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American Retirement Savings Could Be Much Better

By Rowland Davis and David Madland August 2013

Center for American Progress



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Introduction and summary

The personal retirement-savings plans that most Americans use, such as 401(k)s and Individual Retirement Accounts, or IRAs, are unnecessarily costly and needlessly risky. But instituting another kind of retirement plan that combines the best elements of both defined-contribution and defined-benefit plans—such as the Center for American Progress’s proposed Secure, Accessible, Flexible, and Efficient, or SAFE, Retirement Plan,¹ or the related USA Retirement Funds proposal from Sen. Tom Harkin (D-IA)²—could provide a more secure retirement at a far lower cost, according to a new analysis by the Center for American Progress.

These two proposals, also known as collective defined-contribution plans, improve upon the 401(k) model in a number of ways. As described in greater detail in a fall 2012 report, titled “Making Saving for Retirement Easier, Cheaper, and More Secure,”³ CAP’s SAFE Retirement Plan combines elements of a traditional pension—including regular lifetime payments in retirement, professional management, and pooled investing—with elements of a 401(k), such as predictable costs for employers and portability for workers. (see text box)

Our actuarial analysis finds that CAP’s SAFE Retirement Plan significantly outperforms both 401(k)s and IRAs on cost and risk measures. The results of our study are striking:

- **The SAFE Plan costs only half as much for workers.** A worker with a SAFE Plan would have to contribute only half as much of their paycheck as a worker saving in a typical 401(k) plan to have the same likelihood of maintaining their standard of living upon retirement.
- **The SAFE Plan reduces risk dramatically.** A worker with a SAFE Plan is nearly 2.3 times as likely to maintain their standard of living in retirement as a worker with a typical 401(k) account making identical contributions.

The makings of a SAFE Retirement Plan

Some of the plan's key features include the following:

- Plans would be organized as nonprofit organizations run by independent boards with significant participant representation. Their sole objective would be to maximize long-term benefits for all participants.
- Plans would be available to all workers regardless of whether their employer offered retirement benefits prior to the introduction of the plan.
- Investments would be professionally managed. SAFE Retirement Plan boards would be able to contract with professional investment-management providers.
- Benefits would be portable when workers change jobs and would be payable for life.
- Each worker would select a plan, and his or her employer would only need to facilitate enrollment and any required payroll deductions. If employers make contributions, employer costs would be fixed as a percentage of pay, and employers would not be faced with administrative or fiduciary obligations.
- The risks of the SAFE Retirement Plan would be spread among workers and retirees rather than borne solely by employers, as they are in a traditional pension plan, or individual workers, as they are in a 401(k).
- While payout levels in the SAFE Retirement Plan would not be guaranteed, the plan would be far less risky for workers and retirees than a 401(k), with a higher likelihood of achieving target benefit levels.
- The plan would also be much more efficient than a 401(k) in achieving required investment returns at a low cost.
- This hybrid model would not require employers to take on the risk of guaranteeing returns as they must with traditional pensions, nor would it impose any additional costs or risk on government.

The results of our study are relevant not only to federal policymakers, but also to state leaders considering new types of retirement plans for workers in their states.⁴ The SAFE Retirement Plan improves retirement-saving outcomes through two primary paths:

1. Eliminating the glaring inefficiencies common in 401(k)s and IRAs, including their high fees and the behavioral mistakes that workers saving in individual accounts commonly make, such as failing to diversify investments.
2. Mitigating risk to individual participants. In the typical 401(k) and IRA, individuals are left to fend for themselves and are fully exposed to many risks during their working years and in retirement. In the SAFE Plan, risks are shared among workers and among retirees, providing a kind of insurance that reduces risks for all participants.

While some individuals have been able to save significant sums with 401(k)s and IRAs, the weaknesses of these plans have been apparent for some time. These problems are only being fully recognized now, however, as the first generation to primarily depend on defined-contribution plans such as the 401(k)—as opposed to traditional pensions—starts to retire. Less than half of all workers have a retirement plan at work,⁵ and even the typical near-retirement worker with a 401(k) plan only has enough money in their retirement accounts to provide a monthly check of \$575⁶—nowhere near enough money for a secure retirement. These retirees are still subject to great risks: The vast majority of retirees must hope that they don't outlive their small pool of money, and many retirees worry that inflation will erode their purchasing power.

Social Security, of course, provides an essential baseline of income for retirees and must be strengthened so it can continue to do so for generations to come, as the Center for American Progress has already proposed.⁷ But Social Security was never intended to be people's only source of income in retirement. To maintain their standard of living, retired Americans also depend on workplace retirement plans such as 401(k)s, pensions, and, to a smaller degree, private savings.

The cost and risk advantages of the SAFE Retirement Plan are discussed at length below. We first describe the various challenges inherent in saving for retirement and explain why most 401(k)s and IRAs are not as well suited to handle these challenges as a SAFE Retirement Plan. We then describe in more detail how a SAFE Retirement Plan would operate. Finally, using two models based on historical and projected data, we demonstrate how a SAFE Plan performs under many different economic conditions and show that the typical worker would fare much better in a SAFE Plan than in even the best 401(k) plan.

The bottom line is that the current 401(k) system is so inefficient and risky that there are many ways to dramatically improve outcomes for participants that would lower both the costs and risks that workers and retirees face. The SAFE Retirement Plan incorporates a number of these improvements and offers a substantially better way to save for retirement.

The challenges of saving for retirement

Planning for retirement is a multidecade process that requires saving and investing throughout a worker's career and then withdrawing funds during a retirement period that can last many years. Risks include uneven investment returns, inflation, and an unknown life expectancy, while costs include fees paid to manage assets or purchase particular products.

Unfortunately, the typical 401(k) and IRA is not well designed enough to manage the costs and risks of retirement. A better retirement-plan design—such as the SAFE Retirement Plan—can significantly reduce these costs and risks.

When economists and policy experts talk about these issues, they typically describe them as specific kinds of risks and inefficiencies that can be minimized, hedged, or borne. But a more intuitive way to look at these problems is to see how a typical saver would respond to hypothetical questions about their retirement savings if they were a member of a SAFE Retirement Plan, compared to how they would answer if they were participating in a 401(k) plan or IRA. This section illustrates that a member of a SAFE Retirement Plan would be much more comfortable with their answers to the following questions.

How much should I save? And when should I start?

The current 401(k) system leaves decisions about contributions—how much and starting when—to the individual saver. Workers are given the opportunity to contribute as much or as little to their 401(k) plans without much guidance as to the appropriate level. Furthermore, workers have to decide on their own when to start saving, which can lead to procrastination and a higher risk of not saving enough for retirement.

Aspects of the SAFE Retirement Plan can help alleviate these problems. First, all employees would have a set portion of their paycheck automatically deducted and contributed to the SAFE Retirement Plan they have chosen. Employees would, however, have the opportunity to voluntarily stop contributions by opting out of the payments, although when any worker begins a new job, he or she would by default be re-enrolled. Such auto-enrollment policies have been found to be very successful in spurring saving for retirement.⁸ One careful study of Danish savers found that approximately 85 percent of savers are “passive,” and their retirement savings won’t increase in response to tax subsidies but will increase when automatic contributions are set for them.⁹

Second, the contribution level could also be increased over time using a policy known as auto-escalation. If a worker starts out contributing 3 percent of his or her pay, for example, the policy would increase his or her contributions over time as the worker’s salary increases. Previous research has found this method to be an effective way to increase savings rates. A study by economists Richard H. Thaler and Shlomo Benartzi found that savings rates of workers who joined such an auto-escalation plan increased their level of savings from 3.5 percent to 13.6 percent over 40 months—a growth rate that many plans would envy.¹⁰ While auto-enrollment and auto-escalation are becoming more common, as of 2011 only 56 percent of employers who offer a 401(k) plan use auto-enrollment and 51 percent use auto-escalation.¹¹

What if I change jobs?

Because our current 401(k) system is employer based, workers face the problem of having their savings interrupted when they switch jobs. A worker contributing to a 401(k) plan at one job has to start contributing to a new plan if one is offered when he or she begins a new job. The worker then has to choose what to do with the funds remaining in the old 401(k) account—a process that can be complicated and results in many workers losing significant portions of their savings as they either delay moving their money into a new investment fund or cash out their savings early.¹² These problems are a significant source of 401(k) “leakage” and undermine workers’ ability to accumulate sufficient savings for their retirement.

Indeed, it is estimated that about 4 in 10 workers choose to cash out some portion of their 401(k) balance when they change jobs rather than go through the complex process of rolling over their funds into new accounts.¹³ These cash outs represent permanent losses to the retirement system and may be very difficult for workers to recoup later in life. Workers who cash out their 401(k) plans and delay contributing to their new plan for five years may see a 10 percentage-point decrease in their likelihood of replacing most of their income in retirement, according to a study by the Defined Contribution Institutional Investment Association.¹⁴

Savers in a SAFE Retirement Plan would avoid these pitfalls since the system is not employer based. A worker's contributions will flow to the fund of his or her choice regardless of where he or she works. If a worker leaves his or her current job and starts a new one, retirement contributions flow to the same fund and the only change is that there is a different employer facilitating the flow of money.

What is the right investment strategy?

Savers' greatest concern is that they won't have enough money at retirement. Part of this calculation has to do with how much either the employer or the saver contributes to the retirement fund. However, the returns earned on those contributions are a critical determinant. Economists refer to this as "investment risk," or the risk that investments won't have earned enough in the years leading up to retirement.¹⁵ SAFE Retirement Plans would have lower investment risks and higher rates of investment return than traditional 401(k) plans.

One of the main ways that a SAFE Retirement Plan would help workers save more efficiently is by minimizing the costs of investing. Most 401(k) plans have relatively high costs, which make saving for retirement a much more expensive exercise than it should be. The average 401(k) plan has fees that are approximately 1 percent of assets managed,¹⁶ while large pooled retirement-investment funds such as corporate and public-sector pensions have fees that are significantly lower.¹⁷ One study by researchers at the Center for Retirement Research at Boston College found that public-sector pensions had an average management fee of 0.25 percent of assets managed, compared to average costs of more than 1 percent for 401(k) plans with actively traded funds.¹⁸

A major reason fees are so high in most 401(k)s is because the high fixed costs of managing a fund are generally borne by a small number of savers. Research attests to this fact and has found that plan size is a significant determinant of a plan's fees as a percentage of assets.¹⁹ Costs are also high because savers in 401(k) plans often invest in actively managed mutual funds, which have much higher fees than more passive investments such as index funds.²⁰ All told, studies indicate that high fees in 401(k)s can eat away as much as one-quarter to one-third of returns on retirement assets.²¹ Unfortunately, fees for Individual Retirement Accounts are even higher than 401(k) plans.²²

SAFE Retirement Plans would have comparatively low fees because the large size of the fund would spread out the fixed costs of investing and administering the plan. Participants' accounts would be pooled together to hire investment managers, who would then work to further keep costs down by pursuing lower-cost investment strategies that invest heavily in index funds.

In addition to low fees, savers will also benefit from the SAFE Plan's professional money management. 401(k) plans require that the individual saver manage his or her investments. The average investor has his or her own job and most likely is not a finance expert familiar with investment strategies. In fact, individual investors frequently fall prey to a variety of pitfalls that reduce investment returns.

One common investment mistake made by individuals is the failure to properly allocate assets. Over the course of a lifetime, an investor should transition his or her allocation from mostly equities early in life to mostly bonds later in life, as he or she moves from a riskier portfolio to a more conservative one. Many individual investors, however, fail to do this. According to data from TIAA-CREF, many investors simply invest half their money in bonds and half their funds in equities, and this tendency is not restricted to low-information investors.²³ Indeed, even Nobel Prize-winning economist Harry Markowitz has admitted that he did not invest based on modern portfolio theory—the theory that helped him win the Nobel Prize—but rather split his contributions 50-50 between bonds and equities.²⁴ Markowitz has acknowledged that his investment strategy wasn't optimal, noting that “In retrospect, it would have been better to have been more in stocks when I was younger.”²⁵

Other common misallocations include investing either entirely in equities or bonds or overinvesting in local companies and funds, the latter being a trend economists refer to as “home bias.” For example, data from the Vanguard Group show that nearly 20 percent of savers in their plans had 100 percent of their assets in either all equities or all bonds.²⁶ These kinds of mistakes can leave investors vulnerable to market fluctuations due to their lack of asset diversification.²⁷

Savers also often make the mistake of taking out funds in response to market declines and thus missing out on higher returns when the market rebounds, as it tends to do over the long term. One study by researchers Thomas Bridges and Frank P. Stafford at the University of Michigan found that individuals made significant withdrawals from their retirement accounts after the dot-com stock-market bubble popped in 2001 and after the financial crisis of 2008.²⁸ If individuals do not pull their money out of the market entirely, they often shift their investments to less-risky bonds, taking the full hit of the market decline but missing out on the future recovery. Many investors will then only put their money back in stocks when the market is strong, perpetuating a perverse investment cycle that significantly undermines individuals’ ability to grow their nest egg over time.²⁹

For these reasons and many others, professional money managers—who are more patient with their investments, avoid many common investment biases and are able to diversify fund investments among a multitude of asset classes that include some not available to individual investors—have higher average returns than individual investors.³⁰ While such money managers rarely beat market averages,³¹ their goal in managing SAFE Retirement Plan investments would be to meet the average returns of the various markets they invest in, something that individual investors fail to do but professional managers commonly achieve. In short, professional money managers would ensure that SAFE Retirement Plan investments are properly diversified and invested for the long term, allowing them to achieve higher returns than workers in a typical 401(k). Based on previous research, this could amount to an annual average increase in returns of approximately 1 percentage point.³²

The final reason why SAFE Retirement Plans would better enable the average saver to reach their investment goals when compared to savers with traditional 401(k)s is that the accounts of both older and younger workers are pooled together, enabling fund managers to maintain a balanced portfolio that achieves smoother and potentially higher returns over time. This is because individuals with a 401(k) cannot always maintain an ideal asset mix since they must become more conservative with their investments as they age because they have less time

to recover from any possible losses, which can result in lower returns. This benefit of the SAFE Plan, called intergenerational risk sharing, ensures that workers' savings are optimally invested at all times, providing returns that are both more stable over time and—according to research by economist Christian Gollier of the Toulouse School of Economics—potentially up to 0.53 percentage points higher than those achieved in the average defined-contribution plan.³³

What about the risk of losses?

Another major concern for savers in defined-contribution plans is that they may save enough for retirement, only to see their investments suddenly drop in value as a recession hits the economy just as they are about to retire. In a traditional 401(k) plan, the saver takes on the entirety of this timing risk. If the worker is about to retire when the market crashes, he or she must drastically increase his or her contributions or continue to work past his or her expected retirement date to make up for the difference and avoid having a lower-than-planned standard of living.

A SAFE Retirement Plan would reduce the risk of market losses by smoothing out the investment returns from years when returns are particularly high or low. This would be done by creating what is known as a “collar,” which would function as follows: In most years, participant accounts would be credited with market returns, but in particularly good or bad years, the full market return would not immediately be credited. Rather, years of higher returns would be saved away and returned over time in weaker-performing years. The idea of using a collar to smooth returns in pension funds originated in a paper co-authored by Harvard economist Martin Feldstein.³⁴ Through the use of collars, the SAFE Retirement Plan can spread out risk among generations, helping to ensure that no individual is fully exposed to extreme market losses.³⁵

Take the real-world example of the time span between December 2007 and June 2009, the duration of the Great Recession. Workers who were near retirement—ages 55 to 64—and who had been investing in a 401(k) for 20 to 29 years saw their account balances decrease an average of 17.4 percent.³⁶ By early 2013 the stock market had recovered all of the losses suffered during the Great Recession, but in order for a person's 401(k) to benefit fully from this recovery, the person needed to be invested in the market during this period and not taking any withdrawals to fund his or her retirement. Few retirement-age individuals on their own have assets to tide them over until the market recovers, but plans such as the SAFE

Plan do have the time and the financial strategy to provide more stable investment returns. Indeed, estimates from 2012 suggested that the benefits provided by collective defined-contribution plans in the Netherlands—which are similar to the SAFE Plan—may only need to be reduced by approximately 2 percent to 3 percent on average because of investment losses suffered during the Great Recession, representing far less of a hit than that felt by individuals with 401(k)s.³⁷

A more detailed explanation of the how the SAFE Retirement Plan’s collar would function and an example of exactly how it would have protected individuals’ account balances from market fluctuations over the past 25 years can be found in the appendix.

Will I outlive my savings?

No matter how much workers save, there is still a chance they can outlive their assets. The risk that a worker might outlive their savings is known as longevity risk.

This risk can be hedged by purchasing an annuity. The saver buys an annuity that guarantees a certain amount of payments over the years depending upon the amount of savings in their individual account. But only one in five 401(k) plans offers an annuity option.³⁸ For those without the ability to do so in a 401(k), purchasing an annuity in the individual market is more expensive than in the group market, as all of the fees for managing the annuity are borne by the individual.³⁹

Many workers with a 401(k) attempt to manage longevity risk by only withdrawing a small amount of their assets each year, but this process doesn’t always work. Indeed, research on the topic has found withdrawal methods such as these, including the “4 percent rule”—where a retiree annually spends down 4 percent of his initial wealth—to be very inefficient.⁴⁰ It is virtually impossible to support a constant spending plan when market returns on the underlying investments can vary significantly from year to year. As a result, savers may end up significantly over-withdrawing from their retirement accounts and prematurely burning through their savings if their actual investment returns fall below the assumptions they used when initially calculating the size of their fixed annual withdrawal. Further, such withdrawal methods can also be inefficient because savers who wish to be certain they will never run out of money but don’t know how long their retirement will last must always keep extra money in savings and never completely draw down their accounts.

Even if a worker purchases an annuity, he or she still faces several risks. One risk is that interest rates will be very low when the worker is ready to retire and to purchase an annuity. Since the price of an annuity goes up when interest rates go down, the cost of purchasing an annuity would be elevated in a period of low interest rates. When interest rates are low, more money is required to generate the same amount of payouts in retirement.⁴¹

A SAFE Retirement Plan would minimize these risks by providing an annuitized stream of payments that increases in value over time and cannot be outlived. The SAFE Retirement Plan does this by providing payments out of an annuity fund for retirees that is conservatively invested—primarily in bonds with some stocks to enable payments to keep up with inflation over time—and by spreading out the impact of years of very high and very low returns in a similar manner as is done during the accumulation phase.

How do I deal with inflation?

Once a worker retires, he or she faces the risk that steady price increases will erode the value of his or her savings. Under the current 401(k) system, the individual is not protected against the risk of inflation eroding his or her buying power. Even if a worker purchases an annuity, the stream of payments is most likely not hedged against inflation.

The SAFE Retirement Plan would deal with the problem of inflation by providing cost-of-living adjustments to retirees receiving payments from the annuity fund. These payments would help protect against the risk of inflation. The retirees would also receive bonus checks from the annuity fund when the returns are particularly good and the fund is deemed to be sufficiently healthy.

The overall benefits of the SAFE Retirement Plan

As a number of studies have found, plans such as the SAFE Retirement Plan are more efficient and less risky than defined-contribution, or DC, plans such as 401(k)s. Plans that combine elements of defined-benefit pensions with defined-contribution plans are often called collective defined-contribution, or CDC, plans, and though their exact features may differ slightly, researchers have found that this basic model is very effective. A study commissioned by the Organisation for Economic Co-operation and Development found that one such stylized CDC plan significantly reduced the chances that a worker didn't have enough funds to maintain his or her standard of living in retirement compared to an individual in a defined-contribution plan such as a 401(k).⁴² Similarly, a study by the British government found that a CDC plan would impose less risk on an individual than a 401(k)-style plan by making the worker “less dependent on whether the individual happens to retire in a downturn or in a boom.”⁴³

Academics have come to similar and more specific conclusions. Dutch researchers Eduard H.M. Ponds and Bart van Riel estimate that overall investment returns in CDC funds will average about 2 percentage points higher than in a DC plan.⁴⁴ They also find that individual DC plans have a “high downside risk,” meaning that individuals in a DC plan are much more likely to have a lower standard of living in retirement than are savers in a CDC plan.

In perhaps the most comprehensive study of the collective defined-contribution concept, Judith Verheijden, a Dutch retirement researcher, estimated contribution levels necessary to provide a high level of certainty of having adequate income in retirement under several different kinds of retirement plans. Drawing on previous analyses of defined-contribution plans' comparability to defined-benefit plans, she found that in order to have an equally secure retirement, a worker would need to contribute between 70 percent and 74 percent more in a 401(k)-style plan than they would in a collective defined-contribution plan.⁴⁵ For example, a worker would have to contribute 17 percent of their pay to an individual DC plan to get the same security as contributing 10 percent of their pay to a CDC fund.

While these studies describe many of the general advantages of the CDC model over the individual defined-contribution system, they do not directly compare a CDC-style system to the current DC system in the United States. For example, the Verheijden study models a best-case individual DC plan type. Unfortunately, the reality of our current system is far from that ideal due to high fees, lack of coverage, and preretirement leakage of savings. Further, the studies are generally based on retirement plans from other countries that are analogous but not identical to the types of plans in the United States. Most importantly, these studies do not model our specific proposal for a SAFE Retirement Plan.

With that in mind, the next section of this paper lays out the specifics of our proposal for a SAFE Retirement Plan and then uses economic modeling to show the cost and risk reductions available from the new retirement plan. This modeling enables us to answer questions such as: What level of contribution is required in a SAFE Retirement Plan compared to a 401(k) to get to an adequate level of retirement income with a reasonably high probability? And how do the downside risks compare?

The mechanics of the SAFE Retirement Plan

Above we offered a general description of the cost and risk advantages of a SAFE Retirement Plan model. Now we will describe specific elements of the plan and modeling choices so that we can provide a detailed analysis of the plan's performance and then compare it to other plans. The specific design parameters we use for the SAFE Plan have been tested, and we have confirmed that they can provide a sustainable platform for efficient retirement saving. Other design parameters within the same framework would also be workable, however, so the reader should consider our SAFE Plan design as one example within a group of viable options.

In outlining the specific features of the SAFE Retirement Plan, it is worth emphasizing that the plan reduces the costs of saving for retirement and lowers the risks, but it does not eliminate either entirely. This is because retirement planning involves some inherent tradeoffs between costs and risks. To understand why this is so, consider one way to reduce retirement risks: by investing solely in government-backed Treasury bonds that will pay out guaranteed interest for a number of years. The problem is that this practice is prohibitively expensive for most people—saving for retirement in this manner would require the typical worker to save an estimated 23 percent of his or her salary every year for 37 years.⁴⁶

Reducing costs to more manageable levels requires taking some risks such as investing a portion of one's savings in the stock market. Over long periods of time, this should produce higher returns than Treasury bonds, though such investments can also fail to produce expected returns and can even lose value. Managing other risks—such as inflation risk—involves similar tradeoffs.

As a result, the SAFE Retirement Plan necessarily takes some risks but seeks to keep both cost and risk to manageable levels.

The accumulation phase

In our model, 65 percent of funds in the main accumulation fund would be invested in stocks, and 35 percent would be invested in bonds. Of course, SAFE Retirement Plans could be less or more aggressive in their investing by allocating less or more to equities. In our modeling, however, this allocation provided stable and manageable results and provided a reasonable tradeoff between cost and risk.

While the funds would be collectively managed, each member of the fund would have a “notional account.” The member wouldn’t have any control over the contents of the fund, as is the case in a 401(k). The account would exist solely to keep track of each member’s savings contributions and investment credits, which are simply the rate of return credited to each member of the plan that year. As mentioned above, the fund would use a financial instrument called a collar to distribute investment returns through a base investment credit each year. In addition, bonus investment credits will often be added to the base credit if the plan has accumulated surplus assets, which is expected.

In our SAFE Retirement Plan model, the collar we used has a floor of a zero percent rate of return and a ceiling of an 8 percent rate of return.⁴⁷ If the market rate of return is between zero percent and 8 percent, members of the fund are credited with that rate of return. If the market rate of return is below zero percent, however, the fund still credits each account with a zero percent return and uses accumulated funds from a notional “reserve” fund to cover any losses. If the rate of return is larger than 8 percent, the fund only credits the accounts with an 8 percent investment credit, and the excess returns are used to replenish the reserve fund.

Members of the fund may receive investment credits in excess of those distributed by the collar depending upon the health of the overall fund. The fund’s health would be evaluated using the current-value ratio—the value of all the assets in the fund divided by the total value of all member retirement accounts. When the fund does well and has accumulated sufficient assets in its reserve fund, each account would receive bonus investment credits. The exact schedule that we used to distribute bonus credits in our model plan is provided in the appendix.

For example, if the current-value ratio is at least 130 percent, each member of the fund would receive an extra 3 percent investment credit. So in a year with a 6 percent market rate of return, a fund with a current-value ratio of at least 130 percent would give investment credits of 9 percent to all its members. In our model, bonus credits would be dispensed about two-thirds of the time, and the average bonus credit, when payable, is 4 percent.

On the other hand, if the fund is severely underfunded, it can reduce members' account balances, although this happens only rarely in our modeling. More information on such potential reductions is available in the appendix.

Note that it takes a number of years for a new SAFE fund to build up the reserve cushion, so “bonus” payouts in the early years are likely to be lower than after the fund reaches a “mature” state. All of our results reflect expectations for a fully mature fund.

For our baseline modeling, we assume members of the fund would contribute 12 percent of their pay into the collective fund. The 12 percent of pay could be split between an individual employee and an employer. For example, an employee might contribute 9 percent of his or her pay, and his or her employer would pick up the other 3 percent. The 12 percent figure was chosen as an approximation of the standard recommendation of industry professionals, who generally place the required figure at between 10 percent and 15 percent of income, with some placing the minimum recommended contribution at exactly 12 percent.⁴⁸ We also provide results for larger and smaller contribution levels, but use 12 percent of pay as a baseline. No auto-escalation feature was included in this model, but its incorporation may merit consideration going forward.

The payout phase

When a member reaches retirement, funds equal to their accumulated account balance would be transferred to a separate annuity fund, which would pay out annuities to members in retirement. Our model annuity fund would invest 35 percent of its funds in equities and 65 percent in bonds, a more conservative asset mix than the accumulation fund.

The fund would seek to provide a 2 percent annual cost-of-living adjustment in its lifetime payments to participants. This fixed adjustment simplifies the annuity pricing at retirement and is designed to cover most of the prospective inflation risk, even before recognition of the bonus checks described below. As with the accumulation fund, the payouts from the annuity fund could change with the health of the fund. If the funded ratio of the annuity fund fell below 90 percent for two out of three years, the cost-of-living adjustment would be suspended. The adjustment wouldn't return until the annuity fund had a funded ratio of at least 100 percent for two out of three years. In our modeling, suspension of cost-of-living adjustments in any year occurred with a probability of about 14 percent.

On the upside, bonus checks above the regular benefit can be distributed. In our modeling runs, bonus payments are made whenever the funded ratio for the annuity fund exceeds 110 percent. Under this rule, bonus payments are made in about 67 percent of years and, when they are paid out, average about 27 percent of the regular benefit. Over the typical payout period, the fixed 2 percent cost-of-living adjustment, plus the bonus checks paid, will most often exceed what a full inflation cost-of-living adjustment would have provided. The exact schedule we used to determine when the annuity fund would make bonus payouts can be found in the appendix of this report.

To price annuities, we use a nominal interest rate of 5 percent. (Note that our overall model allows interest rates to vary; we make the fixed 5 percent assumption for pricing because it works well and is sustainable, even when market yields from our stochastic model are quite volatile). For example, at this rate a retiree with an account balance of \$200,000 at age 67 would receive an initial monthly benefit of \$1,160, with scheduled increases of 2 percent each year after retirement. The average bonus check for this retiree would total approximately \$290 initially, but would also increase as the regular benefit grows with the cost-of-living adjustment. If the bonus checks become increasingly regular, the board of the fund may permanently increase annuity payments.

Evaluating the SAFE Retirement Plan

We test the plan's performance using two different methods. The fact that both methods produce similar results gives us great confidence in our findings. Additional details on the methods are available in the appendix.

One method is based on historical returns. Here, we simply run our models based on the past 87 years of stock and bond market returns, interest rates, and wage growth.

The other process we use to evaluate the plan is known as stochastic modeling. The word “stochastic,” simply put, means random. In a stochastic model, inputs such as the rates of return on stocks and bonds and factors such as inflation are allowed to vary randomly based on the guidelines chosen. The model then runs the event studied many times with different input values. For our study, the model simulates a saver earning the U.S. median income and making contributions from age 30 to age 67—the retirement age to receive full Social Security benefits—and then runs that simulation 1,000 times. The result is a distribution of outcomes.

Using both of these methods, we compare three different retirement-plan types: our SAFE Retirement Plan, a “perfect-world” 401(k) plan, and a typical “real-world” 401(k) plan.

The “perfect-world” 401(k) has very low fees of 0.25 percent of assets—the same level of fees as the SAFE Retirement Plan. All funds are invested in low-cost target-date funds that shift from stocks when a saver is young to less-risky bonds when he or she is older. At retirement, an annuity is purchased at the low-cost group rate. We also assume universal coverage and no leakage from preretirement withdrawals. We include this “perfect” model to show that a SAFE Retirement Plan would still be an improvement over the best possible 401(k) situation.⁴⁹

The “real-world” 401(k) has fees of 1 percent of assets, which is more representative of current practice.⁵⁰ We continue to assume that all funds are invested in target-date funds—although this is a very generous assumption since many current 401(k) participants use much less disciplined investment practices. At retirement, we assume the retiree uses the 4 percent rule to develop their regular withdrawals since annuity purchases are extremely rare.⁵¹ We also continue to assume universal coverage and no leakage from preretirement withdrawals, which is again a very generous interpretation of actual outcomes in today’s 401(k) environment.

The results we show for the “real-world” 401(k) plan are therefore representative of those workers who have had the opportunity to participate in a typical 401(k) plan and who have made all the correct choices: get into the plan early and make continuous contributions, use a disciplined target-date fund for investments, and keep all the funds in the plan with no early cash outs or loans. Of course, many workers do not even have a plan,⁵² and many of those who do have a plan will not make all the correct choices.⁵³ Consequently, any survey of results across the full spectrum of workers would produce results that are much worse than what we show here for the typical “real-world” 401(k) plan.

Modeling assumptions

Features	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan
Fees	1 percent of assets managed ⁵⁴	0.25 percent of assets managed	0.25 percent of assets managed
Annuities	Assumes retiree uses the “4 percent rule” ⁵⁵ to “self-annuitize”	Group annuity payout purchased	Lifetime payout from annuity fund
Investment decisions	Target-date fund	Low cost, target-date fund	Low cost, professional management
Risk borne by	Individual savers	Individual savers	Pooled among plan participants

We use one main metric to measure the outcomes of the retirement plans: the replacement rate. This metric tells us what percent of a saver’s income at the time of retirement will be replaced by their retirement savings, taking into account any cost-of-living adjustments made to annual payouts from all three plans.⁵⁶ A replacement rate of 100 percent is unnecessary because a retiree does not need to cover many of the expenses of those still in the workforce. For example, a retiree doesn’t need to contribute to their retirement plan or to Social Security. In addition, Social Security benefits aren’t fully taxable. While there are no hard and fast rules, most retirement planners argue that a replacement rate of around 70 percent to 80 percent is a good target to preserve a preretirement standard of living.⁵⁷ In our results, we highlight the 70 percent replacement-rate target, providing a minimum that retirees need to hit in order to maintain their standard of living.

In all of our results, we assume that the retiree replaces approximately 36 percent of their preretirement income with Social Security benefits, which is the median salary replacement expected at age 67 for someone now age 30.⁵⁸ This means that in order to provide a 70 percent income-replacement rate—and thus maintain their preretirement standard of living—the typical retiree needs to replace about 34 percent of income from another source of savings. Workers whose earnings are above the median will need to replace a greater share of income, as Social Security will replace a smaller percentage of their preretirement earnings, while workers whose earnings are below the median will need to replace a smaller share of income since Social Security provides a greater replacement rate for them.

In short, a replacement rate of 34 percent or better from a SAFE Retirement Plan or 401(k) is necessary for a typical worker to maintain their preretirement standard of living throughout retirement.

How a SAFE Retirement Plan would work for the average worker

The mechanics of a SAFE Retirement Plan are best understood by looking at how a typical worker—we'll call him Joe Average—might experience saving for retirement as a member of the plan.

Joe is handed a form on the first day of his very first job. The form explains that his employer will be deducting a set percentage of his wages to deposit into a SAFE Retirement Plan of his choosing. In addition, the employer will be contributing a few extra percentage points of his pay as part of their plan to attract qualified workers. Joe isn't particularly interested in thinking about retirement but decides to accept the default and participate because he knows he should be saving.

Over the years Joe changes jobs several times but continues contributing to the fund along with his new employers. Each year his account receives an investment credit based on the returns of the fund. When the fund has a negative return one year due to a recession, Joe's account balance remains unchanged. He receives a zero percent credit because this is the minimum credit under a smoothing process the fund calls a collar. A few years later the fund returns 12 percent, but Joe only receives an 8 percent investment credit due to the ceiling rate of the collar. He understands that the remaining 4 percent investment return stays in the fund to function as a "rainy-day" cushion to help provide the downside protection needed if markets tank again at some point in the future.

After several years Joe is pleased to find that the fund is providing bonus credits because investment returns have been strong for a while and the overall cushion in the fund has grown in size. In a year where

the fund's return is 6 percent, he receives a total investment credit of 9 percent—6 percent from market returns plus a bonus credit of another 3 percent.

All of these specifics are explained to Joe every quarter when he receives a report from the board of directors and the fund manager. The individualized statement shows Joe how much he has already earned in the fund, as well as all the costs of operating the fund. The statement also shows projected retirement income amounts at age 67 based on certain assumptions about future contribution rates and fund investment returns. Joe likes that the projected retirement figures are highlighted because they help make his planning easy. Occasionally he is required to vote for the members of the board who oversee the fund. Despite the fact that he changes jobs several times, he is still a member of the same fund.

When Joe reaches retirement age, he knows how much he'll receive from the fund in the form of a monthly check to supplement his Social Security check and any of his other savings. In retirement he'll continue to vote on board members to ensure that the fund is managed properly. Joe also understands that after retirement his savings are invested more conservatively in the annuity fund than while he was working. This allows the fund to provide for lifetime retirement payments, so he doesn't have to worry about outliving his savings. In most years Joe's check increases by an automatic 2 percent cost-of-living adjustment to help keep up with inflation, and he also often receives additional bonus payments when the annuity fund has had favorable investment returns.

The results

Any way that we slice our results, the SAFE Retirement Plan outperforms a realistic 401(k) and even a perfect-world 401(k) on measures of both cost and risk. This holds true for stochastic modeling as well as modeling using historical returns—evidence that the results are quite reliable. Because IRAs usually have even higher fees than the typical 401(k), the SAFE Retirement Plan outperforms an IRA to an even greater degree than it does the typical 401(k), though we don't show these results here.

Historical model results

Let's first look at the modeling based on historical experience.

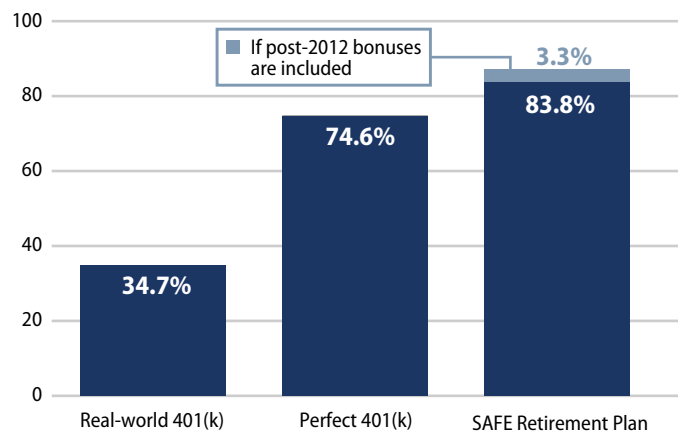
In this model, as in the stochastic modeling, we assume that a worker earns the median salary, contributes 12 percent of income into a retirement plan for 37 years, retires at age 67, and that Social Security replaces 36 percent of preretirement income. We provide results only for workers that retired after 1966 because this is the first cohort that contributed to their retirement funds for their entire careers and for whom complete historical market data is available.

The first metric that can be used to compare the three plans is the average replacement rate provided to all workers who retired between 1966 and 2012. On this measure the SAFE Plan proves clearly superior, replacing an average of 87.1 percent of workers' preretirement earnings if bonuses projected to be awarded to retirees in the years after 2012 are taken into account. Even in a worst-case scenario in which no bonuses were awarded after 2012, retirees would still receive an average of 83.8 percent of their preretirement income.⁵⁹ This compares to average replacement rates of 74.6 percent and 34.7 percent provided by the perfect 401(k)

FIGURE 1

SAFE Retirement Plan would have provided a higher average standard of living to retirees

Average replacement rate for all cohorts retiring between 1966 and 2012



Source: Figures produced by historical model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

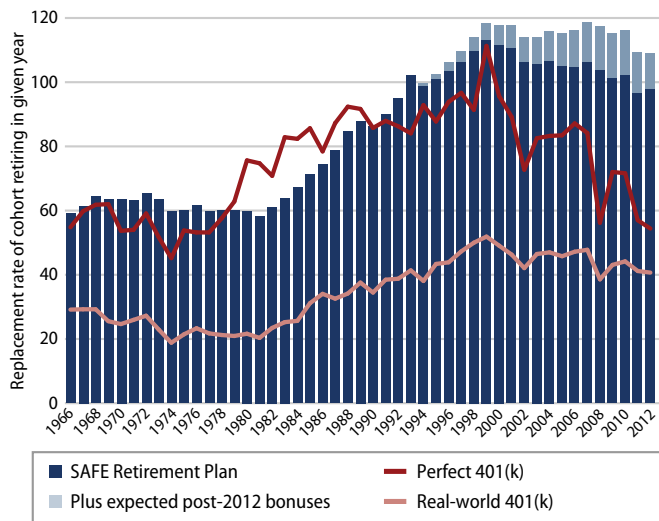
and real-world 401(k), respectively. These differences are substantial, as a worker who retired with the SAFE Plan would have been able to maintain at least 12 percent more of their preretirement income than those with a perfect 401(k) and at least 141 percent more than those with an average 401(k).

While all of the plans were able to achieve replacement-rate averages above the 34 percent target needed to reach the total basic target rate of 70 percent including Social Security, the variation experienced by individual cohorts retiring in particular years should also be taken into account. Indeed, while the replacement rates of retirees using the SAFE Plan or a perfect 401(k) never dipped below the 34 percent threshold in any year, savers with a real-world 401(k) would have failed to meet the target in 21 of the 47 years considered. In other words, compared to workers with typical 401(k)s, those utilizing a SAFE Plan would have been nearly twice as likely to be able to maintain their standard of living in retirement.

Furthermore, when considering the best and worst single-year performances of each plan, the SAFE Plan again outperforms both 401(k)s as shown in the following chart.⁶⁰ The SAFE Plan's worst single-year replacement rate was significantly higher than the worst rates of both the perfect and real-world 401(k)s. On the upper end of the spectrum, the highest single-year replacement rates offered by the SAFE Plan were also greater than the best rates offered by either 401(k).

It should be noted that the perfect 401(k) did provide higher replacement rates to some cohorts retiring in the 1980s. This was, however, largely due to the plan's ability to purchase annuities at extremely favorable interest rates during this period, and in many ways these results further demonstrate just how dependent even the best 401(k)s are on volatile economic factors. Indeed, the perfect 401(k)s' performance after 1990, when conditions were not as favorable, illustrates what can happen to workers' retirement security when all such factors are not perfectly aligned. In this time period—and indeed most time periods—the SAFE Plan significantly outperformed the perfect 401(k). Additionally, it must be remembered that the perfect 401(k) is in no way representative of the

FIGURE 2
SAFE Retirement Plan would have routinely outperformed 401(k)s



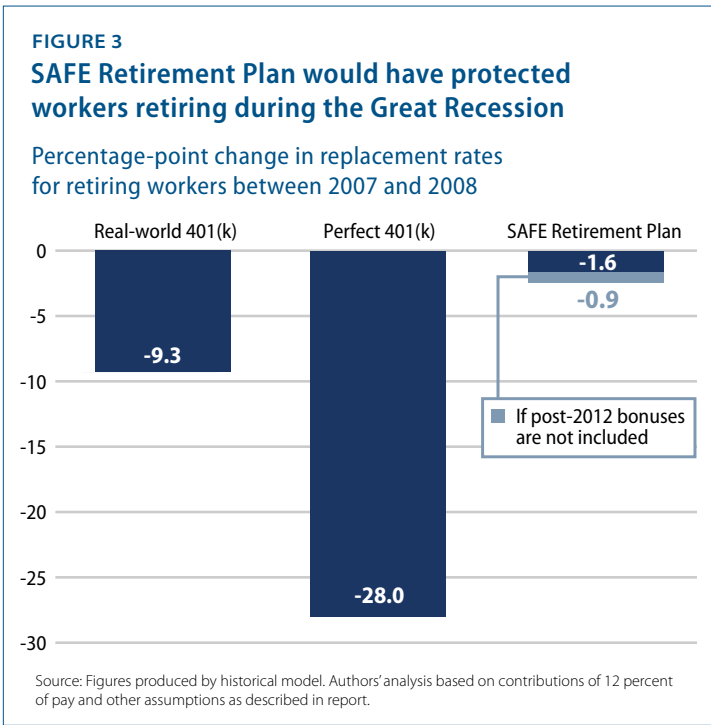
Source: Figures produced by historical model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

average worker's retirement plan, which is more accurately portrayed by the much less impressive performance of the real-world 401(k).

Taken together, all of these facts mean that not only would the average standard of living provided by the SAFE Retirement Plan have been significantly greater, but retirees' worst-case and best-case outcomes would have been superior as well. This is because of the way the SAFE Plan protects workers from the volatility of the market by providing smooth returns—reserving excess returns during good times and using them to subsidize the payouts to workers unlucky enough to retire during market downturns.

Perhaps nothing more clearly illustrates the importance of this smoothing mechanism than looking at how the three plans would have fared during the Great Recession. Compared to workers retiring in 2007, those retiring in 2008 with a real-world 401(k) or a perfect-world 401(k) would have seen their replacement rates plunge by 9.3 percentage points and 28 percentage points, respectively. What these declines actually mean, however, is that these workers would receive annual payments from their retirement plans that would be nearly 20 percent lower than those received by workers who retired only a year before if both groups had a typical 401(k) and more than 33 percent lower if both groups had a perfect-world 401(k). Note that while the drop-off in the perfect-world 401(k) results were worse than the real-world 401(k)s in percentage terms, the perfect 401(k) was starting from a much higher point and ended at a higher point than the real-world 401(k).

Workers retiring with a SAFE Plan, however, would have seen their replacement rates fall by only 2.5 percentage points if they were assumed to receive no bonuses after 2012 and only 1.6 percentage points if they did receive forecast bonuses. This means that in the worst-case scenario, these workers' annual checks would be only 2.4 percent smaller than those received by workers who retired the year before, and in the best case they would be only 1.4 percent smaller. Given the magnitude of the economic crisis experienced during this period, the ability of the SAFE Plan to cushion the blow felt by workers to this extent is exceptional.



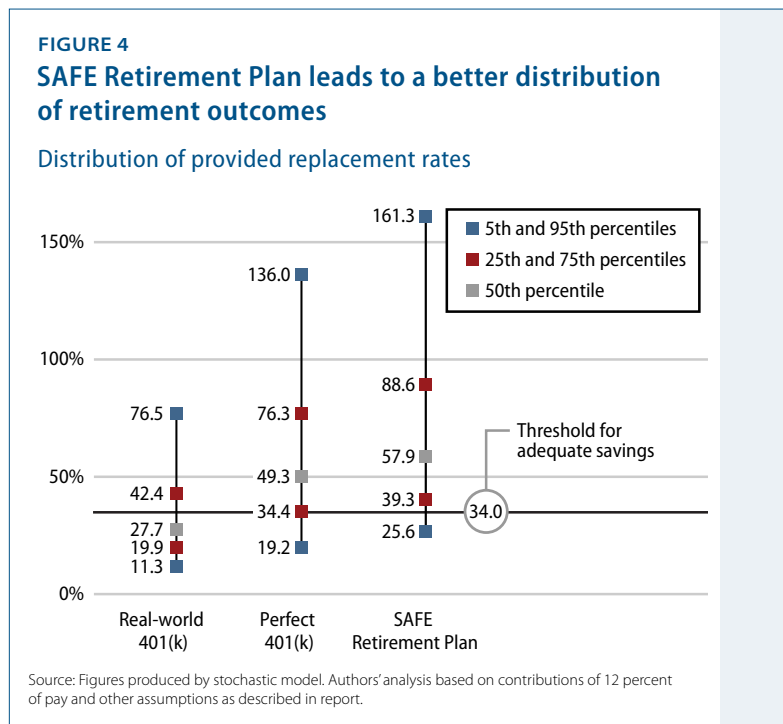
Stochastic model results

The stochastic modeling yields similar results, with the SAFE Retirement Plan generally outperforming both types of 401(k)s. Note that these strong results occur even though our stochastic modeling assumptions are somewhat conservative relative to historical experience, reflecting consensus estimates for future market performance. These conservative assumptions provide a tough test for the sustainability of a pooled investment fund—a test that our model SAFE Plan passes. They also lead to overall replacement rates that are lower than those produced by the historical modeling, but even under these conditions, participants in the SAFE Plan were still generally able to maintain preretirement standards of living.

Annual contributions of 12 percent of salary over 37 years give a worker in a SAFE Plan an 83.5 percent chance of maintaining his or her standard of living in retirement. In contrast, to get that same probability, a worker in a perfect 401(k) would have to contribute 14 percent of his or her salary. This number would jump to more than 24 percent of pay for a worker in a typical 401(k) plan—double the cost for the SAFE Plan.

To put these cost differences in perspective, for a 30-year-old making \$30,000 a year, an extra 12 percent of salary is \$3,600 a year. These additional contributions would need to continue for 37 working years and would increase in dollar value over a person's career as his or her salary rises. Over a typical worker's career, he or she would need to pay an extra \$170,000—and this is before inflation—if he or she were an average saver with a real-world 401(k) and wished to have the same likelihood of a secure retirement as offered by the SAFE Plan.

When considering the risk that a worker's savings will fail to provide him or her with a sufficient standard of living in retirement, fixed contributions of 12 percent of salary give a worker in a SAFE Retirement Plan 2.3 times the likelihood of maintaining his or her standard of living compared to a typical 401(k).



The distribution of outcomes for the SAFE Plan is also better than that for a perfect-world 401(k), with SAFE Plan participants having a 10 percent greater likelihood of achieving the target replacement rate of 70 percent.

Another way of thinking about risk is to consider the very worst possible outcomes. Here again, the SAFE Plan shines: The risk for a SAFE Retirement Plan participant of falling significantly below preretirement standards of living is much lower. The average shortfall risk for the worst 5 percent of outcomes is one way to capture this extreme risk. We define the shortfall risk as the difference between the modeled result and the 34 percent target needed to achieve the total 70 percent replacement rate including Social Security. For example, if one of our results produces a replacement rate of only 25 percent, then the shortfall risk measure would be 9 percentage points.

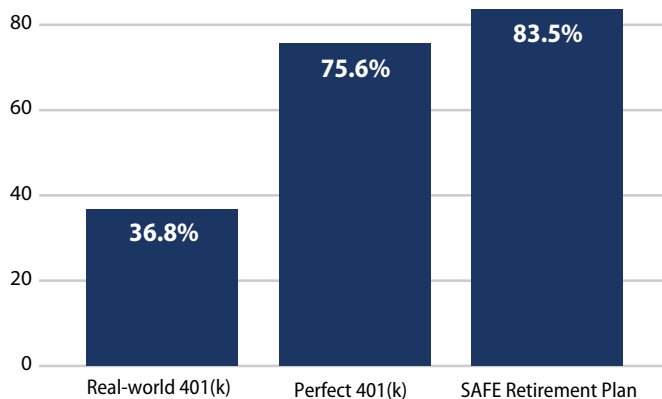
For the SAFE Plan, the shortfall risk for the worst 5 percent of outcomes is 12.3 percentage points, compared with 18.4 percentage points and 25 percentage points for the perfect 401(k) and the real-world 401(k), respectively. What this actually means once payments from Social Security are taken into account is that even the worst outcomes possible with the SAFE Plan still provide plan participants with a retirement income only 17.6 percent below their target income, while a participant in a perfect 401(k) would have an income 26.3 percent below their target income, and a typical 401(k) participant would have an income 35.7 percent below their target income.

Still another way to think about the potential outcomes is to consider the better outcomes as the “reward” and the worst potential outcomes as the “risk.” Let’s define reward in this instance as the average replacement rate for the top 80 percent of outcomes and the risk as the average replacement-rate shortfall for the bottom 20 percent of outcomes. Once again, the shortfall is the difference between the modeled result and the 34 percent target needed to achieve the total 70 percent replacement rate including Social Security.

FIGURE 5

Savers in a SAFE Retirement Plan are more likely to maintain standard of living in retirement

Probability of meeting target replacement rate of 34 percent

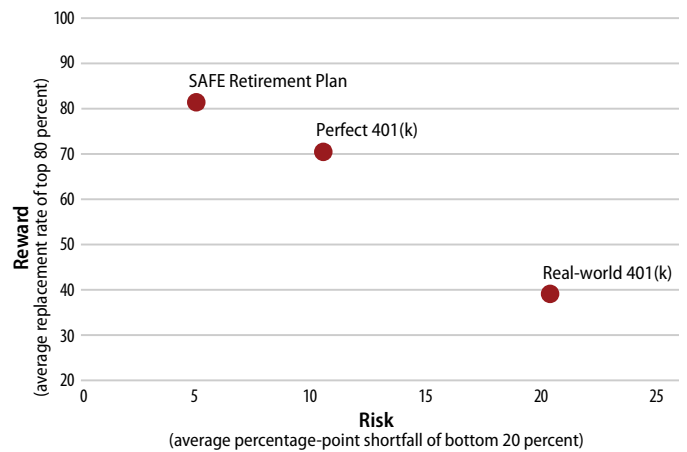


Source: Figures produced by stochastic model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

Using these definitions, the reward for a member of a SAFE Retirement Plan would be 81.3 percent, compared with 70.5 percent and 39.1 percent for the perfect and real-world 401(k)s, respectively. On the risk side, the SAFE Plan has a 5.1 percentage-point average shortfall, while the perfect 401(k) has a 10.6 percentage-point shortfall risk, and the real-world 401(k) has a 20.4 percentage-point shortfall risk. In other words, the SAFE Plan is able to provide a higher reward measure, even while reducing the risk.

Finally, an evaluation of different levels of contributions also shows how much better the SAFE Retirement Plan performs. In all these scenarios, the SAFE Retirement Plan achieves better outcomes. For example, consider contribution rates of 10 percent, or roughly the median total contribution—worker plus employer—for workers who participate in a 401(k) plan.⁶¹ In this scenario, the reward—again, defined as the average replacement rate of the best 80 percent of outcomes—is 67.8 percent for a SAFE Retirement Plan, 58.7 percent for a perfect 401(k), and 32.6 percent for a typical 401(k). Similarly, for the bottom 20 percent of outcomes, the shortfall risk of a SAFE Retirement Plan is only 9.9 percentage points, while it is 14.5 percentage points for a perfect 401(k) and 22.7 percentage points for a typical 401(k). On every measure we use with our stochastic modeling, the SAFE Retirement Plan outperforms both the model 401(k) and the realistic 401(k) in providing a more secure retirement.

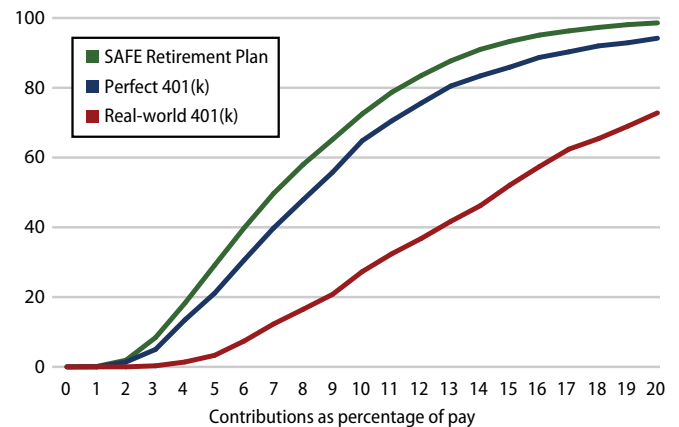
FIGURE 6
SAFE Retirement Plan is less risky and has higher reward than other plan types



Source: Figures produced by stochastic model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

FIGURE 7
SAFE Retirement Plan more likely to lead to adequate retirement saving than 401(k) plans at every contribution level

Probability of meeting target replacement rate of 34 percent



Source: Figures produced by stochastic model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

No matter which model is used—historical or stochastic—the SAFE Retirement Plan comes out ahead. On almost every metric, it outshines not only the typical 401(k) but also the idealized 401(k) representing the best possible outcomes for a 401(k) plan. This is due to the SAFE Plan’s ability to keep fees low, spread costs over a much larger number of workers, and use the surplus returns from particularly good years to safeguard the quality of life of workers who might experience especially poor returns at key points in their lifetime.

Conclusion

Our private-sector retirement system is broken. Yet as this report has shown, the creation of a SAFE Retirement Plan would significantly improve our private-sector retirement system. A SAFE Plan would better handle the risks and costs of retirement compared to the typical and perfect-world 401(k) plan. A saver in one of these funds would be better protected against market downturns and the erosion of his or her retirement benefits while contributing a smaller share of his or her salary. The SAFE Retirement Plan presented in this paper should serve as a model for policymakers as they consider reforming our retirement system.

About the authors

Rowland Davis is a Senior Fellow at American Progress. He is a nationally known actuary and pension consultant who heads his own firm—RMD Pension Consulting, created in 1997—that specializes in asset and liability modeling, risk management, and asset-allocation studies for pension funds. He has developed his own proprietary simulation models and risk-reward models. Working both independently and through a strategic alliance with the investment consulting firm of Ennis, Knupp & Associates, Rowland has conducted numerous policy studies for large pension funds across the country.

Formerly a vice president and consulting actuary at Towers Perrin Forster & Crosby, Inc., or TPF&C, he was also the national director of the asset and liability forecasting and asset-allocation practices at TPF&C. Prior to this national role, Rowland was the senior actuary in TPF&C's Chicago office and lead consultant for several of their largest clients.

Rowland left TPF&C in 1992 with three other partners to form a new actuarial and benefits consulting firm, Davis Conder Enderle & Sloan. Previously, Rowland also worked as a consultant with Meidinger, Inc. and Hewitt Associates.

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Madland has a doctorate in government from Georgetown University and received his bachelor of science from the University of California, Berkeley. He is the co-author of *Interest Groups in Elections*, a book about the role and influence of interest groups in American democracy and is the author of a number of academic articles. He has worked on economic policy for Rep. George Miller (D-CA) and has consulted for several labor unions.

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We would like to thank Nick Bunker and Keith Miller for their invaluable assistance with this paper. We would also like to thank Christian Weller, Monique Morrissey, John Adler, Michele Varnhagen, Michael Kreps, Anne Button, and Armand Yambao for their comments on earlier drafts of this paper. Any mistakes are our own.

Appendix

Because retirement account balances are influenced by a number of variables whose values we cannot predict with certainty—such as investment returns, inflation, wage growth, and annuity purchase rates—we used a Monte Carlo simulation method to model this uncertainty and ran 1,000 simulations.

Monte Carlo simulations require that each input variable such as investment returns be assigned a probability distribution—defined primarily by a mean expected-value assumption and a standard deviation, or volatility, assumption—to reflect the uncertainty of the outcome. These values are based on the following assumptions.

Price inflation

We assume the expected value of price inflation to be 2.5 percent, which is consistent with long-term expectations and current Federal Reserve policy as reflected in market break-even inflation rates. The standard deviation is assumed to be 1.7 percent. The inflation model used is nonlinear, meaning that inflation will revert to the mean, simulating the actions of the Federal Reserve, and includes random bouts of inflation that can become reinforcing.

Wage inflation

Wage inflation is assumed to have an expected value of 3.6 percent and a standard deviation of 1.4 percent. The real wage growth rate of 1.1 percent is the same assumption used by the actuaries at the Social Security Administration when they project the health of the fund in the long run.

Core fixed-income returns

We assume that fixed-income assets such as bonds have a return with an expected nominal value of 4.6 percent and a standard deviation of 5 percent. The 2.1 percent real return is consistent with historical experience.

Equity returns

We assume the return on equities or stocks has an expected nominal value of 8.1 percent and a standard deviation of 20 percent. We assume a blend of 75 percent stocks listed in the United States and 25 percent stocks that are listed outside the United States. The expected return assumes a 3.5 percent equity risk-premium level, compared to the fixed-income portfolio, which is consistent with actual historical results averaged over long periods during the past 50 years. The standard deviation is consistent with historical experience, but the distribution is not normal. We use a model that allows for markets to become turbulent, and the probability of large negative returns is higher than in a normal distribution. In other words, our distribution is “fat-tailed,” which captures extra downside risk.

Career pay progression

We assume that over the course of an individual’s career, his or her pay increases by an average annual rate of 1.6 percent until he or she is 50 years old, and then an average annual rate of 0.25 percent until he or she is 65, at which point wages are, on average, flat until retirement at age 67. This wage growth would then include a random wage inflation described above. We assume that the starting pay for the median-income earner in our model is \$34,600 at age 30. The starting pay level and the career progression assumptions are based on Current Population Survey data.

Mortality rates

The base mortality table used is the Retirement Plan-2000 mortality table, which was released by the Society of Actuaries in July 2000. The rates contained in this table were then projected forward to 2048 and adjusted using the recommended Scale BB projection factors to account for expected improvements in mortality rates over time. The rates utilized are a unisex set of rates based on 50 percent male and 50 percent female weights. Using these rates, the expected future lifetime for an individual retiring at age 67 is 23 years (to age 90). This relatively high age is a consequence of projected mortality improvements.

The collar

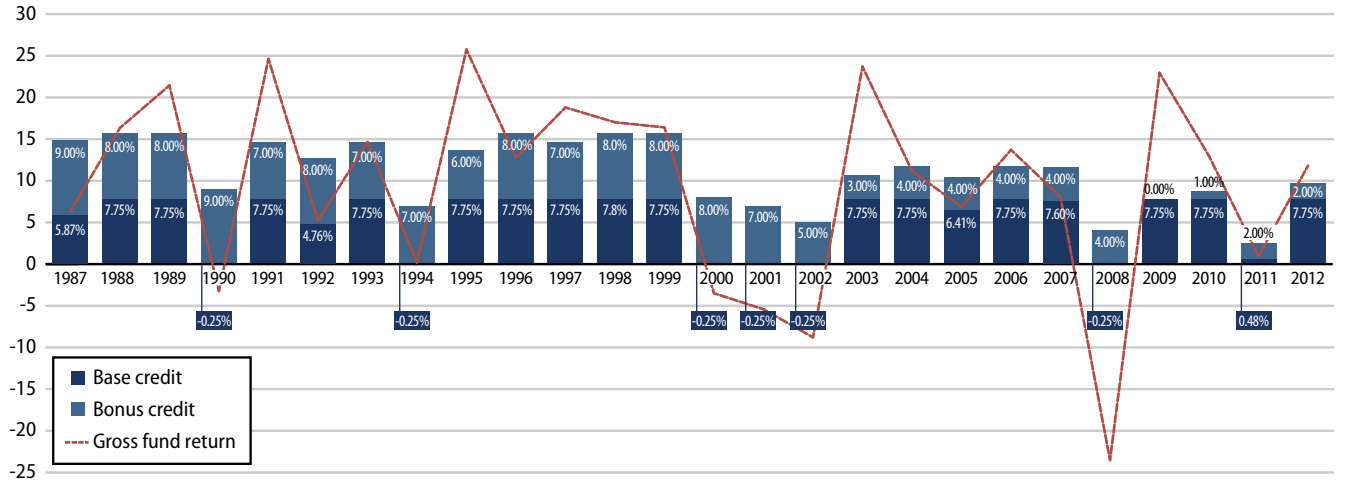
A brief explanation of a collar is as follows. Technically, in financial markets, a collar is created by buying a put option—the right to sell the underlying asset if it falls below a set price—and selling a call option, which is the obligation to sell the underlying asset if it rises above a set price. The result is that the owner of the collar is protected against a large decline but must also give up the returns above a certain level to pay for that protection. In a SAFE Retirement Plan, the main fund would be the buyer of the collar, and the plan’s notional reserve fund would be the seller. In practice this would mean that excess gains from particularly good years would be put aside in the notional reserve fund to supplement workers’ returns in down years.

An example of how the collar would have protected individuals’ account balances over the past 25 years can be seen below. The results contained in the graph were produced by the historical model described in the report. Despite the volatility of market returns over this time period, SAFE Plan accounts always accrued investment credits of at least 2.4 percent.

The base-credit figures shown below are net of fees, which is why even when a 0 percent return was credited to member accounts, it appears as -0.25 percent, and why the highest base credit in any given year was only 7.75 percent.

APPENDIX FIGURE 1

Projected actual fund return versus investment credits provided to individual SAFE Retirement Plan accounts over past 25 years



Source: Figures produced by historical model. Authors' analysis based on contributions of 12 percent of pay and other assumptions as described in report.

Account balance reductions

In the event that SAFE Plans find themselves severely underfunded, they may reduce members' account balances for a period of time until the funds' current-value ratios climb above their designated threshold. In our models, we set a current-value ratio of 30 percent as the threshold for a fund being considered underfunded, although such thresholds are clearly a matter that can be debated and adjusted if necessary in the future. Given this assumption, such account-balance reductions occurred in only 5 of the 1,000 model runs.

APPENDIX TABLE 1

Bonus investment credit schedule

If current-value ratio exceeds	Bonus (value of investment credit)
110%	1%
120%	2%
130%	3%
140%	4%
150%	5%
160%	6%
170%	7%
180%	8%
190%	9%
200%	10%

APPENDIX TABLE 2

Annuity-fund bonus check schedule

If funded ratio exceeds	Bonus (percent of regular benefit)
110%	5%
120%	15%
130%	25%
140%	50%
150%	75%

Historical model results

APPENDIX TABLE 3

Replacement rates provided for cohorts retiring in given year by each plan

Year	Retirement plan			
	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan; no post-2012 bonuses	SAFE Retirement Plan; with post-2012 bonuses
1966	29.1%	54.7%	59.4%	59.4%
1967	29.2%	59.7%	61.4%	61.4%
1968	29.2%	61.7%	64.6%	64.6%
1969	25.5%	61.9%	63.6%	63.6%
1970	24.6%	53.6%	63.5%	63.5%
1971	25.9%	53.9%	63.2%	63.2%
1972	27.2%	59.0%	65.5%	65.5%
1973	22.9%	51.6%	63.6%	63.6%
1974	18.8%	45.1%	59.7%	59.7%
1975	21.4%	53.7%	60.2%	60.2%
1976	23.3%	53.1%	61.9%	61.9%
1977	21.7%	53.1%	59.7%	59.7%
1978	21.2%	57.5%	60.1%	60.1%
1979	20.9%	62.7%	60.0%	60.0%
1980	21.6%	75.5%	59.8%	59.8%
1981	20.3%	74.6%	58.2%	58.2%
1982	23.4%	0.0%	60.9%	60.9%
1983	25.2%	82.7%	63.9%	63.9%
1984	25.6%	82.2%	67.3%	67.3%
1985	31.1%	85.5%	71.4%	71.4%
1986	34.0%	78.3%	74.5%	74.5%
1987	32.5%	87.1%	78.9%	78.9%
1988	34.1%	92.2%	84.9%	84.9%
1989	37.5%	91.5%	87.7%	87.7%
1990	34.4%	85.6%	86.4%	86.4%
1991	38.4%	87.8%	90.1%	90.1%
1992	38.7%	86.1%	95.0%	95.0%
1993	41.3%	83.9%	102.1%	102.1%
1994	38.0%	92.7%	98.8%	99.6%
1995	43.3%	87.6%	100.8%	102.4%
1996	43.8%	93.7%	103.6%	106.2%
1997	47.2%	96.5%	106.2%	109.7%
1998	49.9%	91.2%	109.5%	114.0%
1999	51.8%	111.1%	113.0%	118.5%
2000	49.0%	95.5%	111.6%	117.8%
2001	46.2%	89.0%	110.7%	117.7%
2002	42.0%	72.6%	106.3%	113.8%
2003	46.4%	82.4%	105.6%	114.0%
2004	46.9%	83.1%	106.5%	115.9%
2005	45.7%	83.3%	105.0%	115.3%
2006	47.1%	87.0%	104.8%	116.0%
2007	47.7%	84.0%	106.3%	118.9%
2008	38.5%	56.1%	103.8%	117.2%
2009	43.0%	71.9%	101.1%	115.2%
2010	44.1%	71.5%	102.1%	116.4%
2011	41.1%	56.9%	96.5%	109.5%
2012	40.6%	54.3%	97.7%	109.2%

Stochastic model results

APPENDIX TABLE 4

Replacement rate distributions with contributions of 12 percent of pay

Retirement plan			
Percentile	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan
100	182.2%	346.3%	472.7%
99	113.1%	211.5%	235.6%
98	93.4%	184.9%	201.7%
97	84.1%	153.1%	184.2%
96	79.0%	140.7%	171.3%
95	76.5%	136.0%	161.3%
94	73.4%	130.2%	152.6%
93	69.5%	125.8%	145.2%
92	66.0%	120.9%	138.6%
91	64.4%	116.7%	132.9%
90	63.1%	112.2%	128.1%
89	61.3%	109.2%	123.9%
88	58.9%	105.9%	120.2%
87	55.5%	102.9%	116.8%
86	54.0%	100.4%	113.7%
85	53.1%	97.0%	111.0%
84	52.1%	93.5%	108.0%
83	50.2%	90.9%	105.3%
82	48.6%	87.7%	102.8%
81	47.0%	85.0%	100.4%
80	46.2%	84.0%	98.2%
79	45.1%	82.8%	95.9%
78	44.4%	79.3%	93.9%
77	43.6%	78.7%	92.0%
76	43.0%	77.2%	90.3%
75	42.4%	76.3%	88.6%
74	41.5%	74.7%	86.8%
73	40.9%	73.0%	85.0%
72	40.4%	71.9%	83.4%
71	39.5%	70.6%	81.8%
70	39.0%	68.7%	80.4%
69	38.1%	67.5%	79.1%
68	37.2%	66.4%	77.7%
67	36.7%	65.8%	76.5%
66	36.0%	64.4%	75.2%
65	35.2%	63.0%	73.9%
64	34.3%	61.9%	72.7%
63	33.9%	60.8%	71.3%
62	33.5%	60.0%	70.2%
61	33.1%	58.9%	68.9%
60	32.2%	57.6%	67.7%
59	31.6%	56.5%	66.6%
58	31.3%	55.6%	65.7%
57	30.8%	54.8%	64.6%

Continues

Appendix Table 4 continued

Retirement plan			
Percentile	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan
56	30.4%	53.6%	63.6%
55	29.7%	52.8%	62.6%
54	29.3%	52.2%	61.6%
53	28.8%	51.5%	60.7%
52	28.4%	50.8%	59.8%
51	28.0%	50.0%	58.9%
50	27.7%	49.3%	57.9%
49	27.5%	48.6%	57.1%
48	27.2%	48.1%	56.2%
47	26.9%	47.6%	55.3%
46	26.5%	46.8%	54.4%
45	26.3%	45.8%	53.6%
44	26.0%	45.3%	52.7%
43	25.7%	44.7%	51.9%
42	25.3%	44.4%	51.0%
41	25.0%	43.7%	50.1%
40	24.8%	43.1%	49.3%
39	24.5%	42.6%	48.4%
38	24.2%	42.0%	47.7%
37	23.7%	41.7%	46.9%
36	23.1%	41.1%	46.2%
35	22.8%	40.6%	45.5%
34	22.5%	40.0%	44.8%
33	22.1%	39.3%	44.1%
32	21.9%	38.5%	43.4%
31	21.5%	38.0%	42.8%
30	21.2%	37.5%	42.2%
29	20.9%	36.7%	41.7%
28	20.7%	36.3%	41.1%
27	20.3%	35.4%	40.5%
26	20.2%	34.7%	39.9%
25	19.9%	34.4%	39.3%
24	19.7%	33.8%	38.7%
23	19.3%	33.3%	38.0%
22	18.7%	32.7%	37.5%
21	18.4%	32.2%	36.9%
20	18.0%	31.7%	36.3%
19	17.6%	31.1%	35.6%
18	17.2%	30.4%	35.0%
17	16.8%	29.5%	34.3%
16	16.5%	28.8%	33.7%
15	16.2%	27.9%	33.0%
14	15.9%	27.2%	32.4%
13	15.4%	26.6%	31.8%
12	15.2%	26.1%	31.2%
11	15.0%	25.3%	30.5%

Continues

Appendix Table 4 continued

Retirement plan			
Percentile	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan
10	14.6%	24.2%	29.9%
9	13.5%	23.6%	29.1%
8	13.3%	22.7%	28.3%
7	12.5%	21.4%	27.5%
6	12.1%	20.7%	26.5%
5	11.3%	19.2%	25.6%
4	10.5%	18.4%	24.4%
3	10.0%	17.0%	23.0%
2	8.9%	15.3%	21.7%
1	7.8%	12.5%	19.1%
0	4.5%	7.3%	11.8%

APPENDIX TABLE 5

Probability of meeting target replacement rate of 34% at different contribution levels

Retirement Plan			
Contribution as percentage of pay	Real-world 401(k)	Perfect 401(k)	SAFE Retirement Plan
1%	0.0%	0.0%	0.1%
2%	0.0%	1.4%	1.9%
3%	0.3%	5.0%	8.4%
4%	1.4%	13.5%	18.3%
5%	3.3%	21.1%	29.1%
6%	7.4%	30.6%	39.8%
7%	12.3%	39.8%	49.7%
8%	16.5%	47.9%	58.0%
9%	20.8%	55.8%	65.2%
10%	27.3%	64.8%	72.5%
11%	32.4%	70.5%	78.7%
12%	36.8%	75.6%	83.5%
13%	41.7%	80.5%	87.7%
14%	46.2%	83.4%	91.0%
15%	52.1%	85.9%	93.3%
16%	57.4%	88.7%	95.1%
17%	62.4%	90.3%	96.3%
18%	65.4%	92.0%	97.3%
19%	69.0%	92.9%	98.1%
20%	72.8%	94.2%	98.6%

Endnotes

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- 51 Hewitt Associates, "Hewitt Study Shows More Companies Putting 401(k) Plans on Autopilot; Employers Encourage Retirement Savings by Automating and Simplifying 401k Plan Features"; Updegrave, "The retirement plan Uncle Sam has right."
- 52 Munnell, Fraenkel, and Hurwitz, "The Pension Coverage Problem in the Private Sector."
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- 54 Government Accountability Office, "Private Pensions."
- 55 Aon Hewitt, "2012 Hot Topics in Retirement: Waning Confidence and the Need for Continued Innovation" (2012), available at http://www.aon.com/attachments/human-capital-consulting/2012_Hot_Topics_in_Retirement_highlights.pdf; Scott, Sharpe, and Watson, "The 4% Rule—At What Price?."
- 56 Reported replacement rates for SAFE Retirement Plan participants account for annual cost of living adjustments of 2 percent. Replacement rates for perfect 401(k) participants also account for an annual COLA of 2 percent. Retirees with a real-world 401(k) are assumed to use the "4 percent rule," whereby a retiree takes out annual withdrawals equal to 4 percent of their account balance at retirement indexed for inflation.
- 57 Andrew G. Biggs and Glenn R. Springstead, "Alternate Measures of Replacement Rates for Social Security Benefits and Retirement Income," *Social Security Bulletin* 68 (2) (2008), available at <http://www.ssa.gov/policy/docs/ssb/v68n2/v68n2p1.pdf>.
- 58 The 36 percent figure cited here is calculated using the expected final working-year salaries of workers retiring at age 67 that are currently age 30. It differs from the Social Security Administration's estimated replacement rates for 30-year-old workers with medium lifetime earnings retiring at age 67—approximately 41 percent replacement—because the SSA's calculations use workers' average career earnings as opposed to their final-year earnings. The authors believe using final-year earnings more accurately captures the extent to which workers' postretirement standard of living reflects their preretirement standard of living, since a career-long average is not necessarily reflective of individuals' lifestyles at the end of his or her working life.

59 All replacement-rate estimates produced by the historical model are differentiated between those that take into account possible post-2012 bonus payments to retirees and those that do not. This is because it is not yet possible to know exactly what bonus payments will be made in the years after 2012 to those cohorts currently in the early or middle portion of their payout period since the bonuses' frequency and size will be dependent on future fund performance. To ensure that this uncertainty was taken into account, two separate sets of results were calculated. The first simply assumes that there will be no future bonus payments to retirees, while the second assumes that future bonus payments would follow expected patterns based on our simulation results. Consequently, those results that do not take into account any projected bonuses should be considered the worst-case-scenario results, while those that do take them into account represent a more likely set of outcomes based on past market performance.

60 The SAFE Plan's worst single-year replacement rate of 58.2 percent in 1981 was higher than the worst rates of both the perfect and real-world 401(k)s, which were 45.1 percent and 18.8 percent, respectively, in 1974. The best single-year rate provided by the real-world 401(k) was only 51.8 percent in 1999. The SAFE Plan offered a worst-case maximum rate of 113 percent in 1999 and a best-case maximum of 118.9 percent in 2007, compared to the perfect 401(k)'s best single-year rate of 111.1 percent in 1999.

61 Median total contribution rate in 2012 was 9.5 percent, while the average was 10.5 percent. See The Vanguard Group, "How America Saves 2013: A Report on Vanguard 2012 Defined Contribution Data" (2013), available at <https://institutional.vanguard.com/iam/pdf/HAS13.pdf>.

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