately purchased annuities, which summarizes the expected present value of payouts per dollar of annuity purchased (e.g., Brown, Mitchell, and Poterba, 2001; Mitchell, et al., 1999; Friedman and Warshawsky, 1988). These analyses suggest that an individual with an average life expectancy can expect to receive only 80 to 85 cents in annuity payments for every dollar used to purchase the annuity. In other words, these products have a “loading” of approximately 15 to 20 percent.

A natural question is how the pricing structure of the private annuity market would respond to Social Security reform. The answer to this question is intimately linked to the question of whether annuitization would be optional, or required. The reason is that the 15 to 20 percent loading is partly due to administrative costs, and partly due to the presence of selection effects in the market for annuities. In particular, individuals who voluntarily purchase annuities live longer, on average, than individuals who do not. Annuities are priced to reflect the life expectancies of people who actually buy them, and therefore are “expensive” to an individual with an average life expectancy. If a PRA system made the annuitization decision voluntary, then one would expect to continue to see significant differences in mortality rates between those who annuitize and those who do not. On the other hand, if annuitization is mandatory and uniformly priced (a policy issue that will be addressed later in this paper), this would force individuals into a common mortality pool, thus limiting the “selection” effect.

The most recent paper to decompose the loading factor into its two component parts was written by Brown, Mitchell, and Poterba (2000). In 1998, they calculated the money’s worth for a 65-year-old to be approximately 0.85 using average population mortality rates when discounted using the Treasury yield curve. When the mortality experience of typical annuitants is used, the money’s worth rises to approximately 0.95. This indicates that roughly two-thirds of the loading factor is due to mortality differences between annuitants and non-annuitants, rather than pure administrative costs. In other words, annuities appear to be priced reasonably competitively for those individuals who actually purchase them. James and Vitas (1999) find similarly high money’s worth ratios for a wide range of countries with PRA systems already in place. Thus, using these numbers as a guide, some analysts have concluded that 5 percent is a reasonable estimate of the pure administrative costs of a mandatory annuity system.

There are two reasons why we might not expect a money’s worth ratio of 0.95 for the typical retiree in a U.S. mandatory system. First, administrative costs are largely fixed costs per account and would therefore represent a larger share of account balances for the relatively small accounts that would exist under some PRA plans. Second, because higher income individuals tend to have higher life expectancies as well as larger account balances to annuitize, the assets of these long-lived individuals would represent a

disproportionate share of the assets being annuitized and would therefore drive down the money's worth ratio for lower income individuals (assuming uniform pricing of annuities by income).

On the other hand, it is possible that technological innovations will reduce costs and increase the degree of price competition in the annuity market. For example, recent evidence suggests that the ability of consumers to gather price information from online price comparison sites reduced the price of term life insurance to U.S. consumers by as much as 15 percent in the late 1990s (Brown and Goolsbee, 2000). As the propensity to use the Internet continues to increase, especially among older cohorts, such price comparison sites might play a similar role in keeping private annuity providers price competitive in a system of PRAs annuitized through the private market. In fact, several of the leading insurance price comparison Web sites already offer the ability to search across annuity providers.¹¹

Product Availability

When evaluating the ability of the private annuity market in the U.S. to provide annuitization services on a large scale as part of a PRA system, an issue that is arguably more important than pricing is the range of product choice. The private annuity market in the U.S. has historically had a very narrow scope of products available, and has been largely limited to fixed nominal annuities that subject individuals to substantial inflation risk. Because many proposals for PRAs recommend that individuals be permitted or required to invest in inflation-indexed or variable annuities, it is important to assess the private market's ability to provide these products.

In the U.S., there has been virtually no experience with inflation-indexed annuitization to date. One reason for this has been the lack of inflation-protected securities that commercial insurers could invest in to hedge against this inflation risk. With the 1997 introduction of Treasury Inflation-Indexed Securities, however, this barrier was lifted. Despite this, the industry has been slow to offer inflation-protected annuitization. Brown, Mitchell, and Poterba (2001) report that as of spring 2000, only two companies in the U.S. offered life annuity products that were indexed to inflation. One of these companies, Irish Life of North America, had not sold a single contract. The other company, TIAA-CREF, has seen some limited demand for its Inflation-Linked Bond Account, but it is still quite small relative to other investment options available to TIAA-CREF annuitants, and this product did not protect investors from fluctuations in the price of the underlying securities. Since then, Irish Life has stopped offering its CPI-indexed annuity, but Lincoln National Life Insurance Company has introduced a similar product.

It is unclear whether the lack of inflation-indexed annuitization is a supply- or a demand-driven result. On the supply side, the availability of inflation-indexed bonds should have addressed the primary barrier: the availability of hedging instruments. On the demand side, consumers may undervalue the protection afforded by inflation

¹¹ See www.annuityshopper.com, www.insure.com, and www.accuquote.com.

indexation, possibly because they do not understand the difference between real and nominal quantities. (Economists refer to consumers who confuse nominal and real values as suffering from “nominal illusion.”)

Inflation-indexed annuities are available in Chile, Israel, Australia, and the UK (James and Vittas, 1999). However, in Chile and Israel the entire economies are indexed, so those examples are not directly relevant.¹² In Australia and the UK, very few people purchase the indexed products (James and Vittas, 1999; Finkelstein and Poterba, 1999; Diamond, ed., 1999). Finkelstein and Poterba (1999) and James and Vittas (1999) report that the money’s worth ratios on real annuities are significantly less favorable than on nominal annuities. There are a number of possible explanations for this pricing difference, including greater adverse selection for backloaded annuity products.¹³ But the most likely explanation is that with fixed nominal annuities, the annuity providers price the annuities at a government bond rate and then invest the premiums at a corporate bond rate, making their profit primarily off of this spread. Because inflation-indexed corporate bonds do not exist, companies offering inflation-indexed annuities invest the premiums in inflation-indexed debt and earn their profit by pricing at a rate that offers a lower money’s worth (with the money’s worth ratio calculated using a government bond interest rate).

Nonetheless, because the U.S. Treasury now offers inflation-indexed bonds, it seems clear that the private financial sector would be able to offer inflation-indexed annuities if a PRA system with mandatory annuitization created a demand for them. The one caveat to this conclusion is that there might not be a sufficient amount of indexed debt for annuity providers to hold if market-provided inflation-indexed annuities became a large part of American’s retirement portfolios.

In addition to inflation-indexed annuities, there is considerable interest in the annuity market’s ability to provide annuities with payouts linked to higher yielding assets. In variable payout annuities, the account is invested in a diversified portfolio of securities, and the payments are adjusted periodically to reflect changes in the underlying value of the portfolio. Typically, the initial annuity payment is based on an assumed interest rate (AIR). Then, in each period, the annuity payment increases by the difference between the portfolio return and the AIR. For example, given an AIR of 4% (the value used by TIAA-CREF), if the underlying portfolio returns 10 percent over the course of the year, then the annuity payments increase by $(1+r)/(1+AIR)=1.10 / 1.04$, or approximately 6 percent. If the portfolio returns less than the AIR, the annuity payment falls.

The private annuity market has significant experience with variable annuities as an asset accumulation device. In fact, over the past decade, the individual variable annuity market has witnessed explosive growth, from only \$3.7 billion in 1989 to \$63

¹² In countries that have experienced very high levels of inflation, it is common for most contracts, particularly labor contracts, to include automatic cost-of-living adjustments.

¹³ “Backloaded” annuity products are ones in which a relatively larger share of the real payouts occur in later years.

billion in 1999, for an average annual growth rate of 32.8 percent. However, most of these annuity contracts are being used only for asset accumulation purposes. There is no requirement that these assets be converted into a life-contingent payout stream upon retirement, and available evidence suggests that little of this is being done. As such, the market has much less experience with variable annuities in the payout phase, during which the retiree's annuity payment fluctuates based on the returns of the portfolio relative to a benchmark return. However, such products are relatively straightforward to create, price, and market, and so it is likely that the U.S. annuity market could easily accommodate an increase in demand for such products.

Equity-linked annuity products are similar to variable annuities in that they provide retirees with some exposure to equity markets. A typical equity-linked product will invest some fraction, say 90 percent, of the premium in an ordinary life annuity. The remaining 10 percent will be invested in a series of call options on a stock index such as the S&P 500. In this way, the individual is guaranteed an income floor, and yet maintains exposure to some of the upside potential of equity markets. This financial engineering approach of combining features of traditional annuitization with options on equity and other indices is still underdeveloped relative to its potential. Bodie (2001) discusses this approach in detail and concludes that private insurance companies ought to be able to customize retirement income packages for consumers based on their own preferences.

5. *What will be the structure of the accumulation phase?*

Although the analysis in this paper focuses primarily on the payout phase of a PRA system, the overall impact of such a system also depends on design decisions in the accumulation phase. For example, how much redistribution, if any, will take place during the accumulation phase, such as through contribution matches based on income? What provisions will be in place governing how accounts are divided during a divorce? What range of investment options will be available during the accumulation phase? What will be the size of the individual account balances relative to any remaining defined benefit system, and how will these two systems be integrated? Will there be any government guarantees of minimum investment returns?

These accumulation phase decisions directly affect the importance of annuitizing PRA assets. For example, if PRAs are added on top of a generous defined benefit annuity, the value of annuitizing the accounts would be diminished relative to a situation in which PRAs were carved out of the existing system. In addition, the desirability of allowing annuity payouts to vary with market returns as in a variable annuity will depend on the overall financial resources people have in retirement. For example, it may be desirable to have households that have relatively few assets outside of Social Security to have less of their Social Security benefit subject to stock market risk.

6. *Will there continue to be a guaranteed income floor such as that provided by the existing SSI program?*

SSI is a means-tested income assistance program for people who are 65 years of age and older, blind, or disabled. The program essentially operates as a minimum income guarantee in the U.S. for people in the above three categories¹⁴, and provides an annual federal benefit standard of \$6,624 for a single individual and \$9,948 for a married couple for 2003. Most states supplement the federal benefit. To receive SSI, individuals must also meet an asset test; thus, not all low-income elderly are eligible. Moreover, many eligible elderly fail to claim benefits (see McGarry, 2002).

In analyzing PRAs, it is important for at least two reasons to consider whether SSI will continue and in what form. First, the availability of SSI provides a minimum guarantee for individuals who may not have sufficient balances in their PRAs to provide for retirement consumption. But SSI benefit levels are indexed to inflation, not to wage levels.¹⁵ Thus, absent legislative action, the replacement rate provided by SSI will fall over time, and additional steps might need to be taken to provide a minimum income floor for individuals through the PRAs program. Second, in the absence of annuitization, some individuals might spend down their account balances soon after retirement, and become dependent on SSI to finance their remaining years of consumption. Preventing such behavior is a possible rationale for desiring a minimum level of mandatory annuitization.

¹⁴ Eighty percent of SSI recipients get benefits based on blindness or disability.

¹⁵ The asset limits and income disregards are not indexed at all.

III. Specific Design Decisions to be Made in the Payout Phase

This section of the paper considers 12 design decisions that need to be made in setting up the payout phase of a PRA system. The analysis relies heavily on a model created for this study of retirement income under the current Social Security system and under various potential reformed systems. The model takes as inputs the lifetime earnings and marital histories of individuals and those of their current or past spouses. It then incorporates data on socioeconomic differences in mortality and on the distribution of asset returns and calculates retirement benefit levels under various choices for how the payout phase is designed. Specifically, for each individual and each set of payout-phase options, the model calculates 1) average benefit levels from the current Social Security system;¹⁶ 2) benefit levels from the reformed system assuming median asset returns; 3) the present discounted value (PDV) of lifetime benefits under both systems; and 4) benefit levels from the reformed system under 10th, 25th, and 75th percentile asset returns.¹⁷ The full details of the model are presented in Appendix A of this study.

1. *Should annuitization be mandatory or voluntary?*

The question of how much choice individuals should have over the annuitization decision is quite possibly the most important decision to be made about the payout phase of a system of PRAs. This decision involves a complicated set of tradeoffs, and the resolution of this question will have an impact on the desirability of other design options.

As discussed by Smalhout (2001), most countries that have incorporated an individual accounts program into their Social Security system require annuitization. Exceptions include Argentina, Chile, and Peru, where annuities are offered as one of several payout options.

There are three leading arguments in favor of mandatory annuitization. The first is that it can help myopic or financially unsophisticated individuals maintain a constant standard of living throughout their retirement years, preventing them from regretting at older ages that they spent too much of their resources in earlier years. This paternalistic argument is quite similar to what many economists believe is the main justification for mandatory participation in Social Security retirement programs in the first place: that some individuals would not adequately provide for their retirements if not compelled to do so through Social Security. However, it is hard to assess what fraction would squander their individual account accumulations if allowed access to the full balances at retirement.

¹⁶ The results presented for the current Social Security system in the tables in this report are “current-law benefit levels” and therefore implicitly assume that additional funding is obtained beyond currently scheduled levels. The model can calculate benefit levels for any other funding level the user specifies.

¹⁷ Average benefit levels are calculated for all years of retirement and also separately for years when the individual was married and years when the individual was widowed (when appropriate).

The second argument is that mandatory annuitization has the potential to increase the level of annuity payments (and thus increase the money's worth) to individuals by eliminating adverse selection and lowering average administrative costs. Adverse selection in voluntary annuity markets arises because individuals who expect to live longer will find annuities a more attractive investment than will someone with a shorter life expectancy (because long-lived individuals receive payments for more years). As such, individuals who voluntarily purchase annuities will have, on average, lower mortality than the population as a whole. Knowing this, annuity providers must reduce their monthly or annual payouts accordingly, in order to stay profitable. Mitchell et al. (1999) and Brown et al. (2000) estimate that the mortality difference between annuitants and the general population is responsible for a 5 to 10 percent reduction in annuity payouts.

However, not all of the mortality difference between annuitants and non-annuitants is due to conscious selection on the part of annuity purchasers based on asymmetric information. At least some of the difference is due to the fact that annuity purchasers tend to be higher income, higher wealth individuals, who on average have lower mortality rates. Simulations by Walliser (1997) suggest that the elimination of information-based adverse selection that would be achieved by mandatory annuitization would increase annuity payouts by approximately 3 cents on the dollar.

The third major argument in favor of mandatory annuitization is that it would reduce future dependence on means-tested assistance programs, such as SSI, by ensuring that individuals do not spend their individual account accumulation too quickly and end up in poverty at advanced ages. Therefore, this policy decision not only affects the welfare of individuals; it also has implications for the non-Social Security budget in future years.

Two important downsides to mandatory annuitization are discussed as separate issues below. The first is that mandatory annuitization will make some individuals — those who would prefer to spend a greater share of their retirement resources in early years — worse off. For example, an individual needing an expensive experimental medical procedure not covered by Medicare and who had converted all of his or her savings into an annuity would not have funds on hand to pay for the procedure. Design consideration #2 (below) will discuss this issue in more detail because it bears directly on the question of how much annuitization should be required.

The second downside of mandatory annuitization is that it has the potential to result in redistribution away from economically disadvantaged groups and towards groups that are better off financially. In particular, it is well established that groups with higher socioeconomic status have longer life expectancies. This means that members of these groups will, on average, receive payouts from their annuities for more years. If annuities are priced the same for everyone, regardless of socioeconomic status, then members of higher socioeconomic groups will tend to receive a higher money's worth on their annuity purchases.

Some of these tradeoffs are shown in Table 1. This table shows retirement income levels with and without annuitization for a Social Security reform plan that diverts 2 percent of the Social Security payroll tax to individual accounts and cuts the traditional Social Security benefit by 39 percent to bring the system into balance.¹⁸ Impacts are shown for representative married men with different levels of education and different races in order to show how the results vary by socioeconomic group. Specifically, the results are for individuals with the average earnings and life expectancies for their groups.

The first two columns show results for the current Social Security system. The next two columns display results for a reformed system that requires full annuitization of PRA balances upon retirement at a uniform price. The final three columns show results for a PRA system without annuitization, and include a column showing the lump-sum account balances received by system participants upon retirement. All results represent per capita income, using an equivalence scale of 1.62 to compare married and single individuals. In other words, income in years when an individual is not married is not adjusted, while the total income of the husband and wife during married years is divided by 1.62 to provide a per capita amount that accounts for the economies of scale that derive from sharing resources with a spouse.¹⁹ The measures of retirement income in these tables include only Social Security benefits and income derived from the PRAs; income from other sources is not included.

Two main results are shown in this table. First, because the proceeds of the PRAs represent a significant share of retirement resources, an individual in a system that did not require annuitization who squandered his account balance in the first few years of retirement would be left with significantly less retirement income than if he had been required to annuitize the entire proceeds. For example, the man with a high school education would have annual income of \$9,329 (from the reduced traditional Social Security benefit) instead of \$13,621 (from the sum of the reduced traditional benefit and the annuity generated from the PRA). In this example, in which no explicit redistribution occurs in making deposits into the accounts, both the dollar and percentage discrepancy is greatest for workers with higher education levels, because the individual accounts represent a larger share of total retirement income for those workers.

Second, mandatory annuitization is relatively costly to groups with short life expectancies. This result can be seen by comparing the PDV of annual retirement income from the system with full annuitization to the sum of the PDV of annual retirement income and the lump-sum payment from the account in the system without annuitization. For example, in Table 1, the PDV of benefits for men with less than a high

¹⁸ A 39 percent long-run reduction in the traditional Social Security benefit leads to a stable trust fund ratio at the end of the 75-year period (the horizon typically used to assess Social Security solvency) if the benefit cut is phased in relatively rapidly — linearly over 30 years. See Elmendorf and Liebman (2000) for details. Aaron, et al. (2000) find that with a slower phase-in, long-run benefit cuts necessary in a 2 percent carveout plan can reach 54 percent. A plan that replaced the diverted payroll tax revenue with general revenue transfers to the Social Security Trust Fund would not need to reduce the traditional benefit as much to bring the system into balance.

¹⁹ The 1.62 value is chosen because it is the one recommended by the National Research Council (1995).

school education is \$134,187 under full annuitization and the sum of the PDV of benefits plus the lump-sum distribution is \$144,103, or 7 percent higher. For men with a college education, there is only a 5 percent gain from foregoing annuitization. Similarly, blacks see a 9 percent gain from foregoing annuitization, compared with a 6 percent gain among whites. The relative gain from foregoing annuitization is greatest for the lower income groups because the relatively short life expectancies of members of these groups means that they will receive benefits for fewer years and therefore receive a lower money's worth given the uniform annuity price assumption. It is important to emphasize, however, that the risk of outliving one's assets may be higher for the lower income groups than for the higher income groups, and therefore that the utility gain from insuring against this risk may be greater for the low income groups.²⁰

2. *If annuitization is mandatory, what portion of the individual account balance should be required to be annuitized?*

Complete annuitization would provide individuals with substantial longevity protection. However, because full annuitization restricts choice, this option would make some retirees, such as those with short life expectancies, large bequest motives, or a desire for more flexibility, substantially worse off. Moreover, such a requirement might be perceived as unfair in certain situations. One example is where a terminally ill individual would be required to annuitize his or her full account balance, even though it was clear that the individual would be receiving payments for only a few months.

A more modest approach would be to mandate that individuals annuitize enough of their assets to provide an income stream that, when combined with their traditional Social Security benefit, is above some minimum threshold. For example, this minimum could be set at some multiple of the poverty line, or at some specified level above the eligibility levels for SSI or other means-tested programs. This approach has the advantage that it preserves some individual choice over the disposition of the account balances once this minimum is attained, while ensuring that the incomes of elderly households do not fall below a minimum level. It also would lead to less redistribution from short-lived groups to long-lived groups than would a system of mandatory full annuitization.

There are, however, several disadvantages to the partial annuitization approach. First, the implicit goal of U.S. retirement policy in general and of Social Security in particular has not been simply to provide a minimum level of income, but rather to provide a level of retirement income that replaces a sufficient fraction of preretirement income to prevent large drops in people's standard of living at retirement and thereafter. Partial annuitization would provide less assurance than full annuitization that people's standards of living would be maintained throughout retirement.

²⁰ There are two reasons that the sum of the PDV of future retirement benefits and lump-sum distribution in the "no annuitization" case exceeds the PDV of future retirement benefits for all groups. The first is that no annuity load factor is applied to the lump-sum distribution. Second, the equivalence scale used in comparing married couples and one-person elderly household units implies that the numbers in the table are not simply financial calculations that should on average add up to the same totals.

Second, by making annuitization beyond the minimum level voluntary, a partial annuitization approach would not eliminate adverse selection. In particular, it is possible that there would be potential welfare gains for a large fraction of individuals from annuitizing amounts beyond the minimum level, but that adverse selection would make such annuitization unattractive or that a lack of financial sophistication would lead some of these individuals to forego these gains.

Table 2 shows retirement income levels under a partial annuitization approach for the same representative individuals shown in Table 1. The specific option presented here is to require that the sum of the traditional Social Security benefit and the annuitized portion of the individual account provide income equal to 125 percent of the poverty line, both when the two spouses in the married couple are alive and when one is deceased. Note that this requires the low-income household with less than high school education to annuitize 100 percent of its individual account balances (and it still does not quite reach the poverty level when one member of the couple is deceased) while the college educated household does not have to annuitize any of its individual account and still has an annual benefit level above the required level (which in this example is \$10,618 when single and \$13,381 when married). There would be wide differences in the percentage of PRA balances required to be annuitized by race as well. The representative white household would be required to annuitize 5 percent of its account, the representative black household would be required to annuitize 43 percent of its account, and the representative Hispanic household, 53 percent. If PRA balances were largely used for bequests, then these discrepancies would imply large differences by race in the intergenerational transmission of wealth. Note, however, that the higher income groups may need to consume a greater fraction of their remaining PRA balances during their retirement years to sustain their preretirement standard of living than lower income groups because the annual benefit of 125 percent of poverty represents a smaller fraction of preretirement income for higher income households.²¹

3. Should the annuities be fixed nominal, fixed real, or variable?

Outside of the existing OASDI system, most annuities in the U.S. are fixed in nominal terms. This leaves individuals exposed to substantial inflation risk in two ways. First, even a relatively low rate of inflation of 3.2 percent will halve the real purchasing power of a fixed payment stream over 22 years. Were inflation perfectly predictable, this could be addressed easily by providing annuities that increase in nominal terms each year at the expected inflation rate. The second source of inflation risk, however, arises from the fact that inflation is not perfectly predictable, especially at long time horizons. Variability in the rate of inflation induces variability in the real purchasing power of any nominal income stream, and therefore makes it more difficult for retirees to smooth their consumption stream as desired.

²¹ These higher income households will, on average, have higher levels of pensions and other financial assets; therefore, it could still be the case that their PRA balances are disproportionately used for bequests.

Table 3 shows that elderly women, with their long life expectancies, would be particularly vulnerable to the declining real benefit levels that would result from fixed nominal annuities. Overall average benefit levels are similar under the two approaches to annuitization. But fixed nominal annuities shift a greater share of lifetime income into early, married years and away from later years when a woman is more likely to be a widow. Average benefits during widowhood fall from \$16,697 in a system with real annuities to \$15,336 in a system with nominal annuities. The last two rows show average benefit levels for women who were widowed before retirement or divorced. Because the average benefit levels for these groups are lower than those for married women, they would be particularly vulnerable to inflation-induced declines in real benefit levels of more than 50 percent over a 25 year retirement period.²²

Recognizing these undesirable features of nominal annuities, the leading reform proposals that explicitly address the issue of annuitization generally call for either inflation-indexed annuities or variable annuities. Inflation indexed annuities would be indexed to the CPI in order to keep the real purchasing power of the annuity income stream constant over the entire retirement period. As was discussed above, it should be possible for private financial institutions to offer fixed real annuities in the U.S. However, it is not clear whether there will be sufficient indexed-debt in circulation for such firms to offer a large quantity of real annuities at an attractive price. Moreover, the international evidence suggests that when given the choice between real and nominal annuities, individuals overwhelmingly choose nominal annuities (perhaps because the initial payout is higher for nominal annuities). Given this preference, it might be necessary to make the purchase of real annuities mandatory (or at least the default option) or to engage in a substantial amount of financial education, in order to achieve widespread use of these products.

Variable annuity products are much more common than inflation-indexed annuities in the U.S. These are annuities in which the monthly payout fluctuates with the price of an underlying portfolio of risky assets. Recent research suggests that, contrary to popular perceptions, variable annuities do *not* provide individuals with inflation insurance. At short time horizons, equity returns and the rate of inflation are slightly negatively correlated (Brown, Mitchell, and Poterba 2001), suggesting that equities are not a good short-term hedge to inflation risk. The attractiveness of variable annuities comes instead from the potential for higher returns, for those investors willing to bear the risk of equity investment. Over the typical 20-year retirement period, the difference can be substantial between annuity payments based on the 5 percent or so return underlying a variable annuity and the 2 or 3 percent return underlying a fixed annuity. Table 4 shows results comparing real and variable annuities. In these results, median retirement benefits are about 10 percent higher with a variable annuity than with a fixed real annuity. But the amount of financial market risk is also higher under the variable annuity because financial market volatility during both the accumulation and decumulation phase affects benefit levels, not just volatility during the accumulation phase. Thus, in the row of Table 4 showing retirement income levels for a high school educated household, the

²² With an annual inflation rate of 3.2 percent, real benefits will fall by a factor of 2.2 over 25 years [i.e., $(1.032)^{25}=2.2$.]

spread between a 25th percentile return and a 75th percentile return is \$5,036 (\$16,324-\$11,288) for a variable annuity and \$3,185 (\$15,527-\$12,342) for a fixed real annuity. These numbers describe the range of average benefit levels during retirement. It is important to remember that variable annuities lead to year-to-year fluctuations in retirement income, while real annuities provide constant real benefit levels in retirement. Thus, the numbers in the table do not fully capture the difference in variability between the two products. It is also worth pointing out that the total variability under both approaches is limited because in the example shown, roughly two-thirds of the total retirement benefit continues to come from the traditional Social Security system and is therefore invariant to market returns.

4. Should the annuitization include bequest options, and if so, what type?

Most privately purchased annuities sold in the U.S. today have some form of bequest feature. The most common forms are “period certain” and “refund” features. A period-certain contract guarantees that a minimum number of annuity payments will be made to the annuitant and/or the annuitant’s beneficiary, even in the event of the annuitant’s death. For example, if a 65-year-old individual purchases a “life annuity with 10 years certain,” then the annuity will make a minimum of 120 monthly payments, regardless of whether the annuitant survives to age 75 or not. Beyond age 75, the product reverts to a straight life annuity and will make payments only if the annuitant is alive. Refund options are varied, but typically promise the annuitant that if he or she were to die before some minimum amount of nominal payments had been made, the beneficiaries would receive a lump-sum payment. These and other similar features provide annuitants with some degree of assurance that they will not lose their entire investment if they were to die soon after annuitizing.

These features are extremely popular among those who annuitize. From a purely theoretical perspective, this decision is puzzling, because these products provide bequests only if the insured dies within the guarantee period, whereas an individual could provide a more certain bequest by keeping some portion of the assets in a non-annuitized form. In a mandatory annuitization setting, however, the choice of a bequest option is one way to reduce the degree of annuitization (purchasing life insurance is another, although one that may not be available to all individuals), and would eliminate some of the perceived unfairness of mandatory annuitization for an individual who lives only a short period of time past the date of annuitization.

A choice to permit bequest options has a number of effects on an individual accounts system. First, for a given annuity purchase price, exercising a bequest option lowers the monthly payment to the retiree. This means that a larger account balance will be required to achieve any required minimum monthly payment. Second, bequest options can have important effects on the extent of redistribution within the system, because individuals with shorter life expectancies will be able to choose annuities that leave money to their beneficiaries. Third, allowing choice over the bequest option will lead to its own form of adverse selection, and therefore affect the relative pricing of annuities of

different types, because individuals with higher mortality risk will be more likely to purchase annuities with bequest options.

Table 5 displays the impact of mandatory 10- and 20-year certain bequest options on benefit levels for a variety of demographic groups. The 10-year certain option reduces retirement benefit levels by about 2.5 percent relative to a plan with no bequests. The 20-year certain option reduces benefit levels by about 4 percent.²³ The table also shows the PDV of benefits received under the various options. Note that introducing bequest options increases the PDV of lifetime benefits (including the bequests) for short-lived groups such as blacks and those with less than a high school education and decreases them for long-lived groups such as college educated workers.

A separate issue is the disposition of account balances if a worker dies before annuitizing the account. Most PRA plans envision that if the worker is married the account balance should roll over into the account of the worker's spouse. Workers who are not married could specify an alternate beneficiary, or the accounts of unmarried workers could go to the government to be redistributed to surviving members of the cohort (permitting a small increase in retirement benefits). Because workers who are not married may nonetheless have dependents such as domestic partners or children, there is a case for permitting bequeathal for all workers.

5. How should spouses be treated?

In the existing OASDI system, spouses of insured workers are generally eligible for the higher of their own worker benefit or 50 percent of their spouse's benefits. Upon the death of one spouse, the other spouse receives a benefit that is the higher of the two spouses' worker benefits. These provisions are intended to ensure that nonworking or low-earning spouses are not economically vulnerable when they reach retirement age, especially in the event of widowhood or divorce. An important design question for PRAs is whether and how such spousal protections will be built into the payout phase.

At one extreme, the PRA system could treat all individuals as individuals and make no special provisions for spouses. This approach, however, would surely lead to increases in poverty among the elderly, particularly among widows who would not be assured of an income stream after the death of their husband. Because poverty rates among widowed and divorced elderly women are currently around 20 percent, this approach would be highly undesirable.

To provide protections similar to the current U.S. Social Security system, a PRA system would need to mandate that married individuals purchase joint-and-survivor annuities that continue to make (possibly reduced) payments as long as at least one member of the couple is alive. The current Social Security system provides survivor benefits that are between 50 percent and 67 percent of the benefits that were received by the couple when both spouses were still alive (with the exact amount depending on the relative earnings of the two spouses). During the 2000 Presidential campaign, Al Gore

²³ These specific numbers apply to the rows for "high school educated" and for "whites."

proposed increasing the Social Security survivor share to 75 percent in order to reduce poverty rates among elderly women. President Bush's recent Commission to Strengthen Social Security made similar recommendations.²⁴

Joint-and-survivor options are common in private annuity markets today, and the Employee Retirement Income Security Act (ERISA) makes them the default option for most pension plans (the signature of the dependent spouse is required if one chooses a payout option that does not include survivor benefits).

An alternative approach to ensuring that secondary earners have sufficient retirement resources after the death of their spouse would be to require that annual account deposits be split equally between the accounts of the two spouses (this is known as "account splitting"). Then individuals could be allowed to obtain single-life annuities at retirement. Because each spouse would be receiving payments until death based on half of the total resources of the married couple, the secondary earner's decline in standard of living would be less than if each worker retained his or her own contributions and purchased single-life annuities. Indeed, this would be equivalent to a joint-and-survivor annuity with a 50 percent survivor benefit.

A PRA system would also need to determine how individuals would be treated if their spouse died before reaching the age at which annuitization was required. A common proposal would roll over the account balances of the deceased spouse into the PRA of the surviving spouse and then let the fund accumulate until the surviving spouse reached retirement age. Whether this would provide adequate protection for women widowed at a young age is unclear. In the current Social Security system, a woman widowed at a young age receives a Social Security benefit based on the average earnings of her husband when he was alive — roughly the same benefit she would have received if he had worked a full career at the same average earnings level. In contrast, existing PRA proposals have not included additional deposits into the accounts of women widowed at an early age to replace those that would have occurred if their spouse had survived. On the other hand, because the widow can annuitize at a single-life rate rather than a joint-and-survivor rate when she reaches retirement, the annual payment from a given account balance will be higher than for a married woman who must purchase a joint-and-survivor annuity. The results in Feldstein and Liebman (2002) show that young widows would typically have retirement income levels higher than those in the current system in a reformed system that combines a traditional system funded with a 12.4 percent payroll taxes with add-on individual accounts of 3 percent of payroll. However, it is not clear whether similar results would hold in a reform plan such as a carveout plan that had lower funding levels.

The final important question pertaining to spouses relates to how divorced spouses would be treated in a PRA plan. Under the current Social Security system, the divorced spouse of a worker receives benefits based on the earnings of the former spouse if the marriage lasted for at least 10 years. The divorced spouse benefits are based on the

²⁴ In both cases, the new 75 percent survivor benefit was to be capped at the level of the average retirement benefit in order to target the new resources on low- and middle-income retirees.

earnings of the former spouse over his or her entire career, not just earnings during the years that they were married. However, as long as the former spouse is still alive, the divorced spouse receives a benefit equal to only 50 percent of the worker's primary insurance amount and this (combined with the fact that spouses from marriages that lasted fewer than 10 years receive no spousal benefit) is a major factor in the high poverty rates among divorced women.²⁵

To avoid exacerbating poverty rates among divorced women, a PRA system needs to give spouses legal rights over a share of each other's account balances in case of a divorce. One option would be to require account splitting in the case of divorce. However, many low-income households do not go through formal divorce proceedings; thus, this type of provision might not be adequate to ensure that account splitting actually occurred in these situations. Another option would be to require annual PRA deposit splitting for married couples in each year of marriage, negating the need for account splitting at the time of divorce. It might also be possible to carry out the account splitting at the time of annuitization, but verifying marriages that occurred two or three decades earlier would create significant administrative challenges.

A PRA system with account splitting would provide divorced secondary earners with both advantages and disadvantages relative to provisions under the current Social Security system. The advantages would be that spouses who were married for fewer than 10 years would receive some retirement benefits based on the account contributions of their former spouse. In addition, divorcees would not have their benefit reduced while their former spouse was still alive (indeed, like young widows, divorcees would benefit from annuitizing at a single-life rate). The disadvantages relative to the current system are that the earnings of the ex-spouse in years after the divorce would not lead to additional PRA account contributions and that the PRA system would not redistribute income to couples (including divorced couples) as the current system does.

Table 6 shows retirement income levels for married women under PRA plans with different provisions for survivor benefits. Specifically, results are shown under single-life annuities, and for joint-and-survivor annuities with 50 percent, 67 percent, and 75 percent survivor benefits. Average benefit levels are shown separately for years in which the women's spouse is still alive and for years after the women have become widows. The table shows that retirement income while the women's spouses are still alive does not vary very much across the survivor benefit options. However, there are large increases in retirement income during widowhood as we move across the columns of the table. For a high school educated woman, annual retirement benefits as a widow increase from \$12,502 with single-life annuitization, to \$14,002 with a 50 percent joint-and-survivor option, \$15,016 with a 67 percent joint-and-survivor option, and to \$15,445 with the 75 percent joint-and-survivor option.

Table 7 illustrates how the same women would fare if they were widowed at age 55 (after 30 years of marriage) or divorced at age 45 (after 20 years of marriage).

²⁵ This provision avoids creating incentives for divorce because the total benefit received by the two former spouses is the same as the benefit they would receive if they were still married.

Women widowed at age 55 have higher benefits, on average, in this PRA system than under the current Social Security system. This occurs because they are able to annuitize the combination of their own account and that of their former husband, and they get to annuitize at the favorable single-life rate. In other words, they have an accumulation that is almost as big as it would have been had their husband survived to retirement age, but this accumulation is used to finance the retirement of one person rather than two. Of course an individual who was widowed at a younger age would not inherit as large an account, nor would an individual whose husband was ill for a period before death and therefore had reduced earnings in those years. The divorced women in this table end up with benefits from a PRA system that are about 10 percent lower than under the current system. This is a slightly larger benefit cut than the one received by married men and women, which is of concern, because divorced women are at high risk of poverty under the current system.

In comparing divorced women with young widows within the same educational and racial/ethnic background, there are two reasons why divorced women end up with lower retirement income from a PRA system than do young widows. First, these simulations assume that the divorce occurs at age 45, 10 years earlier than the age assumed for widowhood among the young widows. Thus, divorced women benefit from fewer years of their ex-husband's earnings. Second, unlike the widows who inherit 100 percent of their former husband's PRA balances, the divorced women receive only 50 percent of their husbands' account balances (or with earnings splitting retain only their own accounts).

6. How should disabled beneficiaries and young survivors be treated?

The existing Social Security system in the U.S. includes a significant Disability Insurance (DI) program to insure individuals against "work-duration" risk. Individuals who find themselves unable to engage in substantial gainful activity due to a severe impairment are currently provided with insurance that provides lifetime income, also in the form of an inflation-indexed annuity.

In a PRA system, individuals who are disabled at a young age are unlikely to have accumulated account balances sufficient to finance consumption over their remaining lifetime. As such, special provisions may be required to assist this population.

Currently, the formulas for determining retirement benefits and disability benefits are closely related. Therefore, unless specific steps were taken to decouple the two types of benefits, any benefit cuts in a PRA plan used to bring the traditional system into balance would reduce disability benefits as well. Most reform plans envision that income from individual accounts would make up most or all of the retirement income lost from the cuts in the traditional benefits. This situation may not apply to the disabled population, however. Many of the disabled would have short careers at low earnings

levels, and their individual accounts might not be sufficient to make up for the cuts to the traditional benefit.²⁶

One option to shield DI recipients from benefit cuts would be to specifically exclude DI benefits from any cuts made to the traditional OASDI benefit. If full disability benefits were maintained, it would probably make sense to require individuals who go on DI to forfeit some of their PRA assets (the forfeited assets could go to the DI system to help pay DI benefits). Otherwise, DI recipients would be double-dipping — in other words, they would be receiving the benefits of the PRAs without bearing any of the burden of the cuts to the traditional benefit.

An alternative approach would be for disabled individuals to remain in the individual accounts system and have their accounts credited each year as though they were employed. The traditional DI program could provide benefits at currently promised benefit levels until they reached the age at which disability beneficiaries convert to retirement benefits at which point the DI recipients, like other retirees, would receive the reduced traditional benefit plus the proceeds from their PRA. This second option would eliminate the need to confiscate the individual accounts of the disabled and would more naturally handle beneficiaries who shifted back and forth between DI and work.

Table 8 illustrates how workers from different demographic groups who were disabled at age 50 would fare during retirement under current Social Security rules, under a PRA system that made no special provision for augmenting the individual accounts of the disabled, and under a PRA system that augmented the individual accounts by making PRA deposits as if the disabled worker had continued to earn at his or her previous average level of earnings. For the worker with a high school education, benefits are 12 percent lower in the nonaugmented PRA system than under the current law and 10 percent lower in the augmented PRA system. These benefit reduction percentages are quite similar to those for nondisabled workers. Table 1 shows an 11 percent benefit reduction for the high school educated worker, which results from introducing the PRA plan. The reason that disabled workers fare similarly to the nondisabled is that PRA contributions after age 50 account for a rather small amount of retirement income because those contributions do not have very many years to compound. In addition, only the worker's own PRA contributions stop at age 50, not those of his or her spouse. It is important to emphasize that workers disabled at earlier ages would experience larger benefit cuts and that PRA augmentation would be much more important for them.

Moreover, these calculations assume that disabled workers could not take money out of their PRAs until they reached retirement age. If no special provisions were made, this would mean that they would rely completely on the scaled-back traditional DI benefit in earlier years — a 40 percent reduction in benefits during those years relative to current law.

²⁶ Several prominent reform plans would cut DI benefits along with retirement benefits. These include the plan from the National Commission on Retirement Policy (NCRP) of the Center for Strategic and International Studies and the plans proposed by President Bush's Commission to Strengthen Social Security.

7. *When should annuitization occur?*

Making this decision is more complex than simply choosing an eligibility age for benefit receipt. Rather, it requires answering several related questions.

First, at what age should individuals have access to the funds in their accounts? Since the early 1960s, Social Security has allowed men to claim benefits at 62 (women became eligible for early retirement in the late 1950s). In contrast, individuals can take penalty-free withdrawals from IRAs at age 59.5. If individuals were fully rational, there would be no need to restrict withdrawals from accounts, and individuals could decide when during their lifetime to consume out of their PRAs. However, as discussed previously, the inability of some individuals to plan for the future is a primary justification for mandatory Social Security programs, and therefore it may be desirable to restrict access to retirement funds until a retirement date in order to ensure that individuals have adequate financial resources throughout their retirement. Thus, the basic tradeoff is between raising the retirement income of people who might shortsightedly take benefits too early and later regret doing so, and giving people the ability to allocate their lifetime consumption in the way they see fit.

Many analysts (see Aaron and Reischauer 1998, for example) have argued that increasing both the age when people receive full benefits and the earliest eligibility age is a sensible policy in response to the population's improved health and longevity. However, raising either retirement age — particularly the earliest eligibility age — is very unpopular with the public, according to public opinion polls. It might be possible to use the withdrawal rules for the PRA portion of a Social Security reform plan to move in the direction of higher retirement ages in a way that was more politically palatable in the sense that it would be less likely to be perceived as increasing restrictions on a current benefit. Thus, access to PRA balances could be restricted to the age of full benefit eligibility while leaving eligibility for the traditional defined benefit plan as specified in current law. Alternatively, the eligibility ages for traditional Social Security benefits could be raised, but people could be allowed to tap into their PRA at 62 if they choose to retire earlier.

Second, should the annuitization occur at a single date (most likely the same date that benefit payments start), or should the individual be gradually annuitizing over time by using deferred annuities? The simplest approach to annuitization would be to require all individuals to annuitize the required portion of their PRA balances at a single date (when they turned age 65, for example). However, there are two drawbacks to requiring annuitization at a single date. First, it would likely be perceived as unfair that someone who died a day before their 65th birthday would be able to bequeath their entire account balance to their heirs, while someone who died after their 65th birthday (and had just annuitized) would bequeath nothing (10-year certain or other annuity bequest provisions could mitigate this perceived inequity). Second, requiring annuitization at a single date could expose individuals to significant market risk if they were converting to a fixed real annuity. In particular, if the market happened to fall substantially in the year before an

individual annuitized, the individual could end up with significantly smaller income throughout retirement than an otherwise identical person who reached the annuitization age 1 year (or even 1 day) earlier.

One approach to mitigating these two problems with requiring a single annuitization date is to allow people some discretion over their annuitization date. For example, in the UK, people may delay annuitization up to 10 years. This would allow a person who was sick and had a strong bequest motive to postpone annuitization and a person who was sick and wanted to consume out of his or her account to annuitize at the earliest possible age. In addition, having a choice of annuitization date would reduce the perception that people were being forced to annuitize at a time when the stock market was abnormally low. However, allowing flexibility with regard to the timing of annuitization could reintroduce adverse selection because those with different mortality expectations could differentially choose when to annuitize.

A second approach to mitigating the financial market risk drawback of a single annuitization date is to have people shift their portfolios into safer assets as they approach retirement. Alternatively, purchasing variable annuities would reduce the impact of a single year's stock market performance on retirement income.²⁷

An alternative approach would be to require gradual annuitization either over a person's entire lifetime or in equal installments over a shorter preretirement period such as ages 55 to 65. In the absence of bequest motives, and with no other sources of uncertainty, economic theory clearly dictates the superiority of continuous deferred annuitization over the individual's entire working life. That said, part of the appeal of PRA plans appears to be the opportunity to "build wealth" and some workers may not see "building retirement benefit entitlement" as equally desirable. In addition, it is unclear whether people would be willing to enter into contracts with insurance companies that could stretch over 80 years. Thus, gradual annuitization over the last 10 years of a person's career is likely to be more feasible than gradual annuitization over one's entire lifetime.

8. Should the annuity pricing be uniform, or should there be risk-class pricing?

Annuities operate by transferring resources from short- to long-lived individuals. If all individuals faced the same risk of dying in each period, then uniform pricing of annuities would clearly be efficient. However, in a world in which mortality risk differs based on many observable characteristics, it is important to consider whether annuities should be priced uniformly for everyone, or whether prices should be adjusted to reflect an individual's risk of dying. For example, mortality differs based on gender, race, ethnicity, income, health status, and many other factors that insurance companies can observe. The existing OASDI system uses uniform pricing, as do private pension plans,

²⁷ This assumes that there is some degree of mean reversion in stock prices. If stock prices are nonstationary, permitting additional years of stock market exposure will not mitigate the impact of a single year's stock market performance on retirement income.

which are not permitted to provide different annuity payments based on sex.²⁸ However, the private nongroup annuity market provides higher monthly payouts for men than for women, reflecting gender-based differences in average mortality.

This choice would have a noticeable difference on benefit levels for different groups. Table 9 shows retirement benefit levels for different demographic groups under uniform and risk-class pricing, assuming mandatory annuitization. Groups with lower than average life expectancies, such as blacks and workers with less than a high school education, receive somewhat higher benefits when annuities are priced on the mortality rates of their own group rather than on population-wide mortality rates. The results would be more dramatic for people who were not married at retirement, and the gains for men and losses for women would be the largest changes from risk-class pricing.

It is worth emphasizing that the results in Table 9 assume that all individuals have the same account balances to annuitize. If, as would be the case in many PRA plans, the long-lived groups tend to have larger account balances (because high income is associated with lower mortality), then the gap between benefit levels under different life expectancy groups and uniform pricing would be a few percentage points larger than that shown in the table.

Any annuity pricing based on race or education could very well generate the same type of litigation that occurred in the 1970s and 1980s regarding gender discrimination under the Social Security Act. The litigation may be complicated by the fact that the annuities might not be entirely or at all managed by the federal government, invoking other types of legal claims. These legal issues must be more fully explored before policymakers adopt an individual personal account system. It would likely be perceived as discriminatory (and might be held to be unconstitutional or in violation of the Civil Rights Act of 1964) to permit annuity pricing to depend explicitly on race or education, and as it becomes more feasible to test for genetic markers for longevity, ethical concerns about risk-class pricing may increase. Offering different pricing depending on a worker's account balances could be a way to offer risk-class pricing by socioeconomic status. This approach would thereby prevent some of the "reverse redistribution" from short-lived socioeconomic groups to long-lived socioeconomic groups in a way that was not perceived as violating norms about discrimination, and that would be constitutionally and legally permissible.

9. Should there be redistribution in the payout phase?

Any annuity system that does not engage in perfect, individual-specific "risk-class" pricing will result in implicit redistribution. For example, a uniform pricing system will transfer resources on average from men to women, from low-income groups to higher income groups, from blacks to whites, and from individuals with low levels of

²⁸ The Supreme Court ruled in *City of Los Angeles v. Manhart*, 435 US 702 (1978) that section 703(a)(1) of the Civil Rights Act of 1964 barred requiring women to contribute more than men to pensions to receive the same benefits. In *Arizona Governing Committee v. Norris*, 463 US 1073 (1983) the Court held that the same law barred giving men a higher monthly benefit than women.

education to those with higher levels of education. If risk-class pricing is not feasible or desirable, then an important policy question is whether or not the “reverse redistribution” from low-income high mortality groups to high-income low mortality groups should be offset through a system of transfers.

Most proposals for redistribution in PRA plans have involved the accumulation phase (see discussions in Feldstein and Liebman, 2002; Elmendorf, Liebman, and Wilcox, 2002; and Representative Kasich’s legislation). The revenue for PRAs would be raised either from the proportional payroll tax or the progressive income tax, and then deposits to PRAs would be made in a way that results in larger account balances relative to earnings for lower earners. Table 10 shows retirement benefit levels and the PDV of lifetime benefits for different groups under three different amounts of redistribution in the accumulation phase. These results can be compared to those in Table 9 to see the degree to which redistribution in account deposits can mimic the impacts of risk-based pricing. Under a moderate amount of redistribution, the effects of uniform pricing are more than completely offset.

It would also be possible to accomplish redistribution in the payout phase of a PRA system. One way would be to explicitly redistribute from the accounts of high earners to the accounts of low earners. Feldstein and Samwick (1998) discuss imposing a tax on the account balances of high earners in order to raise the account balances of all retirees to a level that would ensure benefit payments of at least the poverty line. Alternatively, annuity prices could be set in a way that implicitly raised the benefit levels of low earners and reduced them for high earners. For example, if annuities were government provided, the Social Security Administration could be directed to price annuities separately by lifetime income decile.

10. Should the annuities be government-provided or market-provided?

Most PRA proposals implicitly assume that the private market will provide annuities. This, however, is a policy choice. The federal government is currently the primary provider of inflation-indexed annuities in the U.S. through the existing OASDI system. There is no reason that the federal government could not continue to play the role of primary annuity provider even if PRAs are implemented. Indeed, there are several advantages to government annuity provision.

First, administrative costs would likely be lower in a government-run system. Because the government is already in the business of processing claims for OASDI benefit eligibility and sending out monthly checks and does so at very low cost, it would be relatively inexpensive for the government to provide a similar function for a PRA system. Competing private annuity companies, in contrast, would need to set up duplicative administrative structures and would spend money on advertising that a government monopoly could avoid.

Second, the government may better be able to spread risks and may be able therefore to offer better pricing on the annuities. An unexpected aggregate change in the

mortality of the U.S. retiree population is the primary risk to be borne by the insurer in this case. The U.S. government bears this risk now through OASDI, and could continue to do so as the primary annuity provider. Private insurance companies may be able to hedge this risk as well, but it is likely that the federal government might still end up being the ultimate risk-bearer if large changes in mortality led to a solvency crisis in the private insurance system.²⁹

Although government provision is likely to be desirable if annuities are required to be fixed real annuities, the issue is more complicated if variable annuities and other stock-based annuity products are to be used. If the government were to offer annuity products that depended on equity returns, the government would want to back these products with equity holdings, and this would raise all the issues of corporate governance and political interference in private assets markets that arise in discussions of direct investment of the Social Security Trust Fund in equities. Moreover, it is likely that the private sector would be more innovative than the government and have more expertise in designing complicated financial instruments such as “collars,” which would allow individuals to receive much of the upside potential of equity investments while minimizing downside risk.

One possibility arrangement would be for the government to offer a default annuity program, but to give individuals the option of using a private sector provider instead.³⁰

11. How should market-provided annuities be regulated?

If annuities are to be privately provided, it is likely that the scope of government regulation of the annuity market would need to be greatly increased. Currently, life insurers are regulated almost exclusively at the state level, and a shift from state to federal regulation of insurers would clearly raise contentious federalism issues. Nonetheless, the federal government would likely be interested in separately regulating providers of Social Security individual account annuities along several dimensions.

First, the government would need to regulate and monitor claims-paying ability. This would involve setting requirements for capitalization and for the types of portfolios the companies could use to back their liabilities.

Second, the government would need to take steps to ensure that competition occurred over price and not over frivolous marketing gimmicks. The high administrative costs in the Chilean individual account system have been attributed to competition over offering things like toasters and free vacations to people who chose one provider rather

²⁹ It is unclear to what extent the global private reinsurance market could absorb these risks effectively, especially if mortality trends in developed nations are correlated with each other.

³⁰ One of the anonymous reviewers of this paper raised another interesting issue: how would PRA annuities be taxed? If payouts from PRA accounts were taxed like Social Security benefits (as most reform plans assume), then, given the progressive structure of the income tax, large lumpy payments from accounts would be taxed more heavily than gradual payments such as annuities.

than another. Such tie-ins could be prohibited, and a standard prospectus should be required that clearly shows the load factor and benefit payments in a way that can be compared across providers.

Third, the government might want to regulate which products can be sold and how they are marketed. In the UK misselling scandal, many people were persuaded by insurance companies to purchase products that led to lower levels of retirement income than the default option. Limiting the number of annuity products to a relatively small number of identical products would minimize this risk and encourage competition on price, although it might also discourage innovation.³¹

Fourth, the government might want to ensure that Social Security beneficiaries have the same procedural protections concerning market-provided annuities as they have under the current Social Security system in contesting annuity determinations, including reviews by independent adjudicators and access to the federal courts.

12. What advanced financial market products might arise to reduce risk?

The past three decades have witnessed an explosion in the use of sophisticated financial instruments to hedge a wide array of risks. The development of option pricing techniques in the early 1970s made it possible for financial intermediaries to develop and price various derivative instruments, essentially packaging and repackaging risk into tradable commodities. Recent research in the field of pension finance has indicated that it is possible to construct financial instruments, such as accumulated pension collars, to protect individuals against downside risk in variable annuity products (Bodie, 2001; Feldstein and Ranguelova, 2001b).

The basic intuition behind a pension collar is that an individual could purchase a “put option” that guarantees that the variable annuity payment would not fall below a specified level. The guarantee could be financed by selling a “call option.” In effect, the individual would give up some of the upside potential of the variable annuity in exchange for a floor on the downside risk. The simulations in Feldstein and Ranguelova (2001b) study a reformed Social Security system that provides a traditional benefit at two-thirds of currently promised levels and then supplements this with a PRA equal to 2.5 percent of earnings that is converted to a variable annuity at age 67. Using option pricing techniques, they conclude that the average Social Security recipient would be able to guarantee a combined traditional benefit and PRA payment equal to currently promised levels in exchange for foregoing any upside occurrence that exceeded 116 percent of currently promised benefits. If the individual wanted a guarantee of only 90 percent of currently promised benefit levels, he or she would only have to forego any outcome above 150 percent of currently promised benefit levels. Although these calculations assume rates of returns on equities and risk-free bonds that are significantly higher than those recommended by the Social Security Advisory Board (2001), they give a flavor for

³¹ Medicare medigap insurance is an example of the private market competing to offer a small number of identical products.

the type of tradeoffs between downside protection and sacrifice of upside gain that would be available.

In theory, these products can be customized for each individual based on his or her risk preferences. In other words, an individual can choose whether to give up a substantial amount of the upside gain to obtain a higher guaranteed level of income or whether he or she wants a lower guarantee and more upside potential.

Although the actual implementation of these products is still in its infancy, Bodie (2001) reports that in the late 1990s, 30 insurance companies were offering variable annuities that combined a floor with some upside. The products needed for a PRA system would be somewhat more complicated than these existing products and would have longer maturities, but it is clear that these sorts of products can be provided in the market and are not simply theoretical ideas.

The more difficult questions are whether such products could be provided in great quantities at an attractive price and whether individual investors could become sufficiently educated as consumers to make purchases in this market that reflected their own tolerance for risk. On the pricing question, the key issues are whether providers would be willing to write contracts extending over 70 years (assuming that the annuities would be purchased gradually over a worker's career) and at what price a sufficient number of investors would be willing to take the other side of the put and call transactions. On the consumer education question, the government might want to restrict the variety of collars offered to only a handful of standardized products in order to minimize the chance that people would be misled by salespeople into purchasing products that they did not understand.

IV. Model Annuitization Plans

Because policy choices on one annuity provision will affect which choices are most appealing on other provisions, this section of the study sketches and then briefly analyzes three illustrative comprehensive approaches to the payout phase. The first provides only a minimal level of protection against market and naïve investor risk, but leaves individuals with substantial choice in how they allocate their accumulated PRA assets. The second provides much stronger protections designed to mimic those in the existing Social Security system as closely as possible. The third describes an approach that relies on innovative financial market products to try to combine both the upside of variable annuities with reasonable downside protections. There are clearly many other plans that could be assembled and it would be possible to mix and match across these plans. For example, the government could offer a default government plan similar to the second model plan, but then permit people to opt-out and purchase an annuity from the private market.

Plan 1: Poverty-Line Annuitization

- Individuals could choose to access their accounts at any point after age 60, but would be required to purchase a fixed real annuity from the government making payouts from age 64 to death that equaled the difference between the poverty line and the Social Security benefit they would receive if they claimed benefits at age 64. Married individuals would be required to purchase a joint-and-survivor annuity unless they could show that the combined Social Security benefit and annuity purchased by their spouse would exceed the poverty line if the spouse became widowed.
- There would be no restrictions on how the remainder of the PRA could be used.
- The poverty line annuities would not include any bequest option.
- Annuity prices would vary only with the age at which the annuity was purchased.
- There would be no redistribution in the payout phase.
- Disability benefits and benefits for young survivors would continue at current law levels funded with the OASDI payroll tax. At retirement age, DI recipients would convert to receiving the scaled-down traditional retirement benefit plus the proceeds from their PRA.

Analysis of Plan 1

This plan represents a major change in the government's objective for retirement income policy. Currently, the goal of retirement income policy is generally seen as trying to maintain a person's pre-retirement standard of living throughout retirement. Under this plan, the government is concerned simply with keeping people above the poverty line

in retirement. As long as workers have income levels above the poverty line, they may allocate their resources among retirement years however they choose. An important question in thinking about this kind of plan is whether people will purchase annuities from the private market with the portion of their account balances that they are not required to annuitize.

Because the amounts that people are required to convert to annuities are relatively small in this plan, it makes sense from an administrative cost perspective to have the government handle the annuitization. This is especially true because the determination of the amounts that must be annuitized follows directly from people's Social Security benefit levels.

Plan 2: Full Mandatory Annuitization

- All individuals would be required to annuitize their entire account balances into a fixed real annuity provided by the Social Security Administration. One tenth of the account balance would be annuitized each year from age 57 to age 66. The annuities would begin paying out benefits at age 67.
- The annuities would include a 10-year certain provision.
- Married couples would be required to obtain joint-and-survivor annuities with the survivor receiving 67 percent of what the married couple received when both spouses were alive.
- Deposits into the accounts of married workers would be split equally between the accounts of the two spouses.
- Annuity prices would vary by account size, with prices set by the Social Security Office of the Actuary to equalize the expected money's worth ratio for individuals in different lifetime income deciles.

Analysis of Plan 2

The plan aims to come as close as possible to replicating the protection against longevity risk and inflation risk provided in the existing Social Security system. It does so by requiring individuals to annuitize their entire account balances and by requiring them to purchase a fixed real annuity. The plan also attempts to replicate the low administrative costs of the existing system by having the government continue as the provider of annuities, not just for the traditional system, but also for the PRAs. The plan tries to offset the negative redistribution from low-income groups with short life expectancies to high-income groups with longer life expectancies that would occur with uniform annuity pricing by requiring that separate annuity prices be set by lifetime income decile. The plan also tries to reduce poverty among divorced women by requiring that account deposits be split equally between the two spouses. It provides for 10-year certain annuities, both to further redistribution to short-lived demographic groups

and to eliminate the perceived unfairness that can occur if a person dies soon after annuitizing.

Plan 3: Variable Annuities with Collars

- All individuals would be required to annuitize their entire account balances into a variable annuity provided by a private firm. The annuities would begin paying out benefits at age 67.
- Individuals would be required to select from a menu of three “collars.” The first would guarantee 65 percent of their current law Social Security benefit. The second would guarantee 70 percent of their current law benefit. The third would guarantee 80 percent of their current law benefit. The lower guarantees would offer the individual the opportunity to receive a larger fraction of any upside gain. However, no individual could select a “collar” that offered a guarantee below the SSI benefit level.
- Individuals whose account balances were not sufficient to reach the SSI benefit level would receive a transfer from the government financed by a small tax on the PRA balances of other members of the individual’s cohort.
- Annuitants would have the option of purchasing a 10-year certain option.
- Married couples would be required to obtain joint-and-survivor annuities with the survivor receiving 67 percent of what the married couple received when both spouses were alive.

Analysis of Plan 3

This plan aims to allow retirees to continue to benefit from equity returns during their retirement years. To limit the downside risk of post-retirement exposure to the equity market, the plan offers participants a range of “collars” that would limit this risk in exchange for giving up some of the upside potential. The number of options is limited so that participants are not confused by the infinite array of derivative products that could potentially be produced.

V. Conclusion

It is important that the provisions for the payout phase be in place when a PRA system is first implemented. While the protections in the current Social Security system were developed gradually over time, these protections almost always consisted of politically popular benefit expansions. In a defined contribution system, in contrast, introducing protections over time will typically require reductions to expected retirement income levels, and will likely be perceived as the government taking money away from account holders. Moreover, if participation in the PRA system is voluntary, it will be impossible for workers to make informed decisions about whether to participate if the details of the system have not been specified.

The analysis in this report indicates that it is possible to provide a level of protection similar to that in the current Social Security system in the context of a mixed system that includes PRAs. But doing so requires careful design of the payout phase. To fully replicate the protective features of the current system, full annuitization into fixed real annuities must be required of all workers, married couples must use joint-and-survivor annuities, and the government probably needs to be the annuity provider in order to keep administrative costs low. In addition, redistribution needs to be built into the system to offset the reverse redistribution that occurs under single price annuitization from the correlation between socioeconomic status and longevity.

It is not clear, however, that the amount of protection provided by the current Social Security system is optimal. By sacrificing some of that protection and accepting additional longevity risk and/or financial market risk, workers could gain more control over the timing of their retirement consumption and earn higher expected portfolio returns. In particular, the government could choose to require only a minimum amount of annuitization and let retirees have full control over the rest of their account balances. The government could also permit retirees to use variable annuities that offer higher risk in exchange for potentially higher post-retirement returns. Policymakers should consider whether the benefits of increased choice and higher expected benefit levels justify reducing the amount of protection provided from Social Security: the first tier of Americans' retirement income security.

Finally, in designing the payout phase of a PRA system, it is important to analyze its effects, not only on the typical retiree, but also on the full range of workers and dependents who rely on the current system. Special care must be taken to design provisions to protect widowed and divorced spouses, disabled workers, and other demographic groups who depend heavily on the current system and are at high risk of poverty.

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Table 1
Comparison of Annual Retirement Income Levels With and Without Annuitization
Married Men
(dollars)

	Current Social Security System		PRA System With Full Annuitization		PRA System With No Annuitization			
	Benefit Level	PDV	Benefit Level	PDV	Benefit Level	PDV	Lump-Sum Distribution	Total PDV + Lump Sum
Less Than High School	11,474	159,414	9,764	134,187	6,999	97,243	46,860	144,103
High School	15,293	223,432	13,621	196,549	9,329	136,294	73,026	209,320
College	18,281	279,262	16,933	255,379	11,151	170,350	98,769	269,119
White	17,043	250,863	15,411	224,049	10,396	153,026	85,385	238,411
Black	14,747	200,469	13,219	177,321	8,996	122,286	71,345	193,631
Hispanic	13,552	209,886	11,761	180,215	8,267	128,031	59,717	187,748

Notes: Assumes 2 percent carveout with a 39 percent cut in the traditional Social Security benefit, no redistribution in making account deposits, fixed real annuity with no bequest option, joint-and-survivor annuitization with a 75 percent survivor benefit, uniform annuity pricing with a load factor of 0.90, mean returns on a 60-40 investment portfolio of 5 percent and a real discount rate of 3 percent. An equivalence scale of 1.62 is used in comparing two- and one-person households.

Source: Author's calculations.

Table 2
Annual Benefit Levels and Remaining PRA Balances with Annuitization Required
up to 125 of Poverty Level
Married Men

	Annual Benefit Level (dollars)	Remaining PRA Balance (dollars)	Percentage of PRA Annuitized
Less Than High School	9,764	0	100
High School	10,617	51,118	30
College	11,151	98,789	0
White	10,647	81,116	5
Black	10,812	40,666	43
Hispanic	10,119	28,067	53

Notes: See Table 1 notes for details of simulation.

Source: Author's calculations

Table 3
Comparison of Retirement Benefits Under Real and Nominal Annuitization
(dollars)

	Current Social Security System			PRA System With Fixed Real Annuitization			PRA System With Fixed Nominal Annuitization		
	Average Benefit	While Married	As Widow(er)	Average Benefit	While Married	As Widow(er)	Average Benefit	While Married	As Widow(er)
Married Men	17,145	17,080	17,301	15,853	15,564	16,804	15,811	15,875	15,551
Married Women	17,703	18,103	17,063	16,306	16,219	16,697	16,121	16,531	15,336
Widowed Before Retirement	17,278	NA	NA	19,304	NA	NA	18,949	NA	NA
Divorced Women	14,361	NA	NA	13,055	NA	NA	12,881	NA	NA

Notes: See Table 1 notes for details of simulation. Women widowed before retirement are assumed to have been widowed at age 55. Divorced women are assumed to have been divorced at age 45 after 20 years of marriage. Both the widowed and divorced women are assumed to annuitize at a single-life rate. Nominal annuities depreciate in real value at the assumed inflation rate of 3 percent.

Source: Author's calculations.

Table 4
Comparison of Retirement Income Levels Between
Real and Variable Annuities and with Varying Asset Returns
Married Men
(dollars)

	Annual Income from Real Annuity			Annual Income from Variable Annuity		
	25 th percentile	Median	75 th percentile	25 th percentile	Median	75 th percentile
Less Than High School	8,939	9,764	10,994	8,257	10,656	11,477
High School	12,342	13,621	15,527	11,288	14,997	16,324
College	15,265	16,933	19,414	13,875	18,872	20,666
White	13,964	15,411	17,563	12,756	17,090	18,665
Black	11,962	13,219	15,092	10,922	14,579	15,866
Hispanic	10,717	11,761	13,315	9,861	12,884	13,910

Notes: See Table 1 notes for details of simulation.

Source: Author's calculations.

Table 5
Bequest Options in a PRA System
Married Men
(dollars)

	No Bequests		10-Year Period Certain		20-Year Period Certain	
	Benefit Level	PDV	Benefit Level	PDV	Benefit Level	PDV
Less Than High School	9,764	134,187	9,545	134,346	9,458	135,493
High School	13,621	196,549	13,266	196,363	13,115	196,849
College	16,933	255,379	16,433	254,715	16,217	253,952
White	15,411	224,049	14,992	223,772	14,815	224,110
Black	13,219	177,321	12,905	177,914	12,781	180,439
Hispanic	11,761	180,215	11,463	179,796	11,332	179,152

Notes: See Table 1 notes for details of simulation.
Source: Author's calculations.

Table 6
The Treatment of Married Women in a PRA Plan
(dollars)

	Single Life		50% Joint & Survivor		67% Joint & Survivor		75% Joint & Survivor	
	Benefit while married	Benefit as widow	Benefit while married	Benefit as widow	Benefit while married	Benefit as widow	Benefit while married	Benefit as widow
Less than High School	11,048	9,237	11,048	9,970	10,819	10,650	10,722	10,939
High School	14,890	12,502	14,890	14,002	14,550	15,016	14,405	15,446
College	18,842	15,313	18,842	16,495	18,386	17,851	18,192	18,428
White	17,075	14,137	17,075	15,345	16,676	16,534	16,506	17,039
Black	14,734	12,129	14,734	12,717	14,404	13,697	14,264	14,114
Hispanic	13,777	11,503	13,777	12,394	13,474	13,296	13,345	13,680

Notes: See Table 1 notes for details of simulation. Single-life simulations do not assume earnings splitting.
Source: Author's calculations.

Table 7
The Treatment of Widowed and Divorced Women in a PRA Plan
(dollars)

	Benefit in current SS system	Benefit In PRA System
Women Widowed at Age 55		
Less than High School	12,409	12,745
High School	16,692	17,886
College	18,362	21,494
White	17,554	19,716
Black	15,098	16,713
Hispanic	15,076	16,079
Women Divorced at Age 45		
Less than High School	10,157	8,749
High School	12,674	11,446
College	15,576	14,571
White	14,461	13,225
Black	13,234	11,862
Hispanic	11,992	10,726

Notes: See Table 1 notes for details of simulation.

Source: Author's calculations.

Table 8
Benefits for Married Men Disabled at Age 50
(dollars)

	Current Social Security System		PRA System No Account Contributions After Disability		PRA System Supplemental Account Contributions After Disability	
	Benefit Level	PDV	Benefit Level	PDV	Benefit Level	PDV
	Less than High School	10,911	151,764	9,176	126,244	9,363
High School	14,489	211,951	12,774	184,542	13,045	188,337
College	17,684	270,343	16,005	241,641	16,418	247,712
White	16,531	243,490	14,620	212,767	14,970	217,729
Black	13,986	190,369	12,428	166,903	12,676	170,125
Hispanic	12,831	198,917	10,998	168,699	11,243	172,361

Notes: See Table 1 notes for details of simulation.
Source: Author's calculations.

Table 9
Comparison of Uniform and Risk-Class Pricing
Married Men
(dollars)

	Uniform Pricing		Risk-Class Pricing	
	Benefit Level	PDV	Benefit Level	PDV
Less than High School	9,764	134,187	9,816	134,877
High School	13,621	196,549	13,561	195,709
College	16,933	255,379	16,695	251,880
White	15,411	224,049	15,315	222,686
Black	13,219	177,321	13,351	179,038
Hispanic	11,761	180,215	11,588	177,632

Notes: See Table 1 notes for details of simulation. Risk-class pricing means pricing by an individual's sex by race by education class. Assumes all individuals have the same account balances to annuitize.
Source: Author's calculations.

Table 10
The Impact of Redistribution in the Accumulation Phase
(dollars)

	No Redistribution		Moderate Redistribution		Equal PRA Deposits	
	Benefit Level	PDV	Benefit Level	PDV	Benefit Level	PDV
Less than High School	9,764	134,187	11,086	151,840	12,407	169,492
High School	13,621	196,549	14,284	205,853	14,947	215,156
College	16,933	255,379	16,840	254,005	16,746	252,631
White	15,411	224,049	15,710	228,288	16,010	232,526
Black	13,219	177,321	13,937	186,667	14,654	196,013
Hispanic	11,761	180,215	12,747	194,938	13,732	209,660

Notes: See Table 1 notes for details of simulation. No redistribution: account deposits proportional to earnings (2 percent of earnings). Moderate redistribution: account deposits of 1 percent of earnings plus \$300 (for any worker with at least \$5,000 in earnings in the year). Equal deposits: PRA deposits of \$600 per worker (for any worker with at least \$5,000 of earnings in the year).

Source: Author's calculations.

Appendix A: Technical Details of Model

This appendix describes the methodology behind the annuity model.

Data

Earnings Levels and Trajectories

In the past, analyses of the distributional effects of Social Security have often used highly stylized lifetime earnings histories of steady earners with low, medium, high, and maximum earnings. These earnings histories are not, however, typical of real workers, since earnings are generally much more variable than those of these hypothetical workers. In my analysis, I combine earnings levels estimated from the Current Population Survey (CPS) with the latest earnings trajectories estimated for the Social Security Administration by Bosworth and Burtless (2000).

Specifically, for each demographic group I estimate average annual earnings for people 41 to 45 years of age with positive earnings and for the spouses of married people in the demographic group from the March 2000 CPS. This age group was chosen because it reflects peak earning years. Because these earnings data pertain to 1999, I inflate these earnings by 5 percent to account for earnings growth between 1999 and 2001. Appendix Table A shows the estimates of average earnings for workers and their spouses for each demographic group studied in the paper.

Next I scale the earnings trajectories from Bosworth and Burtless along with a few additional ones so that average earnings between ages 41 and 45 equal 1 and multiply the trajectories by our estimated average earnings. There are 18 Bosworth and Burtless trajectories, nine each for men and women. They allow for low, medium, and high earnings and for separate declining, level, and rising earnings patterns within each earnings class. In addition, I include three additional earnings patterns. Constant earnings, as in the traditional Social Security low, medium, and high earnings series, level earnings with early retirement/disability, which takes the male medium level earnings pattern from the Bosworth and Burtless trajectories and stops the earnings at age 50; and sporadic earnings which takes the medium-level earnings pattern and zeros out the three middle years of earnings in each decade of the workers life in order to represent spells of unemployment, disability, or incarceration. In my analysis, I use the medium-level pattern for very low income individuals, not just middle-income individuals. I do this because the low earnings patterns have such steep drops by age 40 that they imply implausibly high levels of earning earlier in life when used with my low-earner means for ages 41 to 45.

Mortality Rates

The mortality rates used in this study are based on the Social Security Administration's projections for men and women in the 1980 birth cohort. I adjust these mortality rates using relative mortality rates by race and education presented in Brown, Liebman, and

Pollet (2002). These relative mortality rates were estimated using the National Longitudinal Mortality Study (a nationally representative sample reporting mortality data by various demographic factors). I created these estimates using nonlinear least squares to fit a Gompertz-Makeham life function. For the current study, these life tables have been further adjusted to account for mortality differences by marital status at retirement. I urge caution in using the estimates for Hispanics because there is considerable heterogeneity in mortality rates among different Hispanic groups. In particular, the existing evidence suggests that Hispanic immigrants have longer life expectancies than native-born whites. Many U.S.-born Hispanic groups have life expectancies similar to U.S.-born blacks.

Asset Returns

This study uses simulated asset returns from a 60 percent stock and 40 percent bond portfolio and from a 33 percent stock and 67 percent bond portfolio. For each portfolio, two sets of 10,000 simulated returns are generated. One, used for fixed annuities, generates returns through age 63 and ranks the returns based on the total accumulated value of a portfolio earning those returns through age 63. The other, used for variable annuities, generates returns through age 100, and ranks the returns on the total accumulated value of a portfolio earning those returns through age 85, roughly the average mortality date conditional on reaching 65.

For the 60-40 portfolio, independent and identically distributed (iid) level returns are generated from a normal distribution with a mean real return of 5.0 percent (after administrative costs) and a standard deviation of 12.7 percent. The mean return is motivated by the arguments in Social Security Advisory Board (2001) that indicate that returns in the future probably will be somewhat lower than in the postwar period. The standard deviation is based on estimates in Brown, Mitchell, and Poterba (2001) which show a standard deviation of equity returns of 16.95 percent, a standard deviation of Treasury bond returns of 11.13 percent, and the estimates in Feldstein and Ranguelova (2001a) of the covariance between stocks and bonds. For the 33-67 portfolio, I assumed a mean return of 4.1 percent and a standard deviation of 11.1 percent.

For each distribution, 10,000 draws are generated and the draws representing the 1st through 100th percentiles are retained and stored in the spreadsheet. For means other than the ones used for the simulations, I simply add the difference between the desired mean and 5.0 to each draw for the 60-40 portfolio and the difference between the desired mean and 4.1 for the 33-67 portfolio. Thus, we assume that the mean is changed, but that the variance does not depend on the mean.

Methodology for Calculating Traditional Social Security Benefits

1. The AIME for the worker and his or her spouse (if any) is calculated by taking the average of the 35 highest years of indexed earnings.

2. The PIA for the worker and his or her spouse (if any) is calculated using the 2001 PIA formula: $PIA = (.9 * \min(AIME, 561) + \max(0, .32 * \min(AIME - 561, 3381 - 561))) + .15 * \max(0, AIME - 3381)$
3. The benefit received while the person's spouse (if any) is still alive is calculated separately by marital status as: Married: $\max(1.5 * \text{own PIA}, 1.5 * \text{spouse PIA}, \text{own PIA} + \text{spouse PIA}) / \text{equivalency scale}$.
Divorced: $\max(\text{own PIA}, .5 * \text{spouse PIA})$
Widowed: $\max(\text{own PIA}, \text{spouse PIA})$
Never Married: (own PIA)

All of these benefit amounts are reduced for retirement at age 64 rather than the age of full benefit eligibility. Age 64 was chosen in consultation with AARP staff both because it is close to the current average retirement age and because it is roughly halfway between the two extreme options of age 62 and age 67 that span the range of retirement dates that could have been used.

4. The benefit received after the person's spouse (if any) dies is calculated as:
Married: $\max(\text{own PIA}, \text{spouse PIA})$
Divorced: $\max(\text{own PIA}, \text{spouse PIA})$
5. The expected benefit at each age is calculated as $p(\text{self alive}) * p(\text{spouse alive}) * \text{benefit if spouse still alive} + p(\text{self alive}) * p(\text{spouse dead}) * \text{benefit if spouse is dead}$.
6. The average benefit is calculated by summing the expected benefits from age 64 to 100 and dividing by the sum of the $p(\text{self alive})$ from age 64 to 100. Average benefits while married and widowed come directly from steps 3 and 4.
7. The PDV of benefits is calculated by discounting the expected benefits by $(1 + \text{real interest rate})^{(\text{age} - 63)}$ and then summing from age 64 to 100.

Methodology for Calculating Payouts from Fixed Annuity

1. PRA account accumulations for the worker and spouse to age 64 are calculated using the worker's and spouse's earnings history, the degree of redistribution in account deposits, and the median rate of return series.
2. Twelve annuity factors are calculated for each individual corresponding to own, spouse, and joint-and-survivor options. For each of the three options, separate annuity factors are calculated using risk-class and uniform pricing and with and without a period-certain provision.
3. Using the account accumulation and the annuity factor, annual annuity payments are calculated. These initial payment calculations assume that both

spouses are alive (if both were alive at retirement) and can decline in real value over time in the case of a fixed nominal annuity.

4. Separate annuity payment streams are calculated for the case in which the worker's spouse is still alive and the case when the worker's spouse is deceased. These payment amounts reflect the joint-and-survivor, option chosen as well as the equivalence scale for comparing one- and two-person households.
5. Expected benefits are calculated by weighting the spouse alive and spouse deceased annuity payments in each year by the probability that the spouse is alive or deceased.
6. Average benefit levels, as well as average benefit levels with spouse alive and spouse deceased, are calculated by weighting the benefit level in each year from age 64 to 100 by the probability that the individual is alive in that year.
7. The PDV of lifetime benefits is calculated by discounting the expected benefit levels by the real interest rate.
8. Expected benefit levels under 10th, 25th, and 75th percentile returns are calculated by repeating steps 1 through 6 using the appropriate draws from the rate of return distribution.

Methodology for Calculating Payouts from Variable Annuity

1. Steps 1 through 6 and 8 in the fixed annuity methodology apply for variable annuities as well. The only difference is that in step 3 the annual annuity payments vary from year to year during retirement depending on the ratio of actual portfolio returns to the assumed portfolio return.
2. The calculation of the PDV is more complicated than in the fixed case, because for comparability we need to adjust it for the uncertainty in retirement income under the variable annuity. Specifically, I convert each distribution of possible levels of retirement income to its certainty equivalent value before discounting at the risk-free real interest rate. I do this using the CRRA utility function and a coefficient of relative risk aversion of 3. Following Brown, Mitchell, and Poterba (1998), I generate a six-point distribution of retirement income levels at the 1st, 10th, 35th, 65th, 90th, and 99th percentile of the return distribution. I calculate utility with each level of retirement income and generate expected utility by taking a weighted average of the six utility levels. Then, I invert the utility function and calculate the certainty equivalent level of income that would produce the expected utility level.

Appendix Table A
Estimates of Mean Earnings from the March 2000 Current Population Survey
(2001 dollars)

	Own earnings	Spouse earnings
Men		
All	48,834	22,347
White	50,897	22,507
Black	32,950	22,799
Hispanic (can be either race)	32,962	13,280
Education less than High School	24,812	11,557
High School	36,204	20,665
College or above	60,140	24,859
Low-wage worker	20,085	12,238
Women		
All	28,642	50,379
White	28,987	52,312
Black	27,206	34,096
Hispanic (can be either race)	22,220	34,032
Education less than High School	16,215	26,092
High School	20,863	41,978
College or above	34,652	57,971
Low-wage worker	14,481	41,761

Notes: Own earnings are mean annual earnings for all individuals 41 to 45 years of age in the specified demographic group *who had positive earnings*. Spouse earnings are the mean earnings of the spouses of married individuals in the specified demographic group, including spouses with zero earnings.

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