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The SERIOUS System: A New Model For Retirement Income Success

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Executive Summary

The Successful Employee Retirement Income Outcomes in the United States (SERIOUS) system is a comprehensive model providing for the delivery of employment-based retirement income. In contrast to traditional Tier II retirement systems dependent upon an employer or industry to sponsor a retirement plan, the SERIOUS system offers a new approach by allowing employees to select from their choice of competing independent plan sponsors. As such, all employees have access to this new retirement system and the access is unaffected by a job change or job loss. The system is funded by voluntary contributions from both employers and employees, although many proven, as well as new, methods are used to encourage participation. Employers are required to enroll all employees into the system and transmit contributions to a central clearinghouse that handles all administrative functions. Plan sponsors are responsible for all investment decisions and use both external markets and an internal adjustment mechanism to manage various risks that allow the system to function effectively even in extreme conditions. While the plan sponsors share risk with employees, certain guarantees are provided so that expected retirement income volatility is minimized, particularly for those employees nearing retirement. Benefits are required to be paid as inflation-protected life annuities, although options for alternative payment methods are provided. Employees are given the responsibility to make sufficient contributions throughout their career. The central clearinghouse allows fulfillment of this responsibility by providing an online interface that clearly shows how an employee's contribution level directly impacts the achievement of a desired retirement income. The system is regulated by a nationwide governing board independent of any plan sponsor, employer, employee group and the federal government. The governing board uses a flexible, risk-based system of regulation to minimize the risk of moral hazard and ensure the solvency of plan sponsors. In exchange for modest, regular contributions, the system provides all employees the opportunity to earn an attractive retirement income and minimizes the prospect of future tax increases to provide for otherwise financially unprepared retirees. While the use of independent plan sponsors in a centralized system will require legislative changes, the SERIOUS system proposal satisfies the needs of all stakeholders and provides an opportunity for a universally accessible and sustainable retirement system that can be realistically achieved.

1. Introduction and Background

The existing Tier II U.S. retirement programs traditionally sponsored by employers are failing to provide an acceptable level of retirement income to a large number of employees. Defined-benefit (DB) plans continue to provide valuable benefits for certain workers, but as they impose large financial and regulatory burdens on employers, they are rapidly disappearing and are unlikely to return. Employer-sponsored defined-contribution (DC) plans, originally intended to supplement DB plans, are now the primary retirement plan for most individuals in the private sector (U.S. Department of Labor 2009). Without any comprehensive national retirement income policy to provide direction, the shift from DB to DC is a natural evolution. Most employers still want to assist employees in saving for retirement, but face ever-increasing demands from investors to abandon any activities (e.g., sponsoring volatile DB plans) that do not support the core business purpose, thus the movement to DC.

While DC plans have provided employers with a way to reduce their costs, employees must confront a number of risks that impact their ability to meet retirement income needs. To assist employees with the inherent investment risk in DC plans, employers and plan administrators have initiated well-meaning, but generally unsuccessful, efforts to provide education about basic investment principles such as risk tolerance, compound interest and diversification (Choi et al. 2001). One outgrowth of these unsuccessful education efforts has been the development of target-date retirement funds that automate the asset allocation process with the retirement date of the employee in mind. While these funds were designed to protect employees from poor investment choices, they do little to actually shield employees from sudden market declines that potentially have devastating effects on their future retirement security. A recent example was the 2008 performance of 2010 target-date funds. These funds were designed for those with less than two years until retirement and declined an average of 23.7 percent (Charlson et al. 2009). In contrast to DB plans that commonly provide annuities, DC plans typically give employees a lump sum upon retirement. Most often, these lump sums are transferred to individual accounts and the employees are responsible for finding a way to make the money last the remainder of their lives. Although life annuities from insurance companies are available to mitigate the resulting longevity risk, they are used by fewer than 20 percent of employees (Sabelhaus et al. 2008). While the problems and risks facing DB and DC participants (both employees and employers) are well known, perhaps less attention has been given to the fact that only about half of private industry workers are even covered by a retirement plan (U.S. Department of Labor 2009).

Society (represented by taxpayers) faces serious challenges then, to not only address deficiencies in existing retirement plans, but also to provide an opportunity for all employees to participate in a functional and sustainable retirement system. If these challenges are not successfully met, society faces unpleasant outcomes in terms of increased taxes and related social costs to provide for financially unprepared retirees. This paper proposes a comprehensive Tier II retirement income system called Successful Employee Retirement Income Outcomes in the United States (SERIOUS). This system is specifically designed to meet the present challenges by using an approach that relies on shared responsibility from employees, employers and society, without requiring any of these stakeholders to bear unaffordable costs, assume excessive risk, or perform unreasonable tasks. Section 2 of the paper provides a brief overview of the structure of the system, while Sections 3 through 9 provide a detailed description of its seven major components. Section 10 discusses some of the implementation and transition issues that would be involved, while Section 11 provides further analysis of the results that can be expected if this system is implemented. Section 12 concludes.

2. Structure of the SERIOUS System

A successful retirement income system must meet the basic needs of all its stakeholders throughout various periods of economic, demographic, social and political change. It must be able to adjust to these and other changes without requiring structural modification or legislative intervention. Many of the individual components and design features of the SERIOUS system are familiar and have, in various forms, been proposed before and even implemented on a limited scale. However, only by combining all these components together can the system successfully meet the needs of all stakeholders. Each of the components will be discussed in greater detail in the following sections, but in order to understand the basic structure of the system and how the various features work together, a brief introduction is provided here.

- The SERIOUS system uses third-party plan sponsors independent of any employer and employee group. Employers will transmit plan contributions using payroll systems, but are no longer burdened with the fiduciary responsibility and associated costs of sponsoring retirement plans. All investment and asset allocation decisions are the responsibility of the independent plan sponsor.

- While plan sponsors can effectively use traditional risk management techniques, the system also contains an adjustment mechanism that allows for investment, inflation and longevity risk to be shared with employees. While this mechanism has the potential to create volatility in expected future retirement income, certain guarantees are provided to control the amount of risk that is shared with employees. The adjustment mechanism and guarantees are key features in promoting the sustainability of the system.

- The system relies on voluntary contributions from both employees and employers, but a variety of incentives and methods, such as automatic enrollment, are used to increase participation. The ability of employers to cost-effectively promote retirement savings, especially among low-income employees, is utilized.

- Using an online interface, employees are provided with information that is easy to understand (requires no investment or mathematical knowledge) and allows informed decisions to be made regarding the appropriate contribution level. The interface also promotes competition and provides cost transparency since the level of benefits being provided by each plan sponsor is shown in an identical format. Employees can use this interface to change contribution levels or plan sponsors at any time.

- Retirement benefits are required to be paid as inflation-protected life annuities. The system allows annuitization to occur in phases at times selected by the employee rather than all at once. Provisions for a limited amount of lump sums and accelerated payments for long-term care needs are also included.

- The system will be established by an act of Congress, but will be operated and regulated by a board independent of the federal government. The board will require that certain levels of reserves and capital be held to ensure solvency. The amount of capital required will consider the ability of each plan sponsor to manage its specific risks, even under extreme scenarios, rather than relying on static factors or restricted investment lists.

- The system is designed to utilize existing markets to manage risk and provide an attractive level of benefits. The SERIOUS system has the potential to stimulate demand for a more diverse and larger supply of certain market instruments that could allow plan sponsors to increase the level of benefits provided.

3. Independent Third Party as Plan Sponsor

Even though Tier II retirement systems have typically been sponsored by employers, this fact is actually one of the reasons so many employees end their career with inadequate retirement income. Employers are under intense pressure to operate efficiently and meet earnings expectations, while employee retirement plans are not a high priority. Even so, many employers, for competitive and other reasons, would still like to contribute to a retirement plan for their employees. However, there are many costs to sponsoring a plan in the current regulatory structure that cause many employers not to sponsor a plan

or reduce the amount that could potentially be spent on employee retirement benefits. This fact is particularly noticeable among smaller employers where only about half even offer a retirement plan compared to over 80 percent for larger employers (U.S. Department of Labor 2009). Any new retirement system needs to recognize the reality that a significant number of employers will never voluntarily sponsor retirement plans and that a government mandate to do so would potentially have a negative financial impact on many employers and on the economy as a whole.

The SERIOUS system reflects this reality and relieves employers from the regulatory, fiduciary and other burdens by using third parties, independent from any employer or employee group, to be plan sponsors. These plan sponsors would be special purpose companies whose sole function is to invest employee and employer contributions in order to provide retirement income benefits. These companies could operate either on a for-profit or nonprofit basis. It is anticipated that the plan sponsor companies would be created by existing entities that have experience in managing pensions, such as insurance companies, but would operate independently of any existing company. Plan sponsors would be required to provide a standardized benefit structure (discussed in Section 7) and provide certain guarantees (discussed in Section 4), although they would be free to invest contributions and determine benefit pricing entirely at their discretion. A central clearinghouse would be created and funded by the participating plan sponsors that would provide all necessary administrative services, such as processing contributions and disbursing benefits. The central clearinghouse would maintain an online interface where employees would be able to compare the level of benefits being provided by each competing plan sponsor in a standardized format. By centralizing administrative functions, using the clearinghouse website to eliminate sales and distribution costs, and having a standardized set of benefits with transparent pricing to minimize marketing costs, plan sponsors will have an extremely low cost structure relative to current financial services firms such as insurance companies and mutual funds.

By moving plan sponsorship responsibilities to independent companies, both large and small employers should be able to devote more company resources to the direct funding of employee retirement benefits. Employees would no longer be concerned that their employer might eliminate their retirement plan. When changing jobs, employees would not have to determine how to roll over a prior balance (e.g., DC plans), lose the benefit of prior years of service (e.g., DB plans), or encounter the possibility that the new employer might not sponsor a retirement plan. Regardless of employer, or even if unemployed or self-employed, all employees can make contributions to a plan sponsor of their choice at all times.

4. Risk Management

The SERIOUS system is not simply a "new plan" that generates retirement income, but rather a comprehensive, sustainable system specifically designed to address the risks that negatively impact the achievement of retirement income goals under a variety of conditions. Since the SERIOUS system is fully funded, the risk of a large demographic shift (such as the one facing pay-as-you-go social security systems) is avoided. By pooling the experience of a large number of individuals, plan sponsors minimize their non-systematic longevity risk. The longevity risk for individuals is eliminated by using life annuities as the primary method of benefit payment. Investment, inflation and systematic longevity risks cannot be eliminated by traditional insurance pooling mechanisms, but can be managed by using external markets and are discussed further in Section 9. However, using markets, while valuable and necessary, would be too costly (or potentially impossible) to eliminate all of these risks. For example, a plan sponsor could invest employee contributions in the S&P 500 and buy a long-term put option to protect against loss until retirement, but the cost of such a market strategy makes it impractical. Since markets do not provide a complete solution, plan sponsors share these risks with employees. However,

the system uses guarantees to minimize the potential negative impact of these risks on employees and also to guide plan sponsors in their use of the markets.

First, while these guarantees will be discussed in the context of individual contributions, it should be clarified that the actual contributions are invested in aggregate at the discretion of the plan sponsor. The plan sponsor is required to guarantee employees a specific amount of retirement income for each contribution; once a contribution is made, the amount of retirement income earned for that contribution cannot be adjusted. In this way the system provides a defined benefit for each contribution, although an employee's total retirement benefit is not fully defined until contributions cease, since plan sponsors can adjust guarantees on future contributions at their discretion. For example, a plan sponsor could guarantee an employee a $250 annuity at age 67 for a $1,000 contribution at time A. Even if the guarantee changed to $225 per $1,000 for contributions at time B, the employee would still receive the $250 annuity at age 67 for the $1,000 contribution at time A. The total retirement benefit for this employee would be the $250 earned at time A plus the $225 earned at time B, plus the sum of all the other income amounts earned for each contribution over the entire career. In order to calculate these income amounts, sponsors would specify a table of guaranteed interest and mortality rates.[1] In any year prior to annuitization, the inflation rate[2] is used in the calculation if it exceeds the rate of guaranteed interest in the table for that year.[3] While this provision does not guarantee that contributions grow at a fixed real rate of return, it ensures contributions at least keep pace with inflation. Once an employee chooses to receive a benefit, the guaranteed income amounts purchased by each contribution are calculated (based on the guaranteed interest and mortality rates associated with each contribution) and summed to produce the total annuity payment. This annuity payment will be fully inflation-protected, increasing or decreasing with the inflation rate, but guaranteed to never decline below the initial payment. Essentially, the employee is using his contributions to purchase a series of single-premium deferred annuities, each with (potentially) unique guarantees.

Table 1 provides an illustration of how these guarantees are applied to a single contribution. In this illustration, a 60-year-old participant contributes $1,000 that has a 3.5 percent interest rate guarantee for all years. The $1,000 accumulates at the guaranteed rate each year, except during the third year when inflation is 4 percent. Upon retirement at age 65, the accumulated contribution is applied to the annuity factor calculated from the table of guaranteed interest and mortality rates producing a $79.60 annual benefit.[4] The next year, the annuity payment is increased 1 percent because of inflation, but then reverts to the original payment amount due to –2 percent inflation (or deflation). Recall that this illustration is only for a single contribution, and the total retirement annuity for this employee comprises the $79.60 benefit calculated for this contribution and the sum of the income amounts calculated for each previous and subsequent contribution.

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[1] This mortality table does not have to be an industry standard mortality table such as Annuity 2000. It simply needs to be a table of mortality rates that the plan sponsor is comfortable using based on its anticipated experience.

[2] The term inflation here and throughout the paper is used generally and makes no attempts to determine which specific measure of inflation, such as CPI-W, CPI-U, CPI-E, is the best to use for purposes of the SERIOUS system. See Barnes et al. (2009) for a further discussion of these various measures.

[3] It would be a prudent risk management measure to include a cap on the amount of inflation protection provided prior to annuitization. Since this inflation guarantee will likely be managed with derivatives, an upper limit would reduce the cost of providing this protection.

[4] This table represents an employee contribution. As will be discussed further in Section 7, employee contributions are fully refundable with interest upon death prior to annuitization. Therefore, the annuity factor based on the retirement age is applied to the accumulated balance at the time of annuitization. Had this been an employer contribution, which is not refundable at death prior to annuitization, a deferred annuity factor based on the contribution age would have been calculated and applied to the initial contribution, producing a larger annuity amount.

TABLE 1						
Pre-retirement				Post-retirement		
Age	Accumulated Contribution (EOY)	Inflation Rate	Interest Rate Applied	Age	Annuity Benefit	Inflation Prior Year
60	1,035.00	0%	3.5%	65	79.60	n/a
61	1,071.23	1%	3.5%	66	80.40	1%
62	1,114.07	4%	4.0%	67	79.60	–2%
63	1,153.07	3%	3.5%	68	81.99	3%
64	1,193.42	2%	3.5%	69	83.63	2%
Guaranteed Interest Rate: 3.5% Annuity Factor at age 65: 0.0667						
Base Annuity Benefit = 1,193.42 × .0667 = 79.60						

While employees are guaranteed not to lose any money on prior contributions, they do face the prospect of volatility (risk) in the amount of retirement income that can be purchased with future contributions if guarantees change. However, this potential volatility is actually advantageous to employees. If a plan sponsor had to establish one guarantee that would apply to all future participant contributions, the guarantee would be set very low because of the difficulty of predicting investment yields available to match an uncertain amount of future contributions. Since the guarantees can be adjusted for future contributions, it allows plan sponsors to reflect current (or currently projected) interest rates, mortality experience, and supply and cost of market instruments (market instruments are discussed further in Section 9). By sharing risk with employees through this adjustment mechanism, it allows the system to be sustainable through both routine and extreme economic, demographic and other conditions. In contrast to other retirement systems with fixed defined benefits or systems that have automatic adjustment mechanisms that rely on certain models (that cannot always handle extreme scenarios), the SERIOUS adjustment mechanism allows the independent plan sponsors to use their professional judgment on how best to set benefit levels (i.e., guarantees) to match current and future expected conditions. Since these adjustments are controlled by the plan sponsor (who is not inclined to lose money) in the context of a competitive marketplace, the risk of moral hazard is much less than if a government, union or industry group had the ability to override the adjustment mechanism, resulting in an unsustainable level of benefits.

Not only can prospective experience be reflected in future guarantees, but past experience can as well. If past experience (e.g., investment earnings, mortality experience) is better than expected, then some of these gains can be reflected in the form of higher guaranteed benefits for future contributions. To provide a numerical example of the adjustment mechanism, assume mortality has suddenly declined nationwide by 2 percent in all age cohorts, causing an increase in expected future benefits. Plan sponsors would naturally reduce their future mortality guarantee by 2 percent, but could also reduce the guarantee more than 2 percent to compensate for the past (incorrect) mortality assumption on prior contributions that cannot be adjusted. Plan sponsors are providing stability to the system, while minimizing the impact on employees, by amortizing the unanticipated increase in benefits on prior contributions over some period of future contributions. Although allowing adjustments to future guarantees could invite the risk of moral hazard, the competitive nature of the system helps to deter that possibility. For example, assume one plan sponsor offered guarantees similar to other plan sponsors, but invested contributions in overly speculative investments. If the investments performed well, the plan sponsor would benefit; but if the

investments performed poorly, the plan sponsor would either have to absorb the losses in terms of reduced profits or could reduce future guarantees to compensate. However, since these losses were specific to this one plan sponsor (rather than a more systematic change such as mortality improvement), the ability to lower future benefit levels is constrained (as is the temptation to invest in inappropriate assets) since lower benefit guarantees reduce the ability to attract future contributions, relative to the other plan sponsors.

Although employees will experience volatility in the total expected amount of retirement income until contributions cease, the level of volatility will be different for each employee. An example will be useful in this case. Assume two workers, ages 25 and 55, make equal regular contributions throughout a career starting at age 20 and ending at age 65 with past contributions guaranteed at 4 percent. If future contributions are also assumed to use a 4 percent guarantee, both employees are projected to receive $20,000 per year at age 65. However, due to lower expected interest rates, the plan sponsor reduces the interest guarantee on future contributions from 4 percent to 3 percent, causing the expected retirement benefit for the younger worker to be $17,000 compared to $19,000 for the older worker. It is important to remember that at no time did the retirement benefit attributable to past contributions actually decrease, only the projected benefit based on future contributions changed, causing the total expected benefit to change. The fact that the benefit for the older employee changed less than for the younger employee is simply a mathematical result of the older worker having a larger proportion of guaranteed (past) contributions than the younger worker. However, the guarantee structure that produces this result is actually one of the most important ways in which the SERIOUS system manages risk facing employees and is consistent with the human life cycle model from economics discussed next.

Bodie, Treussard and Willen (2007) define total wealth as the sum of both financial wealth (stocks, bonds, retirement income) and human wealth (future labor income). They show that the typical present value of human wealth for a 25-year-old high school graduate is about three times that of a 55-year-old. Conversely, financial wealth for older workers is typically higher than that of younger workers. While the risk of loss to human wealth is easily insured by purchasing life and disability insurance, it is difficult for individuals to recover from lost financial wealth in a short period of time. Generally speaking, younger workers have a much greater ability to alter their human wealth (e.g., improve their future earnings through further education) than older workers and can use this increased human wealth to recover losses in financial wealth.

Applying this model to the earlier example, the younger employee has suffered a decline in projected financial wealth (i.e., the retirement benefit) that is much greater than that of the older worker. To offset these losses, the employees could alter their human wealth by earning more money by working overtime, obtaining raises, etc. The younger worker would need to earn more money to cover the loss, but would likely have a greater ability to do so. More formally, the amount of loss that must be covered (and thus the amount of risk that is shared) is positively correlated with the amount of human wealth for each employee. In this example, the 25-year-old with a $3,000 expected benefit reduction has three times as much human wealth as the 55-year-old worker having a $1,000 reduction. Each employee faces the same dollar reduction in financial wealth per unit of human wealth.[5] This means that the adjustment mechanism of the SERIOUS system shares risk in a manner that considers the ability of the employee to handle that risk. In reality, the system is unlikely to share risk as perfectly as shown here

[5] $\frac{\text{Financial Wealth Reduction}}{\text{Units of Human Wealth}} = \frac{\$3{,}000}{3} = \frac{\$1{,}000}{1}$

since it does not consider characteristics of specific individuals (e.g., an employee in poor health or having an irregular contribution pattern). However, it allows the system to be administered efficiently while ensuring that workers nearing retirement do not experience a large reduction in their expected amount of retirement income. For those employees that have ceased contributions (i.e., retirees), their entire benefit is fully protected from investment, inflation and longevity risk.

5. Employer Roles and Responsibilities

In exchange for eliminating the fiduciary and administrative burdens of employers who wish to provide retirement benefits for their employees, the SERIOUS system assigns employers new responsibilities, but without distracting from their core business or by imposing excessive costs. All employers, without exception, would be required to automatically enroll employees into the SERIOUS system.[6] Employees could opt out and not participate, but by requiring automatic enrollment it would protect those individuals who, because of inertia and other reasons, do not participate in voluntary retirement plans. A variety of studies have shown automatic enrollment in existing DC plans increases participation, in some cases up to 95 percent (Bovbjerg 2009). Although the percentage of employees who opt out is initially small, the percentage appears to increase as time passes (Nessmith et al. 2007). To mitigate this factor, those who do opt out will be automatically enrolled each year and will have to opt out again if desired.

Much like payroll tax deductions submitted by the employer to the government, contributions to the SERIOUS plan sponsors are transmitted by the employer to the central clearinghouse. Upon changing jobs, employees stay enrolled in the system and the same percentage of salary will be deducted by the new employer, unless the employee initiates any changes. The initial default contribution rate will be set at 6 percent, although employees will be free to adjust this percentage at any time. Currently, many DC plans have a 50 percent employer match on the first 6 percent of income so assuming employers will provide a similar match in the SERIOUS system, the choice of 6 percent allows the employees to take full advantage of funds offered by their employers. An additional reason for selecting 6 percent rather than something lower is that research has shown that the rate of employee participation in automatic enrollment is unaffected by the magnitude of a default contribution rate (i.e., higher default contribution rates do not cause greater opt-out rates) (Nessmith et al. 2007). Finally, assuming a lifetime 6 percent employee contribution rate, an employer match of 3 percent and a conservative 3.5 percent interest rate, the SERIOUS system would replace over 40 percent of an employee's final salary starting at age 67.[7] Regardless of whether an employee accepts the default or selects another value, the contribution rate will be automatically increased each year by one percent of salary. Again, employees would be allowed to adjust this increased amount at any time.

Employers would not be required to make contributions to the SERIOUS system on behalf of employees, but would be provided with strong incentives to do so through the use of tax-deductible

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[6] Automatic enrollment by the employer would simply require providing the name (and potentially other identifying information) of each employee to the central clearinghouse. After that, all interaction (e.g., selecting contribution levels, requesting benefits) is between the employee and the central clearinghouse rather than the employer. The self-employed could enroll directly through the central clearinghouse

[7] Based on author's calculations assuming an employee making annual contributions from age 25 through age 66 with 1.5 percent annual real wage growth. An inflation-protected annuity taken at age 67 based on the Annuity 2000 mortality table (50 percent male/50 percent female) would provide payments replacing 41.6 percent of the employee's final income. The Annuity 2000 mortality table is found in Johansen (1996) and is used for calculations throughout the paper. The Social Security replacement rate for a medium-earnings worker is also about 41 percent (Trustees 2009), producing a combined income replacement rate of over 80 percent for the average-income worker.

contributions (identical to current deductions for employer-sponsored retirement plans) and a tiered bonus tax incentive. To qualify for these tax incentives employers would be required to make at least a minimum contribution of 1.5 percent of salary[8] for all employees—even for those who opted not to make any contributions themselves. Instant vesting would be required for the 1.5 percent employer contribution (employee contributions are always fully vested) but employers would be allowed to make additional contributions subject to a maximum five-year vesting period in order to facilitate retention of employees. The tiered bonus tax deduction acts to not only offset the cost of employer contributions, but is also a form of incentive compensation for employers to use their status as an unbiased advisor to educate employees about the SERIOUS system and the benefits of participating.[9] For an employer where at least 95 percent of employees contribute, the additional bonus deduction would be equal to 100 percent of the minimum 1.5 percent contributions. The bonus deduction would gradually decline and go to zero for employers having less than 50 percent participation.[10] By effectively lowering the cost of contributions, it should allow employers to provide a higher overall level of contributions than they might otherwise be able to afford.

The SERIOUS system includes a number of features that assist in providing retirement income to all employees, however, many employees are not able to take advantage of the tax deductions since they do not earn enough to pay any taxes. Because of this, the minimum 1.5 percent employer contribution is of particular benefit for lower income workers. Based on this 1.5 percent employer contribution alone, the average low-income employee would see his retirement income increased by approximately 20 percent over that provided by Social Security, bringing his total income replacement rate to about two-thirds of final salary.[11] Currently, only 43 percent of employees in the bottom wage quartile are even eligible for an employer-sponsored retirement plan, and only half of those participate compared to greater than 80 percent eligibility and participation rates in the highest wage quartile (U.S. Department of Labor 2009). Mandatory automatic enrollment will help improve these numbers, but the minimum 1.5 percent employer contribution for nonparticipating employees is still needed. Even in existing DC plans with automatic enrollment, lower-income employees opt out at much higher levels than higher-income workers, presumably because they require most or all of their income in order to provide basic needs for themselves and their families. For example, a recent study showed that 23 percent of employees earning less than $30,000 annually opted out of automatic enrollment in their 401(k) plans compared to only about 7 percent for workers earning more than $50,000 (Nessmith et al. 2007). While the immediate impact of the minimum 1.5 percent contribution by employers is to assist those least able to afford retirement saving, it should provide additional benefits in the future. Madrian and Shea (2001) use the "endowment" effect from behavioral economics to propose that once individuals become owners of a retirement plan, they value the plan more than if they did not have one. By having an employer contribute a modest amount to a plan owned by the employee, it is anticipated that employees will value the plan more and, as their income grows over time, will be more likely to contribute their own funds as well.

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[8] The minimum 1.5 percent employer contribution is required only on the portion of salary that is less than 45 percent of the national average wage index. For example, if the national average wage is $40,000, then, regardless of an employee's actual salary, the maximum annual required employer contribution under this provision is $270=$40,000 × 45% × 1.5%.

[9] To maintain credibility as unbiased advisors, employers would be prohibited from accepting compensation from plan sponsors or directing employees to use one plan sponsor over another.

[10] There would also need to be certain specific definitions on what constitutes employee "participation." The point is to encourage employees to contribute at least at a minimum level throughout the year. For example, a contribution of 1 percent of salary for one pay period would not qualify as "participation" when determining the employer tax bonus.

[11] Based on annual contributions of 1.5 percent of a constant salary (no real wage growth assumed) for a 25-year-old working until age 67 using the Annuity 2000 mortality table and a 3.5 percent rate of interest. The SERIOUS system benefit based on these calculations provides an income replacement rate of 11.0 percent of final salary. The Social Security replacement rate for a low-earnings worker is 55.4 percent (Trustees 2009).

6. Employee Roles and Responsibilities

In most current and proposed contribution-based systems, employees have to simultaneously choose a percentage of salary to contribute and select specific investment funds or asset classes in which to invest. To properly make these decisions, the employee should consider and make estimates of potential future investment returns, interest rates and inflation, among other variables. However, given the fact participants spend very little time making these decisions, it can be assumed that most employees consider very few of these factors.[12] These decisions can be avoided in some plans by relying on defaults, but this is no guarantee that the default (usually risky) investment fund is appropriate for the risk tolerance of the individual employee. In the SERIOUS system, investment decisions are made by the plan sponsors so employees need to only select a plan sponsor and a contribution percentage. These two decisions, which can be changed at any time, are simplified by using an online interface that will allow employees to understand how the system works, what choices need to and can be made, and the impact of those choices. The interface will allow these choices to be made in an educated and timely manner without having to consider a large range of additional factors or make independent complex calculations.

This online interface, maintained by the central clearinghouse, will be similar to Figure 1. The interface shows the amount of projected retirement income at various retirement ages and contribution levels, and is based on the unique characteristics of each employee (e.g., age, current salary).[13] While Figure 1 only shows the projected retirement income for one particular plan sponsor, the actual interface would include this identical information from each of the competing plan sponsors to assist employees in selecting an initial (or changing to a new) plan sponsor.

Employee Contribution Rate							
Retirement Age	1.5%	3.0%	**5.0%**	7.5%	10.0%	12.5%	15.0%
61	3,171	6,341	**10,569**	15,854	21,138	26,423	31,707
63	3,660	7,320	**12,200**	18,299	24,399	30,499	36,599
65	4,260	8,520	**14,200**	21,300	28,400	35,499	42,599
67	4,749	9,498	**15,829**	23,744	31,659	39,573	47,488
69	5,423	10,846	**18,076**	27,114	36,152	45,190	54,228
71	6,437	12,873	**21,455**	32,183	42,910	53,638	64,366
73	7,319	14,638	**24,397**	36,595	48,794	60,992	73,191
75	8,208	16,415	**27,358**	41,038	54,717	68,396	82,075
77	9,498	18,995	**31,658**	47,488	63,317	79,146	94,975
79	11,360	22,721	**37,868**	56,802	75,736	94,670	113,604
81	13,217	26,434	**44,057**	66,086	88,115	110,143	132,172

[12] A study by Benartzi and Thaler (1999) showed that 58 percent of plan participants in one DC plan spent less than one hour making contribution rate and investment decisions.

[13] Before actual implementation, various focus groups and further analysis should be done to present the data in the best possible way in order to avoid any unintended framing. For example, if showing age 61 as the first age on the interface would encourage more people to retire at that age, then changes to the interface should be made. The intent is for the system to be retirement age neutral.

If the employee represented in Figure 1 was a new enrollee to the system, an inflation-protected life annuity of $15,829 would be earned if retirement occurred at age 67 and 5 percent of a constant salary was contributed each year, using this particular plan sponsor.[14] Although employee contribution rates are shown across the top of the interface, the actual retirement income amounts shown would also automatically reflect any employer matching contributions that might be applicable. For employees who have already been contributing to the system, their current contribution rate is highlighted (5 percent in Figure 1), although as discussed in Section 4, the total projected retirement income is based upon both prior contributions (benefits are defined and cannot change) and future contributions (benefits are subject to change). For example, if Figure 1 instead represented an employee who had made prior contributions, the $15,829 benefit in the 5 percent column might represent a $3,000 guaranteed benefit based on prior contributions plus a $12,829 projected benefit for future contributions that would be subject to adjustment. Likewise, the $9,498 benefit shown in the 3 percent column would comprise the same $3,000 guaranteed benefit, but only a $6,498 projected benefit for future contributions.

Employees use the online interface to initially choose a plan sponsor and contribution level, but they also use it to monitor their retirement benefit throughout a career and make desired changes to these initial choices. If there is a change in plan sponsor guarantees or other variables, (e.g., salary, employer match), the interface will be updated instantly. The system is neutral with respect to the appropriate time for employees to retire, and, therefore, there is no "normal" retirement age. The interface supports this goal by allowing employees to see the trade-offs in dollar terms of various retirement ages and lets them make unbiased decisions about what works best for their particular circumstances. If an employee should change plan sponsors, the interface automatically combines the benefits earned using any prior sponsors with the benefits earned using the current sponsor. Employees would not have to be concerned with rollovers to another account or keeping track of multiple accounts. Implicit in the determination of the benefit amounts would be various expense assumptions since plan sponsors would not be allowed to charge any fees directly to employees or employers. Due to the transparent nature of the interface and standardized product design, employees need only compare the income amounts for each plan sponsor, since these amounts have already incorporated the impact of expenses.

In current contribution-based plans, the focus tends to be on the size of the current account balance, asset allocation and potential future investment returns, rather than the amount of savings needed to achieve a target retirement income. A system with highly variable investment returns and uncertain future annuity purchase rates allows an employee to assume a higher rate of return, making his future benefit look larger and often provides an excuse for not saving enough for a secure retirement. Venti and Wise (2000) have contributed a valuable study concluding that the most important factor in determining the amount of retirement wealth accumulation is the amount chosen to save (rather than spend) during the working years.[15] They found that investment choices that individuals make do have some effect on wealth accumulation, but the impact of these choices is relatively minor. The design of the SERIOUS system is consistent with and attempts to take advantage of these findings. The clearinghouse interface does not show the total accumulated contributions or guaranteed interest rates

[14] This calculation assumes a 3.5 percent interest rate, the Annuity 2000 mortality table and a single life installment refund annuity for a new employee earning $50,000 annually. Employer contributions in the form of a life only (i.e., no installment refund feature) would be added to these amounts if the employer also contributed. Additional options, such as showing a joint and survivor annuity, could also be shown on this interface.

[15] The study controls for income levels and in fact shows that the variability among savings levels is not restricted to certain income brackets. Venti and Wise found that there are significant numbers of high-income households that save little and many low-income households that save significant sums.

so that the employee's choice of contribution level is framed as the most important factor in determining a desired income at retirement.[16] By eliminating both the need to consider a range of complex factors and the possibility of assuming unrealistic investment returns, it reduces the opportunity for excuses and poor decision making and the employee responsibility for saving appropriately can be realistically fulfilled.

While the clearinghouse interface is a valuable tool that can be understood even by those without financial sophistication, it is a certainty that due to inertia or lack of interest in financial matters, some employees will rarely (or never) use the interface to monitor their retirement benefit or change their contribution level. While this could be problematic in plans that use low default contribution rates and risky default funds, the SERIOUS system offers protection to these inattentive employees. Since the contribution rate increases automatically each year and certain minimum guarantees are provided, these employees who remain in the system and simply "do nothing" will have an attractive benefit upon retirement.

7. Benefits

As discussed in prior sections, the SERIOUS system benefits are always expressed in terms of an annuity. More specifically, benefits are in the form of an inflation-protected life annuity with joint and survivor options available. By using life annuities as the primary form of benefit payment, it protects employees from the well-known risk of outliving their money, but actually has an additional less commonly discussed benefit. It provides a more optimal and balanced way of spending retirement savings. While it is certainly common for retirees to spend their retirement savings too soon, Copeland (2005) has observed that many retirees, in the absence of annuities, might actually be conserving too much of their savings by trying to manage longevity risk themselves.

It has been well documented that individuals with below-average health avoid annuitization, causing existing life annuities to be more costly than they would be in the absence of this anti-selection. However, prices are lower for compulsory annuities, which necessarily have a lower level of anti-selection, than those annuities sold on a voluntary basis (Poterba 2001). In addition to the high cost of annuities in the voluntary marketplace, objections about loss of control of principal for large cash needs and bequest motives have caused the voluntary rate of annuitization from existing retirement funds to be very low. In the SERIOUS system, annuitization is mandatory, which will expand the pool of risks and bring down the cost, relative to the current price of voluntary annuities.

Commencing annuity payments would typically be limited to a minimum attained age, such as age 60.[17] Each annuity payment is the sum of (1) an amount based on employer contributions and (2) an amount based on employee contributions. The amount per dollar of employer contribution is greater than the amount per dollar of employee contribution due to the way in which these two quantities are calculated. The amount based on employer contributions is simply a life-only (or joint life) annuity that

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[16] The guaranteed interest rates and the total amount of contributions accumulated would be available; these would just not be part of the clearinghouse interface.

[17] The choice of age 60 may need to be adjusted in the future as circumstances change, but is currently based on two primary factors. Currently, many individuals who leave the workforce near age 60 need substantial amounts of money to pay for health care costs until they are eligible for Medicare at age 65. This fact may change depending upon the outcome of national health insurance reform. Also, an individual does not begin to see a significant gain from annuitization prior to age 60 due to the fact that mortality credits from assumed deaths prior to age 60 are limited. Theoretically, the SERIOUS system could support annuitization at any age since the plan sponsor is required to specify a table of guaranteed mortality rates for all ages, but the choice of a minimum age is more of a consumer protection feature for employees.

ceases all payments upon death. If an employee dies before annuitization, no refund of employer contributions is provided. The amount based on employee contributions is a life annuity with an installment refund feature that upon death would, if applicable, continue payments to a beneficiary until total payments were equal to the employee contributions accumulated at the guaranteed interest rates up to the time of annuitization. If death occurs prior to annuitization, employee contributions accumulated at the guaranteed interest rates up to the time of death are paid to the beneficiary. By allowing employee contributions to be refundable, it removes the argument that these funds will be "lost" if death occurs prematurely. Those employees with strong bequest motives and sufficient other assets can simply never annuitize (or only partially annuitize) and their accumulated contributions would be payable to the beneficiary upon death.[18]

Partial annuitization would be allowed in order to facilitate a phased or nontraditional retirement arrangement or simply provide flexibility on when to take annuitized income. An employee could annuitize at various points in time (at their discretion), even while making further contributions to the plan. A common situation might be an employee who at age 65 wanted to (or needed to for health reasons) continue working only on a part-time basis. Having earned a $1,500 monthly benefit, the employee could choose to receive 50 percent (or another percentage) of his earned benefit by taking a $750 annuity. The other 50 percent of his benefit would continue to increase based on the guaranteed interest and mortality factors and could be augmented with additional contributions and annuitized at a later date.[19] Partial annuitization would also allow employees to take advantage of the fact that annuities provide more generous income at older ages. An employee who stops working entirely could take a portion of his benefit upon retirement and defer the remainder until some of his other sources of income were exhausted. For example, if an employee retired at age 67 and deferred a portion of his retirement benefit until age 80, that portion would be more than three times greater than if it had been taken at age 67, even without any additional contributions.[20]

There would be limited exceptions to receiving payments prior to age 60. If an employee became permanently disabled, annuity payments could be requested based on his current age and accumulated contributions. Supplemental annuity payments could also be requested if an employee or employee's spouse needed long-term care. Since the cost of long-term care might exceed the annuity payment an employee would be normally be entitled to, the normal annuity payment can be increased up to the amount needed to cover the cost of long-term care. The total additional amount payable under this provision is limited to the accumulated amount of employee contributions at the point of annuitization less any prior annuity payments received. For example, assume an employee whose contributions have accumulated to $100,000 producing a $1,000 monthly benefit at age 65. At age 70, the retiree needs long-term care costing $2,000 per month, leaving a $1,000 monthly shortfall that could be taken as an addition to the normal payment. Since the retiree has already received $60,000 (5 years × 12 months × $1,000/mo) in annuity payments, there would be $40,000 ($100,000 accumulated contributions – $60,000 prior benefits) available to cover the additional long-term care cost for 20 ($40,000/$2,000/mo) months. If still living at the end of 20 months, the retiree would continue to receive the original $1,000 monthly. This approach would not be an option for those who had already received more annuity payments than their accumulated contributions, but it does allow some individuals needing long-term care to access funds on an accelerated basis that would have been paid out in any event.

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[18] This would be a taxable event.

[19] There would be not be limits on the number of times an employee could annuitize, but restrictions requiring that payments meet a minimum threshold would be appropriate.

[20] This example is illustrated in Table 3 in Section 11.

Access to the commuted value of future annuity payments would also be allowed in the event of certain extremely rare situations, such as an organ transplant not covered by existing health insurance. Loans, common in DC plans for such events as purchasing a home or providing for educational expenses, would not be permitted.

Lump sums after age 60 would be allowed up to a maximum of 25 percent of the accumulated balance.[21] However, there is an explicit cost since providing an option to take a lump sum (even on a limited basis) has the potential to reduce the amount of benefits available to other employees. When an annuity benefit is calculated it assumes a certain life expectancy based on the guaranteed mortality rates. However, it would be expected that a significant portion of the individuals requesting a lump sum would have a lower-than-average life expectancy since taking a lump sum would be a valuable option for them. Rather than compensating for this anticipated anti-selection by having plan sponsors lower prospective guaranteed mortality rates for everyone, plan sponsors would be allowed to apply an actuarially justified reduction factor to the lump sum. For example, an employee who requests a lump sum of $100,000 would be provided a statement prior to processing the request showing that a 3 percent reduction factor will be applied and the available lump sum is $97,000.[22] By allowing a limited amount of lump sums with an explicit cost, the system provides flexibility while also signaling to the employee that the primary goal should be to take retirement income in the form of an annuity that cannot be outlived.

8. Regulation and Governance

New legislation will be required to establish the SERIOUS system since many of its necessary provisions would not be feasible under existing laws. There are already a number of existing insurance companies that could provide some of the functionality of the SERIOUS plan sponsors, but the current industry infrastructure is not efficiently designed to deliver the maximum level of retirement income. Each company currently has its own administrative operations, has to contend with regulation from multiple state jurisdictions, and spends vast resources on sales and marketing costs. Most importantly, then, the new SERIOUS legislation will allow third-party plan sponsors to operate as part of a system with centralized administration (i.e., central clearinghouse) and a single nationwide governing board. The new legislation will also need to codify the requirements of plan sponsors and employers and make necessary adjustments to tax laws.

The governing board created by the SERIOUS legislation will provide oversight of the system and its member plans. Board members will be appointed by the president, but the board and the SERIOUS system itself will not be a part of or affiliated with the federal government. Funding for the board and its central clearinghouse will be provided by the plan sponsors participating in the system, although plan sponsors will not have a role in determining board policy.[23] The most important function of the board is to ensure solvency, and it will employ a multifaceted approach so that employees will be confident that benefits will be paid according to sponsor guarantees.

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[21] This 25 percent would be determined at the point where the first distribution is taken. For example, if the accumulated balance is $100,000 when the lump sum is first requested, a total of $25,000 in lump sums could be taken over the future lifetime of the employee even though the accumulated balance could potentially grow again over $100,000 if the lump sum was small and annuitization was deferred much later in life.

[22] This factor could be tiered. For example, a plan sponsor could choose to make half of the lump-sum amount not subject to the anti-selection factor, but apply a 5 percent factor to the other half.

[23] There will be a need for some additional start-up funding provided by the government, but after the system is fully operational no government funds will be used.

The first solvency measure will require that the SERIOUS plans be fully funded by holding appropriate reserves. Since the SERIOUS system provides for a series of single premiums payable in return for a series of benefit payments in the future, the reserve is simply the present value of future benefit payments. Each future benefit would be discounted by a rate of interest found on a market yield curve reflecting nearly default-free interest rates (i.e., there would be recognition of credit risk).[24] The yield curve used would be the same for all plan sponsors. The mortality table used in the present value calculation is based on each plan sponsor's current expectation of future mortality experience.[25]

While the basic reserves should be adequate to provide for benefits during periods of stability, an additional level of protection is needed to protect employees and beneficiaries from more severe conditions. The plan sponsors would be required to put in place a system of risk measurement and establish a level of capital consistent with the specific risks taken. Similar to current requirements for variable annuities that provide for a principle-based capital calculation, the level of capital required should consider how the sponsor uses hedging or other techniques to manage its asset/liability risks under a wide range of scenarios, including tail scenarios. The board would determine basic guidelines for the establishment of capital and take an active role in auditing[26] the risk measurement systems, but individual plan sponsors would use assumptions and experience specific to their plan. If a plan sponsor did not have a sufficient level of capital, the board would be authorized to take corrective actions, similar to state insurance regulators when companies have impaired levels of risk-based capital. The general concept behind this capital calculation can be illustrated using a simplified example that ignores expenses. Assume a plan sponsor invests a contribution guaranteed at 4 percent in a 5 percent risk-free fixed rate bond. If the inflation rate goes above 5 percent, the return on the asset would be insufficient to provide for the inflation guarantee. If this risk was simply assumed by the company, additional capital requirements over the basic reserve would be required. Alternatively, if the company could buy a derivative instrument that would pay off if the inflation rate exceeded 5 percent, any additional capital requirements could be reduced or potentially eliminated. The goal is to provide plan sponsors with an incentive to manage risk appropriately so that obligations can be met even under extreme conditions, while at the same time not requiring excessive amounts of capital.

The board would also create a system-wide insurance fund that would reimburse affected employees up to certain limits in the unlikely event that a plan sponsor is unable to meet its obligations. Payments (or premiums) to this fund would be based on two factors. The first factor is fixed and is the same for all plan sponsors. The second factor is based on the relative risk assumed by each plan sponsor as determined by the analysis done to calculate the additional capital requirements. The product of these two factors is applied to plan sponsor assets and results in an insurance fund payment (premium) that is based on risk-adjusted asset size. Thus, if two similarly sized sponsors have widely different risk profiles, the plan sponsor assuming more risk will pay more into the fund. Anytime an insurance fund such as this is established, the risk of moral hazard is created since some plan sponsors could take excessive risk knowing there is an insurance fund that will provide for employees. However, with effective and timely oversight by the SERIOUS board and by making both the capital requirements and payments into the

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[24] The specific rate on the yield curve used would be for a maturity that would match the expected time until payment of the benefit. For example, a benefit cash flow expected in 20 years would be discounted at the 20-year interest rate found on the yield curve.

[25] The board will need to ensure that the table used in the reserve calculation is appropriate for the specific liabilities of the plan sponsor. It would be anticipated that the mortality table used for the reserve would be the same or similar to the mortality table that is being guaranteed on current contributions.

[26] Since some state insurance regulators might have objections to having a single nationwide regulator of what are essentially special-purpose insurance companies, the SERIOUS board should consider using the expertise of state insurance department personnel in auditing plan sponsors.

insurance fund directly related to the level of plan sponsor risk, the opportunity for moral hazard is greatly reduced.

9. Use of Markets

As discussed in Section 4, plan sponsors can use the adjustment mechanism to share certain risks with employees. As such, plan sponsors are reliant upon the use of external markets[27] to set and manage their guarantees to determine how much risk is shared with employees and what level of retirement benefits will be provided. For example, if the guarantees are unable to be managed effectively using the markets, there is more uncertainty (risk) associated with offering guarantees, and this will be reflected in the (lower) level of benefits provided by plan sponsors. This section discusses how the SERIOUS system is designed to provide attractive benefits by effectively using existing markets to minimize risk to both plan sponsors and employees.

Since plan sponsors are operating in a competitive environment with a standardized benefit structure, sponsors will want to offer an attractive level of benefits. However, taking excessive risk in an attempt to offer an aggressive level of benefits is very costly, in terms of additional capital or hedging costs. Efficient markets provide a way to measure the natural trade-off between the costs and benefits of risk. For example, a risk-free inflation-indexed security such as U.S. Treasury Inflation-Protected Securities (TIPS) could be used to match plan sponsor liabilities, but by investing solely in TIPS the yield would unlikely be high enough to attract contributions. Rather, plan sponsors could invest primarily in a high-quality diversified portfolio of corporate bonds, with a small portion of the portfolio potentially reserved for securities with a higher risk-return profile. To hedge the inflation guarantee, the plan sponsor could use a derivative product, such as an inflation cap, that would pay if inflation exceeded a certain level.[28] Assuming the additional costs (e.g., capital, hedging) of this portfolio are covered by the additional yield, the plan sponsor's effective use of the markets has minimized the risks involved and allows for a higher guarantee to be provided relative to the TIPS-only portfolio.

In discussing the use of markets, it is not the intent to restrict the creative strategies of plan sponsors or require the use of specific market investments, such as corporate bonds and inflation caps in the prior example. However, it is anticipated that plan sponsors will primarily use fixed-income investments rather than equity since, unlike traditional DB plans, the SERIOUS sponsors cannot rely on a cash infusion from an employer or government to compensate for large investment losses. Life insurance companies, which also have long-term liabilities containing guarantees, have consistently favored fixed income, with over 70 percent of industry assets in bonds in 2007 (ACLI 2008). The SERIOUS system interest guarantee structure is designed to allow plan sponsors to optimize the use of fixed-income markets and accommodate a variety of strategies. As discussed in Section 4, a plan sponsor specifies a table of guaranteed interest rates that is applied to each contribution. Once a contribution is made, the table of guaranteed interest rates attached to it cannot be changed. However, for future contributions, the table can be adjusted at the discretion of the plan sponsor at any time. This allows the plan sponsor

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[27] The use of "external markets" means markets outside the retirement system itself, such as stock, bond, derivative or insurance markets. For example, as discussed in Section 4, nonsystematic longevity risk is eliminated by pooling the experience of participants within the plan; thus this would be use of an "internal" market.

[28] Note that the structure of the inflation guarantee prior to annuitization reduces the hedging cost. If a plan sponsor had to guarantee a fixed return plus inflation (rather than the greater of a fixed return or inflation), it would cause the guaranteed interest rate to be reduced because of the hedging cost involved. Inflation caps are actively traded at a variety of strike prices and maturities up to 30 years (Armann 2008). Armann (2008) and Barclays Capital (2005) demonstrate a variety of ways that inflation derivatives can be used to manage inflation risk.

to price the guaranteed benefits based on current and expected market interest rates and the available supply and cost of investments and hedging instruments. In this way, plan sponsors are able to reflect the current market environment in the level of benefits provided rather than be forced to take unnecessary risk in order to meet fixed benefit targets that may be unrealistic, especially under more severe market conditions. For example, assume a plan sponsor is limited by current market supply to investing contributions for a 30-year-old cohort in 30-year corporate bonds with a 7 percent market yield. When this cohort begins to annuitize in 30 years, there is risk that the matured proceeds cannot be reinvested at 7 percent.[29] However, even if the matured proceeds could be reinvested at 7 percent, the plan sponsor may want to use a different investment or hedging strategy (e.g., invest in TIPS) during the annuitization phase since annuity payments are fully inflation-protected. In recognition of reinvestment risk and to facilitate the use of different investment or hedging strategies, the table of guaranteed interest rates attached to these contributions (ignoring pre-annuitization hedging costs, expenses and profit) might contain a 7 percent rate for the first 30 years and 5 percent thereafter. If the plan sponsor was investing for a 40-year-old cohort instead of the 30-year-old cohort, 20-year bonds (having a lower yield) might be more appropriate for the accumulation phase. As such, the table of guaranteed interest rates can be based on the age of employees at the time contributions are made. In this example, the plan sponsor could accurately reflect the reality that fixed-income yields vary with time to maturity by providing a table of guaranteed interest rates to the 40-year-old cohort that is different (e.g., 6 percent for the first 20 years and 5 percent thereafter) than that applied to the 30-year-old cohort.

Although the prior examples focus on a plan sponsor with assets maturing at the end of the accumulation phase and being reinvested for the annuitization phase, one of the major structural advantages of the SERIOUS system is that it does not require large quantities of assets to mature (or be sold) when the accumulation phase ends and an entirely new set of assets to be purchased when the annuitization phase begins. In theory, if a plan sponsor could obtain bonds with sufficient maturity to cover both phases, the sponsor would simply need to alter its inflation hedging strategy at the point of annuitization. Assuming a working lifetime from age 30 to 60 and a potential retirement lifetime of age 60 to 90, investing for both the accumulation and annuitization phases using a single long-term bond would allow sponsors to invest in 30- to 60-year maturities compared to a maximum maturity of only 30 years if two different entities were handling each phase. By investing for as long as the market will allow, plan sponsors can provide employees with the best possible guarantee by minimizing reinvestment risk and taking advantage of the normal upward sloping yield curve (i.e., longer maturities have higher yields).

Another feature that benefits both employees and plan sponsors while promoting efficient use of the markets is the requirement that once contributions are made, they cannot be withdrawn (other than through one of the benefit options) or transferred to another plan sponsor. If plan sponsors were faced with the prospect of ongoing unpredictable short-term liquidity needs, they would either have to hold a cash reserve at a below-market yield or sell long-term assets at a potential loss (to meet withdrawals). Either way, the guarantees provided would be reduced to reflect the cost of this employee withdrawal option. Not allowing withdrawals and transfers also provides stability to the system. If one particular plan sponsor was facing financial difficulty and was forced to lower its future guarantees, many employees would likely consider changing to another plan sponsor. If employees were also allowed to transfer their prior balance to a new sponsor, it could contribute to the further deterioration of the prior sponsor's financial condition and potentially lead to a run-on-the-bank situation.

[29] Pelsser (2003) has proposed an interesting and potentially effective strategy using swaptions to hedge the risk that interest rates are lower at the time of annuitization.

It is also possible to use both the derivatives and insurance markets to hedge systematic longevity risk. While mortality has improved dramatically over time, most of these changes occur relatively slowly and can be accommodated internally by having plan sponsors lower guarantees on future contributions as discussed in Section 4. If mortality is monitored closely, the impact of these gradual adjustments on employees will be minimized. However, in an instance where a dramatic medical breakthrough causes a sudden unexpected significant decline in future mortality, markets provide an alternative solution. Reinsurance companies have extensive experience with mortality that may offer some solutions to plan sponsors. Also, longevity swaps have recently been implemented in the United Kingdom and represent a potentially useful market solution to manage systematic longevity risk (Slaughter and May 2008, Towers Perrin 2009). The concept of longevity (or survivor) bonds has also been discussed as a way to hedge this risk (Blake, Cairns and Dowd 2006).

Although the SERIOUS system does not require any new types of securities that do not already exist, movement toward more developed markets will allow plan sponsors to better manage risk and provide more attractive guarantees. Since the structure of the SERIOUS system is well-defined with standardized benefits, demand for certain market instruments (e.g., inflation hedges) will be strong, allowing markets to develop and meet these demands. Xiao and Xiao (2009) have shown that the current amount of DB assets significantly exceeds the available supply of corporate and government bonds, especially those with longer maturities. Thus, as the SERIOUS system grows there will be a need for an expanded supply of long-term fixed-income securities. The system should also increase the demand for inflation-linked securities, but the U.S. market is almost exclusively comprised of TIPS. A more diversified inflation-linked security market including higher-yield non-governmental issues, especially at longer maturities, could potentially provide a more cost-effective alternative than inflation derivatives. Society, through its government, can play a helpful role in this area. For example, Goldenberg (2007) reported that the U.K. Debt Management Office issued a 50-year inflation-indexed note that had the effect of dramatically increasing the supply of corporate inflation-linked securities.

10. Implementation and Transition

Now that the structure of the SERIOUS system has been defined, issues regarding implementation of, and transition to, the new system are examined. While the ability of a proposed retirement system to provide an adequate level of retirement income is extremely important, the likelihood that the system can be implemented successfully must also be considered. The SERIOUS system has a number of advantages that will be useful in achieving passage of legislation authorizing its creation. First and most important is that all the primary stakeholders are better off under the SERIOUS system than under current Tier II retirement systems. Employers would no longer face the burden of establishing and maintaining retirement plans and would be provided enhanced tax incentives to contribute on behalf of their employees. Employees are given the opportunity to earn an attractive retirement benefit that is protected from a variety of risks, especially near the end of a career. Society assumes no new liabilities and is not burdened by the prospect of higher future social insurance or welfare costs that otherwise might be demanded by financially unprepared retirees. Markets are used effectively and the probability for the development of more complete markets is enhanced. While certain parties that benefit financially or otherwise from the current system may raise objections, the focus must remain on the true stakeholders and how each benefits from the proposed system.

Any consideration of legislation impacting the Tier II retirement income structure will naturally bring up discussion of the Tier I Social Security system. Due to demographic and other reasons, Social Security will require adjustments in the future such as benefit reductions, tax increases or retirement age increases. These are complex and politically difficult decisions that will have to be made. While it would be possible to address the problems with Tier I and Tier II simultaneously, it would be practically much more difficult to reach an agreement and pass such a far-reaching piece of legislation. However, while the SERIOUS system operates independently of Social Security (and does not propose or require any changes to Social Security), it offers lawmakers a potential future solution to the challenges facing the Social Security system. Once the SERIOUS system is implemented and has had a chance to operate through various economic cycles, the system can be evaluated. If the system is meeting the needs of its stakeholders and providing attractive benefits, it would create an opportunity for future Social Security reform. One plausible proposal would decrease future Social Security benefits in exchange for increased government subsidies that would promote additional contributions to the SERIOUS system. This would provide an increased SERIOUS benefit to compensate for a lower Social Security benefit with the goal of having the total amount retirement income (Tier I + Tier II) largely unchanged. Although this is simply an example and not a formal proposal, it does demonstrate a potential solution to relieve the financial pressures on Social Security while maintaining (or improving) the overall benefits of future retirees by allocating limited government resources to a more effective system.

One final consideration in examining the likelihood that the SERIOUS legislation can be passed is its impact on government revenues. As with current retirement systems, the SERIOUS system relies on tax incentives for employee and employer contributions. While it is unlikely that lawmakers would want to reduce these incentives for privately provided retirement income, especially among lower-income employees, it is possible the limit on tax-deductible contributions could be reduced. The relative high limit on tax-deductible contributions to DC plans, according to a number of studies, does not promote additional retirement savings among most employees and has primarily been a benefit to high-income employees.[30] The SERIOUS system recognizes this and will institute a lower annual contribution limit relative to current DC plans. The tax revenue gained by having a lower contribution limit will offset the cost of the additional bonus tax credit offered to employers discussed in Section 5.[31] Although greater participation will certainly result in a larger total tax subsidy than currently exists, the intent of the SERIOUS system is to be revenue-neutral on a per participant basis. Existing DB plans could continue to coexist along with the new system. Individual retirement accounts (IRAs) and DC plans could also be maintained as tax-deferred vehicles, up to certain limits, but future contributions would no longer be eligible for tax deductions.

Once the enabling legislation is passed, transition to the new system can begin. The SERIOUS board will need to be appointed and define certain detailed requirements not addressed by the implementing legislation, such as setting a minimum level of initial capital to qualify as a SERIOUS plan sponsor. Given the fact that there are many existing companies with experience in managing risk and investments, the creation of plan sponsor companies could occur rapidly. Since the system relies on the

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[30] Holden and VanDerhei (2001), Burman et al. (2004) and Bovbjerg (2001) show that high-income employees comprise a significant portion of those who are able to contribute to existing DC plans near or at the contribution limits.

[31] Based on the data from the Urban-Brookings Tax Policy Center Microsimulation Model as shown in Burman et al. (2004). Author's calculation assumes that the current average employee and employer contributions to DC plans for individuals with incomes greater than $200,000 were reduced by $5,000, producing a reduction in total tax deductions of about $25 billion. Assuming the SERIOUS system had about 95 million participants whose employers received the full bonus tax deduction as described in Section 5, the total tax deduction increase would also be about $25 billion. The exact alterations to the tax code will be made by Congress, but this demonstrates it would be possible to compensate for the proposed new bonus tax deduction by reducing existing contribution limits.

existing widespread practice of payroll deductions and employer matching, and the impact of these contributions can easily be seen on the clearinghouse interface, educating and transitioning employees to the new system should not be difficult. SERIOUS plan sponsors could choose to allow employees to roll over contributions from prior DC plans into the new system. Finally, although this discussion has focused on the U.S. perspective, the SERIOUS system also has the potential to be successfully implemented in other countries.

11. Results and Analysis

While the SERIOUS system contains a number of features that promote retirement savings among a greater portion of the population, there could be concerns about the ability of the system to provide adequate retirement income, especially in the presence of guarantees. However, using conservative assumptions, it can be shown that the SERIOUS system is capable of providing an attractive level of benefits. Table 2 provides the income replacement rates for three different combinations of employee/employer contributions for a 25-year-old with 1.5 percent real wage growth from age 25 until retirement.[32] Mortality is based on individual annuitant mortality (Annuity 2000 table) which would generally be much lower than the broader population expected to participate in a nationwide system with mandatory annuitization. If mortality improves significantly in the future, the system will provide lower replacement rates through the adjustment mechanism. While increases in life expectancy do not necessarily provide all employees the ability to increase their working lifetime to offset lower income replacement rates, it does provide an incentive for many employees to work longer. Since the actual guaranteed interest rates necessarily vary, the 3.5 percent and 5.5 percent interest assumptions used in Table 2 represent a weighted average of the guaranteed interest rates earned over a career. The Appendix demonstrates that it can be reasonably expected that the average guaranteed interest rate will be between 3.5 percent and 5.5 percent. Using the 5.5 percent interest rate assumption, an employee who contributed 3 percent of his salary that was matched by his employer from age 25 until retirement at age 65 would have an income replacement rate of 49.4 percent. If the employee's final salary was $50,000, his annuity would pay $24,700 ($50,000 x 49.4%) starting at age 65 and be adjusted for inflation each subsequent year. While Table 2 provides a good picture of the range of benefits provided by the SERIOUS system, it is also useful to combine these values with projected Social Security income replacement rates. Currently, the average contribution to DC plans is approximately 7 percent by employees and 3 percent by employers (EBRI 2009, PSCA 2009). If these contribution rates are continued under the SERIOUS structure, the system would replace 46 percent of income at age 67, assuming a 3.5 percent interest rate. While Social Security replacement rates vary by income level, the average wage earner would replace about 41 percent of income at age 67 (Trustees 2009). By combining the SERIOUS benefit with Social Security, the average income worker would have a retirement income replacing about 87 percent of his salary. Combined income replacement rates including Social Security could easily exceed 100 percent using more optimistic interest assumptions. While the Appendix discusses the likelihood that the average guaranteed interest rate will be between 3.5 percent and 5.5 percent, it is also useful to examine the income replacement rate based on one additional scenario—0 percent interest for all years. Assuming a 7 percent employee and 3 percent employer contribution rate, a 0 percent guaranteed interest rate would still replace a respectable 25 percent of income at age 67. Although a 0 percent scenario is extremely unlikely, it demonstrates the ability of the SERIOUS system to provide an adequate level of retirement income even under extreme scenarios.

[32] One and one-half percent real wage growth is the historical average from the U.S. Census Bureau (2009).

Table 2
Percent of Final Income Replaced by the SERIOUS System

	Interest Rate Guarantee = 3.5%			Interest Rate Guarantee = 5.5%		
	Employee/Employer Contribution			Employee/Employer Contribution		
Retirement Age	1.5%/1.5%	3.0%/3.0%	7.0%/3.0%	1.5%/1.5%	3.0%/3.0%	7.0%/3.0%
65	12.7	25.4	41.4	24.7	49.4	81.4
67	14.2	28.5	46.0	28.2	56.3	91.7
70	17.5	35.1	56.4	35.3	70.6	113.8
75	24.9	49.7	77.6	53.2	106.4	167.8

The previous analysis focused primarily on the impact of the guaranteed interest rate on the benefit amount, but there are two additional features of the SERIOUS system that help provide an attractive benefit level. In other current (e.g., DC) and proposed systems, contributions are accumulated in some manner and then an annuity is purchased on the open market. Not only are there potential transaction costs incurred in a system where the parties doing the accumulating and annuitizing are different, but there is a risk that current long-term interest rates are low at the time the annuity is priced, producing an unexpected and unsatisfactory level of retirement income. The retiree could choose to wait until interest rates increase, but in that case is faced with the prospect of investing the funds at a low rate for an indefinite period of time. Conversely, for employees in the SERIOUS system who contribute over their entire career, the annuitization rate used is essentially a weighted average of guaranteed interest rates attached to their previous contributions rather than a current (and potentially low) market rate. To provide a numerical example, two employees, one using SERIOUS and one using DC, earn a constant 5 percent interest rate throughout their careers. Suddenly, when they retire, market interest rates drop to 4 percent, which has no impact on the SERIOUS annuity, but leaves the DC participant with a choice between purchasing an annuity that provides about 8 percent less income than expected or waiting until interest rates rise and managing his funds appropriately until that time.[33]

In addition to potential interest rate differences, by purchasing what amounts to a series of deferred annuities throughout a career, SERIOUS participants have an advantage relative to purchasers of lump-sum annuities. With a typical life-contingent annuity, no further payments are made after death, allowing the annuity benefit to be larger than if a refund was payable for annuitants who died before recovering their original investment. These "mortality credits" occur both for the SERIOUS system (on employer contributions only) and annuities purchased with a lump sum in the open market. However, since SERIOUS annuities are purchased over time, far in advance of receiving payments, they benefit much more than lump-sum annuities from these mortality credits. Table 3 provides some numerical examples (using employer contributions only) illustrating this advantage. The employee shown in Table 3 had employer contributions throughout a career that have accumulated to $100,000 upon retirement at age 67. If the employee were in the SERIOUS system, the annuity benefit at age 67 would be 9 percent larger than an employee faced with purchasing an annuity in the open market. Essentially, employer contributions made for employees not surviving to age 67 are redistributed to surviving plan participants in the form of higher annuity payments. Since a lump-sum purchaser does not commit funds much in advance of receiving benefits, he is unable to earn these mortality credits prior to

[33] Eight percent is the reduction in an annuity calculated at 4 percent vs. 5 percent at age 67 using the Annuity 2000 mortality table.

annuitization. While the still-significant difference is only 9 percent at age 67, since prior mortality is relatively modest, the difference accelerates at more advanced ages. The SERIOUS benefit is 42 percent more than an annuity purchased with a lump sum if annuitization is delayed until age 80. Another way to interpret this number is that the lump-sum purchaser would have had to come up with 42 percent more money (through increased savings or investment earnings) in order to match the benefit provided by the SERIOUS system.

Table 3
Comparison of Annual Benefits for an Employee Retiring at Age 67 [34]

Age of Annuitization	SERIOUS Annuity	Annuity Purchased with Lump Sum	% Difference
67	8,376	7,678	9%
72	12,787	11,019	16%
80	29,738	20,978	42%

The values in Table 3 illustrate the impact of mortality credits on pure life-contingent annuities purchased in advance compared to those purchased with a lump sum, so to the extent that an employee has made (refundable) contributions, the differences shown in the table will be reduced. However, the impact of anti-selection will have the opposite effect. For example, assume this 67-year-old retiree takes an annuity at age 72 and over his lifetime has contributed half of the $100,000 and his employer has contributed the other half. Based on Table 3, it is expected that employer contributions purchase an annuity that provides about 16 percent more income than if an annuity was purchased with a lump sum. There should be no difference in the annuity purchased by employee contributions since mortality credits prior to annuitization are eliminated due to the refund feature. However, if there is 10 percent anti-selection in the open market (impacting both employee and employer contributions) the overall SERIOUS annuity would be about 19 percent greater than the open market annuity purchased with a lump sum.[35]

While this analysis demonstrates the ability of the SERIOUS system to provide attractive benefits, some employees might feel the system should consider their specific risk tolerance level by investing more in equity to provide an opportunity to earn even greater benefits. However, even if employee-specific risk tolerance could be accurately quantified, there is no guarantee (in the absence of additional funding from government or an employer) that such a system would provide adequate retirement income to all employees. Even with more complex self-adjusting mechanisms than presented here, it is difficult to comprehend how a system reliant on equity investments could be sustainable through certain extreme market events, such as in Japan where the major stock index has lost over 70 percent of its value in the last 20 years.[36] It must be remembered that this is a retirement income system, not a brokerage account or even a savings account. As such, the focus is on how best to meet the conflicting needs of each

[34] Table 3 is based on an employee with a starting salary of $21,347, annual real wage growth of 1.5 percent and annual employer contributions of 3 percent. Contributions accumulate at 4.5 percent and reach $100,000 at age 67. Contributions cease at age 67. For annuitization shown after age 67, the $100,000 continues to grow at 4.5 percent until annuitization. The Annuity 2000 mortality table and a 4.5 percent annuitization rate are used.

[35] (1.16 × 1.1 × 0.5) for employer contributions + (1 × 1.1 × 0.5) for employee contributions = 1.19. The 10 percent is consistent with the anti-selection that Poterba (2001) found in the voluntary vs. compulsory annuities markets.

[36] Nikkei.com (2009) reports that the Nikkei 225 stock index reached a high of 38,915.87 on Dec. 29, 1989, and in December 2009 was around the 10,000 level.

stakeholder, rather than providing direct government tax subsidies for potentially high-risk investment activity. While tax deductions for investments made outside the SERIOUS system will be eliminated, there will still be many ways (IRAs, variable annuities, etc.) to accumulate retirement wealth on a tax-deferred basis that will accommodate a wide range of individual risk preferences. Simply stated, by using the fixed-income markets, the SERIOUS system is able to provide income replacement nearing 50 percent for all employees with a modest level of regular contributions and protects those employees nearing and in retirement from volatility in their expected income.

12. Conclusion

Under current retirement systems (DB or DC) there are numerous possible causes for an employee to have an insufficient level of retirement income—inadequate employee financial knowledge, poor investment performance, inflation, employer bankruptcy, job turnover, lack of access to retirement plans and many others. One or more of these causes affect millions of employees and are extremely difficult to address in existing Tier II retirement income systems. The SERIOUS system addresses each of these issues and only by total lack of employee participation can inadequate retirement income result. However, by using automatic universal enrollment, automatic annual re-enrollment for employees who opt out, and automatic annual contribution increases, employee non-participation is minimized, providing a realistic opportunity for all employees to achieve a financially secure retirement future.

The SERIOUS system is a new model for the delivery of employer-based retirement income that considers both the needs and the available skills of affected stakeholders. The use of competing independent plan sponsors requires a new way of thinking, but it is fundamental in allowing optimal alignment of roles and responsibilities that can realistically be fulfilled with the existing skills of each stakeholder. Society establishes the system structure that is adjustable to changing conditions and provides for strong and efficient governance free from political influence and arbitrary benefit adjustments. Employers play a key role in achieving universal access to retirement savings without distracting from their core business operations. Employees are given both the responsibility and the necessary information to make sound decisions about preparing for retirement. Markets are utilized effectively in order to manage risk and provide an attractive level of benefits. By carrying out each of these roles successfully, the conflicting needs of each stakeholder can be satisfied to the maximum extent possible, and the SERIOUS system can be a sustainable retirement system for the 21st century and beyond.

Appendix

Table 2 in Section 11 has provided projections of income replacement rates generated by the SERIOUS system using guaranteed interest rates that are applied uniformly to all contributions. Since interest rates can differ by age and duration and for each contribution throughout a career, the interest assumptions used in Table 2 actually represent a weighted average of each of the guaranteed interest rates applied to each contribution. This Appendix demonstrates how the 3.5 percent and 5.5 percent interest assumptions were developed as a range for the actual weighted average that can reasonably be expected over a career.

As discussed in Section 9, it is expected that SERIOUS plan sponsors will primarily use fixed-income instruments, although some insurance company immediate annuity managers have used small amounts of equity to back these long liabilities (Santoloci 1991). Additionally, sponsors that have sufficient capital in excess of regulatory requirements could use equity or other alternative assets, allowing them, if successful, to provide a higher level of guarantee. Nevertheless, the focus here will be on the fixed-income markets and how the available yields relate to the level of guarantees provided by plan sponsors. Traditionally, long-term bonds have been used by insurance companies to fund their income annuity liabilities, and a review of long-term corporate bond yields shows that over the past 90 years the average annual yield has been about 6.5 percent.[37] This is just a starting point as plan sponsors still need to provide for expenses, allow for risk, and earn a profit. The SERIOUS system has an advantage over traditional insurance companies in that there are no commission and distribution expenses because of the central clearinghouse. Administrative expenses will be very low since the clearinghouse assumes many routine functions and spreads the cost among the plan sponsors. Both the SERIOUS system and traditional annuities must allow for asset default risk, reinvestment risk (discussed in Section 9), and the risk that mortality will decrease in a systematic fashion more than expected. Based on a number of studies, a conservative estimate would reduce yields about 1 percent annually, providing a net average yield of 5.5 percent.[38]

However, costs for hedging inflation must also be considered. It is anticipated that plan sponsors will use a variety of techniques, such as inflation caps or swaps, to offset this risk. Hedging costs using these instruments are highly dependent upon the current and expected levels of inflation, the specific inflation guarantee involved (e.g., providing for inflation over 6 percent versus over 3 percent), among many other variables. In certain extreme scenarios it may even be cost-prohibitive to use some of these derivatives. As such, it is difficult to define an "average" inflation hedging cost. However, by constructing a hedge that does not depend on actual prices from the derivatives market, it shows not only that

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[37] The 6.5 percent is calculated by the monthly average of the Moody's (2009) seasoned corporate bond index assuming an equally weighted portfolio of AAA and BAA bonds. This same index is used to determine the interest rate used in the calculation of statutory reserves for life insurance and annuities. BAA bonds, which are used in the often cited study of money's worth of annuities by Mitchell et al. (1999), have an average yield of 7.1 percent over the past 90 years based on the Moody's index. The net average rate of return on life insurance company fixed-income portfolios is 7.3 percent over the past 50 years (ACLI 2008).

[38] Page (2004) uses information from the Thrift Savings Plan to suggest that mandatory annuities purchased on a group basis through a central clearinghouse would reduce annuity benefits by at most about 5 percent (actual range given is 1 percent to 5 percent). The effect varies by age, but 5 percent of an annuity payment is equivalent to a 50–75 bps reduction in the interest rate. James and Song (2001) estimate that traditional immediate annuity providers reduce premiums about 6 percent, which is equivalent to a 70–90 bps interest rate reduction for administrative and investment expenses and reserves for mortality, reinvestment and other risks. Their commission and distribution expenses are not included in this figure. Milevsky and Young (2005) report that low-cost variable-payout immediate annuity providers have a mortality risk fee of 50 bps or less and charge an investment management fee of 5–50 bps. Poterba and Warshawsky (2000) report that administrative and investment expenses for the TIAA-CREF pension system are 30–35 bps. Claire (1988) stated that based on an informal survey of insurance company structured settlement providers, 100 bps is an average reduction in interest rate to cover expenses, reinvestment risk and profit.

the system can function in extreme scenarios, but also provides an upper bound on actual hedging costs that will be incurred. For example, a plan sponsor could invest a cohort of contributions in corporate bond. At the same time, a nominal Treasury bond can be sold short and TIPS bond purchased with the proceeds. The net yield to the plan sponsor is the real yield plus inflation provided by the TIPS plus the credit spread between the corporate bond and nominal Treasury. To illustrate using a numerical example, a corporate bond yielding 6.5 percent and a TIPS yielding 3 percent are purchased, and a Treasury bond yielding 5 percent is sold short. The result is a portfolio that will pay 4.5 percent plus inflation, which is the sum of the 3 percent real TIPS yield and the 1.5 percent credit spread between the corporate bond and the nominal Treasury. Subtracting the assumed 1 percent margin for expenses and risk, the plan sponsor is able to provide an interest guarantee of 3.5 percent that is fully protected from inflation. As the long-term real interest rate is about 3 percent, and the average spread between long-term corporate bonds and similar maturity Treasuries is close to 1.5 percent, a plan sponsor should be able to, without using any derivatives and regardless of the nominal market interest rates, provide a provide an average guarantee of about 3.5 percent.[39]

While the hedge illustrated in the previous paragraph is appropriate for matching inflation-protected annuity payments, it actually provides too much protection, as only inflation exceeding the guaranteed interest rate needs to be hedged prior to annuitization. By using the derivatives market, a more appropriate hedge can be obtained at potentially lower cost. Since a 5.5 percent guarantee can be provided with no inflation protection and a 3.5 percent guarantee can be provided with full inflation protection, the plan sponsor can logically spend up to 2 percent on hedging costs. For example, if an appropriate hedge could be purchased for 1 percent in the derivatives market, then the guarantee could be set at 4.5 percent (6.5% yield – 1% hedge – 1% expenses). While available market yields and hedging costs will vary continuously, this analysis has demonstrated that plan sponsors who use long-term bonds to fund their liabilities should be able provide a career average guaranteed interest rate of between 3.5 percent and 5.5 percent.

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[39] A study by Girola (2005) found that the long-term real rate of interest is about 3 percent. For the credit spread assumption, the monthly average of the Moody's (2009) seasoned corporate bond index assuming an equally weighted portfolio of AAA and BAA bonds was used. Based on this portfolio, a spread of 1.3 percent was obtained over the Long-Term Government Securities from 1925–2000 and a spread of 1.4 percent was obtained over the 30-Year Treasury Constant Maturity Rate from 1977–2009, excluding a portion of 2002–2006 when the series was discontinued (Federal Reserve 2009). Since typical insurance portfolios appear to be weighted more heavily toward BAA bonds, a slightly higher 1.5 percent spread was used.

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