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TIAA AND CREF: PROGRAM FEATURES AND RECENT EVIDENCE ON PERFORMANCE AND UTILIZATION

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ABSTRACT

Hybrid retirement plans that combine the best features of defined benefit and defined contribution plans can provide an efficient and equitable method of ensuring retirement security for workers. Co-operative pension structures also enhance retirement security through risk pooling and leveraging economies of scale. Yet most U.S. private sector workers are not covered by these types of plan design. The TIAA-CREF system, which began in 1918 and covers millions of workers in the non-profit sector, provides an example of a plan design with features of a hybrid co-operative pension. We examine the historical performance of the core components, TIAA (a guaranteed fixed annuity) and CREF (a variable annuity), discuss key design features, and analyze data on contributions, investment returns, risk pooling, and retirement distribution characteristics.

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Financial Services

Over the past 30 years, defined contribution (DC) plans have emerged as the primary employment-based retirement program for millions of U.S. workers.[1] DC plans provide covered workers with substantial latitude in determining whether to participate, how much salary to contribute, how to invest assets, and how to take distributions from the plans. As participation in DC plans has grown, more households bear increased responsibility for managing the various risks to their retirement savings. A growing body of research finds that many DC plan participants have difficulty making decisions that maximize their chances of achieving retirement security. For example, workers may make poor retirement plan decisions because they are prone to certain behavioral biases or have low financial literacy.[2] Policy makers recently began enacting changes to the DC plan system with the goal of reducing the risk of participants making systematic mistakes. Major changes enacted as part of the Pension Protection Act of 2006 included new rules for qualified plan default provisions that were designed to increase worker participation, achieve a minimum rate of retirement contributions, and provide automatic investment diversification. These changes focused on helping households manage risk during the accumulation phase but provided no guidance for the distribution phase of their retirement plan.

As the U.S. population ages, there is a great need to ensure that retirement programs are designed to carry individuals not just to but also through retirement. This need has resulted in a renewed interest in plan designs that include guaranteed income options that can help households manage various retirement income risks. Among the ideas being considered policy makers are requiring default (or mandatory) annuity features and encouraging the expanded use of hybrid plan designs.

The chapter provides an overview of how TIAA-CREF, a Fortune 100 financial services company that provides retirement services to the non-profit and public sectors, incorporates features of a co-operative hybrid pension into retirement plan design. We define a co-operative pension as a retirement plan that, over time, distributes all assets (net of operating costs) to system participants. A hybrid pension combines elements of both a Defined Contribution (DC) plan and a Defined Benefit (DB) plan. The TIAA-CREF retirement system combines a DC structure during the accumulation phase, with workers allocating contributions to investment choices that include mutual funds and deferred fixed and variable annuities; a DB structure during retirement by providing the option to annuitize part (or all) of retirement assets; and a co-operative structure for individuals who participate in the fixed annuity component over their working and retired lives.

In what follows we first provide a brief overview of the TIAA-CREF system. Next we discuss how TIAA Traditional, a guaranteed fixed annuity, and the CREF variable annuity work and provide data on past performance. We then review some recent data on participant experience, and a final section concludes.

THE BASICS OF TIAA-CREF SYSTEM

TIAA-CREF is multi-faceted financial services organization, offering a range of pension, IRA, life insurance, brokerage, financial guidance and advice, wealth management, banking, endowment, and planned giving services. In this chapter, we focus on the structure of core pension business which serves over 3.9 million individuals and over 15,000 institutional clients.[3] Many institutions offer at least two plans – a primary plan (which may accept only employer contributions) and a supplemental plan (which typically accepts only employee contributions). Because TIAA-CREF serves the non-profit and public sector markets, some institutions are subject to the Employee Retirement Income Security Act (ERISA) but many are not. Numerous sources provide information on corporate structure, governance, and risk management aspects of TIAA-CREF.[4] Our focus in this chapter is how the system impacts participant outcomes.

Individuals participating in the TIAA-CREF system choose from a menu of investments when building their retirement portfolios. Table 1 provides information on the asset classes and investment choices available to participants as of December 31, 2013; it also documents the rapid growth in the investment choice set over the past 20 years. Participants can invest in one guaranteed asset, the TIAA Traditional annuity. This asset class was the genesis of the Teachers

Insurance and Annuity Association (TIAA) in 1918 and provides a guarantee of principal, a guaranteed interest rate, and additional declared dividends in excess of the guaranteed rate.[5] In 1952, the College Retirement Equity Fund (CREF) became the first organization to offer a variable annuity when it introduced the CREF stock account. This account allowed participants to directly purchase (and bear the associated investment risks of) an equity asset class within their retirement plans. In 1988, CREF began offering a fixed income asset class with the introduction of the CREF Money Market account. A fourth asset class – balanced – was added in 1990 with the introduction of the CREF Social Choice fund.[6] The introduction of the TIAA Real Estate fund in 1995 added a fifth asset class – real estate. As shown in Table 1, a number of additional equity, fixed income, real estate, and balanced asset class fund options were added to the investment menu over the 1990s and 2000s. Notable among these were the introduction of the CREF inflation-linked bond fund (1997), retirement class mutual funds (2002), and the target-date series of life-cycle mutual funds in 2004. In total, TIAA-CREF offered 57 investment options across five different asset classes at year-end 2013; assets were divided about 39 percent to 69 percent into the equity and non-equity asset classes, respectively.

TABLE 1. TIAA-CREF ASSET CLASSES AND ASSETS UNDER MANAGEMENT

As of December 31, 2013

Asset Class and Investment Account	Date of Inception	Assets ($ mil.)	% of Total
Guaranteed			
TIAA Traditional	April 23, 1918	$259,504	43.8%
Equity			
CREF Stock	July 1, 1952	$126,458	39.4%
CREF Global Equities	March 1, 1990	$19,128	
CREF Growth	April 29, 1994	$19,409	
CREF Equity Index	April 29, 1994	$15,858	
TIAA-CREF Equity Mutual Funds (21)	October 1, 2002	$52,478	
Fixed Income			
CREF Money Market	April 1, 1988	$11,979	8.2%
CREF Bond Market	March 1, 1990	$13,078	
CREF Inflation Linked Bond	May 1, 1997	$7,644	
TIAA-CREF Fixed Income Mutual Funds (9)	March 31, 2006	$16,006	
Real Estate			
TIAA Real Estate	October 2, 1995	$16,908	3.1%
TIAA-CREF Real Estate Securities Mutual Fund	October 1, 2002	$1,286	
Multi-Asset			
CREF Social Choice	March 1, 1990	$13,341	5.5%
Lifecycle funds (10)	October 15, 2004	$18,203	
Lifestyle funds (5)	December 9, 2011	$243	
TIAA-CREF Managed Allocation Mutual Fund	March 31, 2006	$710	

Source: TIAA-CREF Asset Management

At retirement, participants have a menu of distribution options available for converting assets into retirement income. Participants have access to a full menu of annuity options, including fixed and variable, single and joint, standard and graded, various length guaranteed (or certainty) periods, transfer payout, and interest only payments. Participants also have options to take systematic withdrawals, lump-sum payments, or required minimum distributions. The flexibility of the distribution menu allows participants to customize their retirement incomes to suit their own consumption and estate planning needs.

Prior to 1988, however, the TIAA-CREF system could be characterized as a co-operative hybrid retirement plan. The hybrid component was facilitated through a plan design that required defined contributions be allocated to units of deferred annuities and then participants converted these assets into a lifetime income benefit in retirement. The co-operative component was attributed to a system design that, over time, distributed all assets (net of operating costs) to participants. Though the requirement to convert assets into lifetime annuities is no longer the norm, the co-operative arrangement remains in place for participants choosing to utilize annuities. In what follows we describe how TIAA and CREF work and provide data showing the two products remain an integral part of many participants' retirement income plans.

TIAA TRADITIONAL

The TIAA Traditional annuity is a guaranteed fixed annuity product that can be purchased at retirement or while working by investing in deferred TIAA annuity units through an employment-based retirement plan. During a participant's working life, the overall concept of "investing" in TIAA is quite simple. Contributions are made by a participant (or on behalf of the participant by his/her employer).[7] Each contribution has a guaranteed lifetime minimum rate of return that is based on the month and year in which the contribution was made. For most of our participants, this guaranteed minimum rate is 3%.[8] All TIAA participants are thus guaranteed (subject to TIAA meeting its claim paying ability) to have an account balance that continually grows at the stated minimum rate. In addition, in any year the TIAA Trustees can declare that "additional amounts" will be credited to participant accounts – in effect providing an interest rate greater than the guaranteed minimum rate.

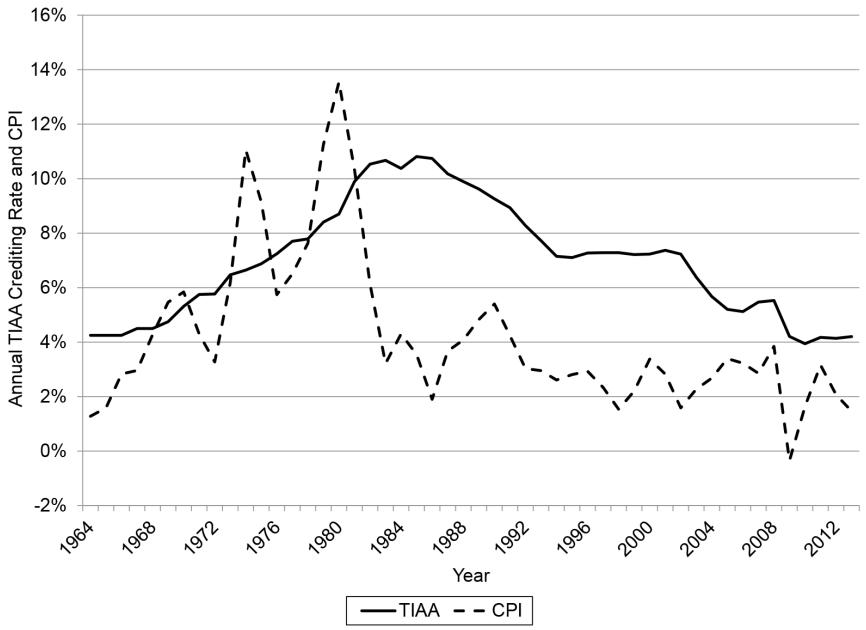
A participant (or surviving spouse, partner, or beneficiary) has the right, but not the obligation, to turn the accumulated units of TIAA into a stream of lifetime income. The decision to contractually convert into lifetime income typically happens in retirement but can occur at later ages. Similar to the accumulation phase, the TIAA annuity contract has a guaranteed minimum payout rate and the TIAA trustees, on an annual basis, can declare additional amounts to increase the total payment beyond this minimum guarantee. A full menu of annuity choices is available and includes options for single or joint life, standard or graded, and certainty periods of various lengths.[9] If a participant chooses not to take a lifetime annuity, then there are other income options such as receiving interest only payments, taking the Required Minimum Distribution (RMD) amounts, or opting for an annuity certain. The accumulated balance can also be transferred out of TIAA in roughly equal-sized periodic payments using a Transfer Payout Annuity (TPA), with the transferred amounts moved into other TIAA-CREF investments or taken out of the system, though this may depend on plan rules.[10]

The basic concepts behind TIAA are simple, but features of the system make including a TIAA deferred annuity in an investment portfolio somewhat complex to understand. First, in each year for over 50 years, the TIAA trustees have declared additional amounts for both the accumulation rate and the payout rate. Hence, participants and advisers who only consider the minimum guarantee would tend to underweight the expected return contribution of the product. Second, TIAA has a unique "vintage" system that applies different crediting rates to marginal accumulations based on the time of original contribution. Thus, the return a participant earns on his total contributions is unique to that individual's history of contributions. Third, there is typically limited liquidity and cashability for TIAA accumulations held in employer-sponsored retirement plans, thereby limiting the ability to rebalance a portfolio. Each of these features will be addressed in this section.

TIAA CREDITING RATES DURING THE ACCUMULATION PHASE

Participants can purchase TIAA deferred annuity units through their retirement plan either by allocating part of their contributions or by transferring other retirement assets into the product. The accumulated TIAA units earn a lifetime guaranteed minimum rate of return that is determined by the type of retirement plan contract. For many participants this guaranteed minimum is 3%, though more recent plan contracts have a year-to-year floating guaranteed rate that is at least 1% and at most 3%.[11] For the past few decades, the actual credit rates have been much higher than the guaranteed minimum specified in the plan contract. Figure 1 shows the average crediting rate earned by units in illiquid employer-based contracts over the past 50 years.

FIGURE 1. TIAA AVERAGE CREDITING RATES VERSUS CONSUMER PRICE INDEX: 1964 – 2013



Source: TIAA-CREF and Bureau of Labor Statistics

Figure 1 shows that the average crediting rate is generally positively correlated with long-term nominal interest rates but not with inflation. The crediting rate increased as interest rates rose from the 1960s through the 1970s, and the reverse has occurred over the past three decades. Note also that the TIAA crediting rates have been in excess of the 3% for over 40 years, sometimes substantially. As evidenced in Figure 1, the TIAA crediting rate has also exceeded the rate of inflation for decades.[12] This pattern of crediting rates is due to the long term nature of the underlying investments in the portfolio, the insurer's ability to buy and hold investments (especially government bonds), the size of the general account (which helps facilitate investment in alternative assets), and low expenses.

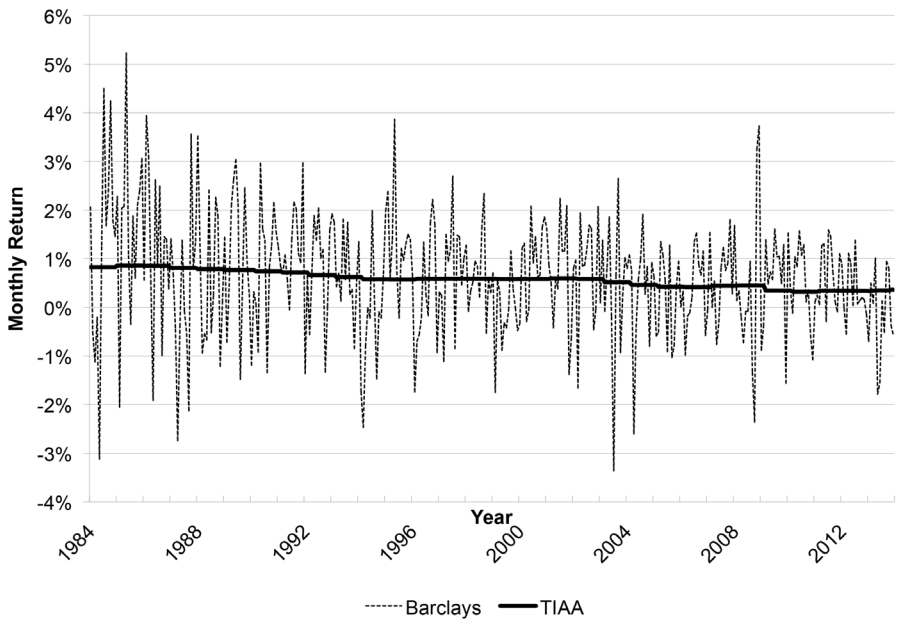
When a participant is credited with earnings on his existing TIAA assets, his new accumulation receives the same guaranteed minimum rate. As a simple example, suppose a participant makes a one-time allocation of $100 to TIAA and has a plan contract with a guaranteed minimum rate of 3%. After 10 years, the minimum accumulation would be $134.39. If instead, during the first year, the actual crediting rate was 5%, then after 10 years the guaranteed minimum accumulation will be $137.[13] The additional 2% earned in the first year is guaranteed once it has been earned.

As an illustration using historical returns, assume a participant made a one-time allocation to TIAA of $100 on January 1, 1984 and had a plan contract with a guaranteed minimum crediting rate of 3%. A 30 year projection of his guaranteed minimum accumulation as of January 1, 2014 would have been $242.73. But when we apply the actual crediting rates to this participant's TIAA accumulations, the actual amount accumulated was $846.61, an amount nearly 3.5 times larger than the guaranteed minimum. Of course, past performance is no guarantee of future results, and if today's low interest rate

environment persists into the foreseeable future then there is a strong likelihood that a 2044 actual accumulation from a one-time $100 contribution in 2014 will result in a smaller total return. Nevertheless, it is important to understand that considering only the guaranteed minimum accumulation rate of 3% understates the potential value of investing in a TIAA account.

Another important aspect of investing in TIAA is the lack of downside volatility in the total return to the participant. When market interest rates rise or fall, bond holders can experience portfolio gains or losses to their total return because of the interaction between interest rates and the price of bonds. By contrast, TIAA participants always earn a positive return because the interest rate risk is managed within the TIAA general account. This lack of participant downside investment risk compares favorably to other "safe" fixed income investments – namely bond funds – that are required to distribute capital gains and losses to participants. Figure 2 compares the past 30 years of monthly returns in TIAA with the Barclays Aggregate Bond Fund returns.[14] The bond funds had negative monthly returns about 30% of the time over the sample period. The likelihood of short term negative bond returns is a particularly important consideration for older workers nearing retirement and who are rebalancing their portfolio away from equities and towards fixed income products. A consequence of using that strategy in a rising interest rate environment is that near-retirees may bear excessive interest rate risk relative to an alternative strategy of holding TIAA. This is because the latter pools the risk within a general account that is not required to distribute capital losses to participants.

FIGURE 2. MONTHLY RETURNS TO TIAA AND BARCLAYS AGGREGATE: 1984 – 2013



Source: TIAA-CREF Asset Management

Table 2 provides additional evidence of the advantages of pooling investment risk across participants within the TIAA general account. The average return performance of TIAA and the Barclays aggregate give the appearance of similar performance across various time periods. Taking into account the funds' volatility (as shown in Figure 2), however, indicates that participants bear substantially more risk in the bond funds compared to TIAA. The Barclays aggregate had negative returns in about 30% of the months, compared to zero negative months for TIAA. The difference in the Sharpe ratios highlights the additional risk to participants within the bond fund as compared to the accumulations held in the TIAA general account.

TABLE 2. AVERAGE RETURNS TO TIAA AND BARCLAYS AGGREGATE

Returns as of December 31, 2013

	5 years	10 years	20 years	30 years
TIAA Traditional				
Average Return	4.5%	4.3%	5.9%	7.4%
# of Negative months	0	0	0	0
Sharpe Ratio				2.0
Barclays Aggregate Bond				
Average Return	4.3%	4.4%	5.6%	7.5%
# of Negative months	17	38	77	106
Sharpe Ratio				0.3

Source: Author calculations

CONTRIBUTIONS AND THE TIAA VINTAGE SYSTEM

An uncommon feature of the TIAA Traditional annuity is its vintage system for crediting the returns that participants earn on their contributions. Generally speaking, the vintage system exists because TIAA is structured as a non-profit "co-operative" annuity with a long-term investment horizon. When a participant contributes to TIAA Traditional, assets are purchased to back the total lifetime expected impact of that contribution. Contributions made at different points in time (called "vintages") can therefore earn different crediting rates because the assets backing the various vintages of contributions will tend to have different rates of return.

The vintage system can make it difficult for some participants to understand their total TIAA returns, because most participants contribute to the fund over their working lives and not as a simple lump-sum conversion of assets at a point in time. As a result, most TIAA participants tend to have accumulations in many different vintages and their overall average return is a blend of the returns to the various vintages.[15] The vintage system is akin to a cooperative pension in that all the participants of a particular vintage 'own' the underlying vintage assets and share in the return.

Table 3 provides a hypothetical example of how the vintage system contributes to a participant's TIAA returns. The total average return in the table is calculated as the weighted average of the accumulations attributable to the various vintages. Note that, for most contracts, interest earnings above the 3% guarantee are placed in the new vintage and the average interest earned on total accumulations can thus change on a daily basis.

TABLE 3. AN EXAMPLE OF CALCULATING RETURNS IN THE TIAA VINTAGE SYSTEM

Vintage	Accumulation	Interest Rate
2000-2007	15,555	4.25%
2008	10,234	5.00%
2009	9,479	4.50%
2010-2013	12,905	3.75%
TOTAL	48,173	4.32%

Source: author calculations

The TIAA vintage system was created to treat participants fairly relative to their tenure within the system. The alternative of using a single total portfolio rate might drive down returns for existing participants when interest rates fall, and by necessity it would require reduced new money rates when interest rates rise. The vintage system reduces exposure to this type of interest rate risk.

The "co-operative" characteristics of the vintage system extend through the accumulation phase into retirement, and they can affect the annuity settlement crediting rate.[16] This is because the settlement rate will reflect the various vintages investment experience as well as an additional amount from the return of unneeded contingency reserves.[17] Given TIAA's non-profit co-operative annuity structure, when the contingency reserves are no longer needed, then TIAA distributes them to the participants who helped generate them. Absent unusual circumstances, the longer a participant has assets in TIAA, the higher the payout rate, because the older vintages have larger contingency reserves. Table 4 illuminates this concept by showing current payout rates by vintage.

TABLE 4. TIAA PAYOUT RATES BY CONTRIBUTION VINTAGE

Vintage	Payout Rate at Age 65
Pre-1992	9.73%
1992-1997	7.72%
1998-2008	7.19%
2009-2013	6.33%-7.01%
New Money	6.50%
Average Policyholder	7.60%

Source: author calculations

We note two important features of the TIAA system. First, the comparison of vintages to "new money" rates shows the difference in payout rates that a long-term participant in TIAA receives, compared to someone who converts other retirement assets into a TIAA annuity on the contract settlement date. For example, a long-term participant annuitizing assets with vintages from 1990 to 2008 would have a payout rate between 7.19% and 9.73%, depending on the timing of the contributions. By contrast, a person converting retirement assets into a TIAA annuity would receive the "new money" rate of 6.5%. Second, participants can not pick and choose which vintages they want to sell or annuitize – all decisions are pro-rata across various vintages to deter participants from gaming the system when interest rates change. Continuing the previous example, if the long-term participant annuitized half his TIAA assets, then the crediting rate is weighted pro-rata across his various vintages.

TIAA ANNUITY PAYOUT RATES

Participants choose if, when, how, and how much they annuitize from their holdings of TIAA assets. A participant may decide he does not need to annuitize any retirement wealth and so can continue holding TIAA assets through retirement. Alternatively, he can take interest-only payments, allow Required Minimum Distribution (RMD) rules to generate payments, or convert those assets using a Transfer Payout Annuity (TPA).[18] For those choosing annuitization, a full range of choices is available including options for single versus joint life, standard versus graded, and a range of guarantee options. Once a participant decides when, how, and how much to annuitize, the TIAA assets are converted into an annuity payment stream using the current applicable annuity payout rate. Given the vintage system described above, this rate is likely to be unique to each participant.

As in the accumulation phase, TIAA provides a guaranteed minimum payout defined in terms of expected lifetime income. Expressing the payout as income per $1,000 of TIAA accumulation, most contracts currently have an age 65 minimum guarantee of $4.11 of monthly lifetime income, or over $49 per year. TIAA has also historically credited additional amounts to the payout rate. For example, as of January 1, 2014, the initial income per $1,000 on "new money" at age 65 was $5.54 a month, or over $66 per year. All of these payments are stated as rates, with the guaranteed minimum payout rate equal to 4.93% and the "new money" payout rate equal to 6.6%.

As is well known, annuity payout rates vary depending on several factors, including annuitant age, annuity option, and the current interest rate. Table 5 provides examples of current payout rates. Participants annuitizing at younger ages,

those choosing two-life annuities, and/or those electing a certainty or guarantee period (e.g., a life annuity that also includes a guaranteed minimum number of payments) will receive a lower payout rate compared to older annuitants and those opting for a single life annuity with no guarantee period. While the payout rate will differ based on these factors, the expected total lifetime benefit will be roughly equal across ages and options. By contrast, differences in the current interest environment at the time of retirement can result in different payout rates and different expected lifetime benefits. For example, while the current new money payout rate for an age 65 annuitant is 6.5%, many years ago it was quite a bit higher, hitting a peak of about 14% in the early 1980s.

TABLE 5. PAYOUT RATES BY ANNUITY OPTION AND AGE

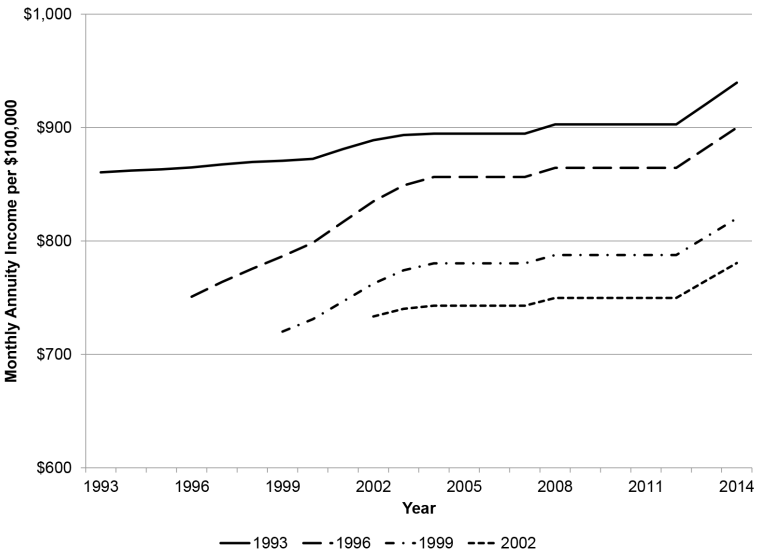
As of January 1, 2014

	Single				Joint and 100%
	No guarantee			20 year guarantee	No guarantee
	Age 55	Age 65	Age 75	Age 65	Ages 65
Payout Rate	5.5%	6.6%	8.9%	6.0%	5.7%
Guaranteed Minimum Rate	4.1%	4.9%	6.4%	4.7%	4.3%

Source: TIAA-CREF

One challenge of the annuitization decision process is that, unlike mutual fund investments, there is no single "price" for annuities. That is, the guaranteed minimum interest rate is known, but the actual payout rate depends on age, option, and interest, plus the additional impact on the rate from the vintage system and additional credited amounts. Because these additional amounts are not guaranteed, a prospective annuitant retiree will not know his/her actual income per $1,000 accumulation until very close to the settlement date. Furthermore, the additional amounts can change even for those who have already turned their accumulation into lifetime income. Though no reductions have occurred since 1993, the year that the current TIAA rate methodology was put into place, reductions have occurred. Figure 3 shows that TIAA has declared numerous increases to post-annuitization payout rates to annuitants in different cohorts. As Figure 3 shows, initial income per $100,000 has varied over the past 20 years.[19] Notably, there were no reductions since 1993, even though this period included the 2001 recession and the 2008 financial crisis.

FIGURE 3. TIAA MONTHLY INCOME PER $100,000 FOR VARIOUS COHORTS



Source: author calculations

COMBINING ACCUMULATION AND PAYOUT FEATURES: A HYBRID CO-OP PENSION PRODUCT

TIAA can be characterized as a co-op hybrid pension product based on the features and structure of the system. TIAA has a DC component because participants allocate retirement contributions to TIAA over their working lives and accumulate units of a deferred guaranteed fixed annuity. The vintage system has features of a co-operative pension because of TIAA's non-profit annuity structure – meaning that the risk pooling, returns, and Board decisions on the distribution of underlying no-longer-needed contingency reserves is proportional to the accumulated shares owned by each vintage cohort. Likewise, the guaranteed minimum crediting and payout rates during the accumulation and payout phases, respectively, provide a co-operative structure for distributing returns and income from system assets while effectively pooling market risk. At retirement, the features of the participating annuity options provide a minimum level defined benefit pension with a high likelihood of receiving additional amounts.

Design complexity is an issue for this type of product within a retirement plan investment menu. A growing body of research indicates that individuals face both behavioral and financial literacy hurdles when making retirement decisions and complexity can be a major driver of poor decision making.[20] Research also indicates that low annuitization rates can be partially explained by behavioral biases.[21] For example, prospect theory indicates that after a lifetime working to accumulate retirement wealth, retirees may have a difficult time writing a big check from their stock of assets to receive a series of small checks in the form of annuity income. Including hybrid pension products in the investment menu (in the form of a deferred fixed annuity) can help participants overcome this behavioral bias by encouraging them to write a series of small checks during their working lives (allocating contributions to the deferred annuity) and receiving a series of larger checks in retirement. Guaranteed minimums can help with loss aversion because every contribution is guaranteed to grow at a minimum rate and produce income for lifetime retirement income at a minimum rate. Other features, such as the vintage system and allocation of additional amounts, should increase demand for these products but this may be offset by the added complexity. So while research in behavioral finance and financial literacy has improved plan design during the accumulation phase, much work remains to be done with respect to the distribution phase.

A simple example highlights the challenges. While exact projection of future lifetime benefits from TIAA cannot be performed, a rough estimate can be calculated using today's crediting and payout rates. For example, at age 35, a one-time $100 contribution is guaranteed to increase to $243 by age 65. With a guaranteed minimum payout rate of 4.9%, this one-time contribution generates at least $12 in annual income for a single life annuity. A more realistic example is to estimate the guaranteed income benefit received starting at age 65 when assuming level contributions of $100 monthly for 30 years. Applying the current guaranteed minimum guaranteed rates results in about $2,842, while applying average current rates generates about $4,347 in annual income.

This simple example shows that including this type of hybrid product in a retirement plan can nudge participants to focus on retirement outcomes and not simply wealth accumulation. Advice engines can provide different outcome metrics under a variety of other assumptions. For example, by assuming a contribution equal to a fixed percentage of salary, one can actually determine the final benefit as a replacement ratio (projected benefit divided by final salary), using either the minimum guaranteed interest and payout rates, or current rates (or even historical average TIAA rates).

Another advantage of this type of hybrid product is that the guaranteed minimum income floor allows participants to customize their retirement investment portfolios to seek higher returns (and more risk) or to reduce total risk exposure by allocating more assets to a higher income floor. The flexibility of distributions in retirement is also a feature. Participants have the right, but not the obligation, to convert their accumulations into lifetime income. Participants are free to use their accumulations in any way they choose, subject to contractual limits. For example, a participant in poor health may not want to annuitize, may choose a joint life annuity to provide for a spouse or partner, or may choose a single life annuity with a guarantee period to ensure assets revert to the estate in case of an early death.

THE CREF VARIABLE ANNUITY

In 1952, CREF became the first commercially offered variable annuity product.[22] The design concept behind CREF is intuitive and simple to understand. During the accumulation phase, CREF investments appear to perform similar to mutual fund investments. Participants who allocate contributions to CREF purchase fractional shares (units) of a basket of underlying assets. The daily share value changes based on the underlying performance of the assets held in the fund. But there is a small difference between CREF and mutual funds. When the latter has capital gain distributions and/or dividends paid, the declared amount is used to add to the number of shares you own. In CREF the units are valued daily and any gains or dividends are added to the unit value.

As shown in Table 1, there are currently eight different CREF accounts. The original is the CREF Stock account, which provides a broadly diversified basket of equities with foreign and domestic stocks, large and small cap, and combines both active and passive management. Other accounts include: the Index fund, Growth account, Global account, Bond Fund, Inflation-linked Bond fund, Social Choice fund, and a Money Market Account. Participants are free to choose any allocation to these accounts, as well as TIAA Traditional, TIAA Real Estate, or any other mutual funds on the employer's menu.

A key difference between CREF and a mutual fund is that in the payout phase the participant has the right, but not the obligation, to convert CREF accumulations into a stream of lifetime income. Similar to TIAA, participants choose if, when, how, and how much of their CREF accumulations to annuitize. Participants may take non-annuity distributions similar to mutual funds, take lump-sum or systematic withdrawals (there may be limits based on plan rules), or simply draw down their accumulations based on the Required Minimum Distribution (RMD) rules.

A unique feature of the CREF payout annuity is that it offers post-settlement asset allocation choices. Conversion from any CREF annuity to another CREF annuity and/or to a TIAA annuity is permitted. Thus if an annuitant wants to "lock in" gains after a good year, or simply wants to reduce or increase the risk of his annuity payment stream, he can transfer some or all the assets to another account. In this way, an overall 'asset allocation' goal can be achieved through retirement: in this case the 'asset' is the right to collect payments for life.

One consequence of purchasing a variable annuity is that the retiree does not know from payment-to-payment the amount of actual income he will receive from the annuity. This income uncertainty is balanced against the possibility of achieving greater investment returns than those promised within a fixed annuity. In essence, CREF (or any variable annuity) provides an instrument for those who seek the security of lifetime income and also wish to participate in the equity and/or bond markets.

In general, the size of life annuity payment per $1,000 of assets converted will depend, among other factors, on the annuitant's age at settlement, how long he is expected to live from that age (single or joint mortality), and an assumed investment return (AIR). In the case of fixed annuity like TIAA, insurers have a high degree of confidence in what the underlying investments are expected to earn, so the payment calculation is straightforward. By contrast, expectations are less certain regarding what assets will earn in a variable annuity like CREF. This is because the equity market may be bullish or bearish and interest rates may rise or fall. CREF uses a 4% AIR to calculate the initial annuity payment and then each year (or month for those who choose to revalue their payments monthly), the payment is adjusted by comparing the 4% AIR with the actual return earned. If the CREF funds earn more than 4%, the payment will be increased; if the fund earned less than 4%, the payment will decrease. CREF may also adjust the annuity payment based on changes in system expenses, group mortality, or other factors (these have been very minor over time).

A frequent question is why CREF uses a 4% AIR. The answer is not simple and, as with any long-run market forecast, can be viewed as much an art as a science. Part of the explanation is that firm seeks to reduce potential volatility of participant outcomes based on past market experience. On the one hand, CREF could use a lower AIR; this would result in a lower initial payment but participants would be more likely to receive increases and those increases tend to be larger.

Moreover, using a higher AIR would result in high initial payments but it would also bring a greater likelihood of decreases in payments.

Consider the example of a 65 year-old participant who has a contract for a CREF single life annuity with a 10 year guaranteed period. Using the standard 4% AIR results in an initial annual payment of about $6,680 per $100,000 in assets converted. If instead we use a 0% AIR, then the initial payment would be $4,181; using a 6% AIR generates an initial payment of $8,076. Suppose in the following year the actual return of the CREF fund is 6%. Then the annuities with 0%, 4%, and 6% AIR would get a 6%, 2%, and 0% increase, respectively. Given historic experience, CREF uses the 4% AIR to accomplish the overall goals of sufficient initial income with potential for increases that can help keep pace with inflation.

How effective has the 4% AIR been in achieving these goals? The answer depends on the date of annuity settlement. Figure 4 shows the evolution of payments per initial $1,000 income from a variable annuity using the CREF stock account. We show the paths for cohorts with settlement dates in 10 year intervals from 1955 to 1985, noting that the horizontal axis shows years from settlement and not standardized years. For example, the 20th year payment for the 1965 cohort is equivalent to the initial year payment for 1985 cohort. The $1,000 line represents the perfect inflation-hedged annuity. For most cohorts, on average, a variable annuity using the CREF stock account has done well with regard to keeping pace with inflation. This has been particularly true for cohorts with settlement dates after 1980.

FIGURE 4. REAL CREF STOCK ANNUITY PAYMENT FOR VARIOUS COHORTS

Source: author calculations

RECENT PARTICIPANT EXPERIENCE IN THE TIAA-CREF SYSTEM

The TIAA-CREF system has undergone substantial change over the past 25 years. Prior to 1989, TIAA-CREF could be considered a pure co-operative hybrid system. As shown in Table 1, participants then faced a simple investment menu of two choices – TIAA and CREF Stock – when deciding how to allocating contributions and assets. And during that time, the TIAA-CREF system offered a single form of retirement benefit: the immediate life annuity. Today, participants can choose from an investment menu that includes mutual funds along with CREF variable annuity funds and the TIAA Traditional fixed annuity. Participants have a full range of non-annuity income distribution options including Systematic Withdrawals and Transfers (SWAT), Minimum Distribution Option (MDO), Transfer Payout Annuities (TPA) and Interest Payment Retirement Option (IPRO).[23] Participants can still choose from a full menu of variable and guaranteed fixed annuities. So to participants, while the system retains components of the co-operative hybrid system it also offers

more flexibility, both during the accumulation and distribution phases. And, participant choices over the past decade are radically different from those of the prior era.

Table 6 shows asset class participation and proportion of contributions invested for periodic years from 1993 to 2013. The participation rates are split between people who allocate all contributions to asset class (100%), and those who allocate a fraction of contributions to an asset class (0.1% to 99%). In 1993 the investment menu was limited to TIAA and five CREF funds. About 81% of participants contributed to TIAA, about 77% contributed to CREF equity accounts, and around 28% contributed to CREF fixed income accounts. As the investment menu expanded, the proportion of participants allocating any contributions to TIAA fell, and only about 40% contributed to TIAA in 2013. As noted in Rugh (2004), equity class participation peaked in the early 2000's and has steadily declined since the 2001 recession. As shown in Richardson (2014), the drop in participation in the guaranteed and equity classes has been offset by a strong increase in participation in the multi-asset class, and the shift is almost completely attributable to increasingly strong participation in auto-diversified life-cycle fund investments which were first offered in 2004.

TABLE 6. ASSET CLASS PARTICIPATION AND PROPORTION CONTRIBUTED: 1993 – 2013

	1993	1996	1999	2002	2005	2008	2011	2013
TIAA Guaranteed								
100%	16.1	11.2	6.7	7.5	6.2	4.9	5.7	5.1
0.1 - 99%	65.2	56.5	48.5	54.8	56.6	49.6	41.0	34.9
Equity								
100%	11.5	22.2	29.6	20.0	11.3	8.9	7.6	7.3
0.1 - 99%	65.2	61.8	55.8	61.9	67.7	62.4	53.2	46.9
Fixed Income								
100%	3.8%	4.2%	5.4%	6.8%	8.9	8.2	8.6	8.2
0.1 - 99%	24.5	23.8	25.2	26.0	34.1	37.1	34.0	29.6
Real Estate								
100%	--	0.0	0.1	0.2	0.4	0.4	0.3	0.6
0.1 - 99%	--	0.7	9.0	26.5	39.9	39.8	32.9	29.9
Multi-Asset*								
100%	--	--	--	--	1.2	10.7	20.1	27.6
50.1 - 99%	--	--	--	--	13.6	14.3	13.6	13.3

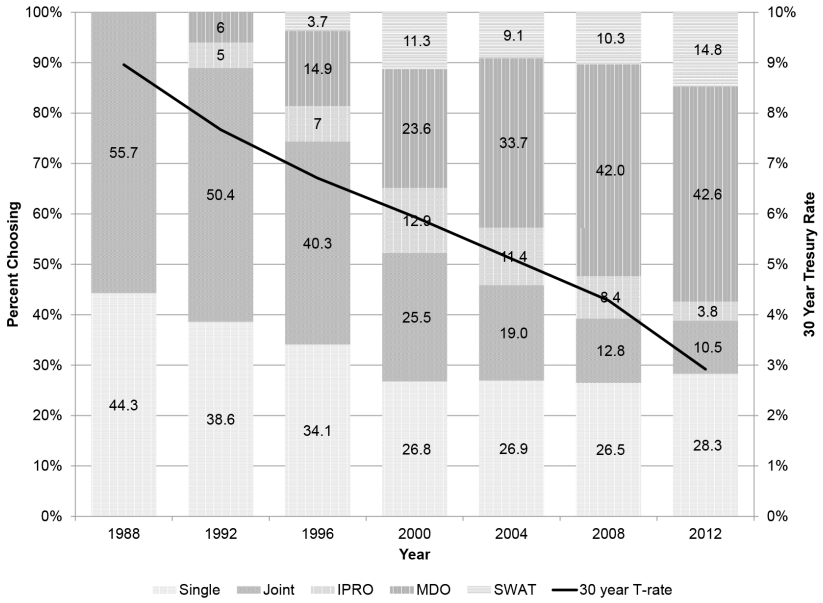
Sources: Ameriks (2000), Rugh (2005), Richardson (2014) and author calculations

*Analyses prior to 2005 included the multi-asset CREF Social Choice Fund in the Equity Class.

Figure 5 shows initial income choices by TIAA-CREF participants over the period 1988 – 2012. As discussed above, 1988 was the last year that the TIAA-CREF could be considered a true hybrid system. Among participants choosing an income stream that year, about 56% opted for a joint life annuity and 44% a single life annuity. In the next eight years, TIAA-CREF expanded the distribution menu. In 1989, the Interest Payment Retirement Option (IPRO), which allows participants to receive interest income from their TIAA asset accumulations, became the first non-annuity payment option offered by TIAA-CREF. The Minimum Distribution Option (MDO) was first offered in 1991 to help retirees satisfy their federally required minimum distributions. And Systematic Withdrawals and Transfers (SWAT) were automated in 1996. Figure 6 shows that SWATs and MDOs in particular have become a relatively popular initial distribution choice and now account for over 50% of new income distributions. Figure 5 also shows that the relative decline in first-time annutization rates was strongly correlated with long-term interest rates. Of particular note is the drop in demand for joint life relative to single life annuities. In addition, the relative demand for IPROs, in which a participant receives the interest payment from the

annual crediting rate while leaving the asset untouched, appeared sensitive to declines in market interest rates. We note that while the relative demand for annuities has declined within the TIAA-CREF system, the proportion of new retirees annuitizing part of their retirement wealth remains high relative to experience in the broader economy; only about 10% of workers leaving their job after age 65 annuitize any assets (Burman, Johhnson, and Kobes, 2004).

FIGURE 5. INITIAL INCOME CHOICES BY TIAA-CREF PARTICIPANTS: 1998 – 2012



Sources: Ameriks (2002), Brown, Poterba, and Richardson (Forthcoming).

CONCLUSIONS

Hybrid retirement plans in theory combine the best features of DB and DC plans. Co-operative pensions are designed to provide adequate risk sharing and treat different age cohorts fairly. These plans can provide an efficient and equitable method of ensuring the retirement security of workers. Nevertheless, few private sector workers are currently covered by these types of plan. The TIAA-CREF system, which began in 1918 and covers millions of workers in the non-profit sector, provides an example of how to incorporate features of hybrid co-operative pension into a retirement plan design. The hybrid features along with an expanded menu of investment and distributions choices have provided participants with more flexibility but may also result in workers and retirees increasing their retirement risk exposure. Nevertheless, many participants continue to customize their portfolios and include TIAA Traditional and CREF in their retirement planning.

Including hybrid products like TIAA Traditional within a DC plan investment menu can provide greater retirement security than a plan structure with a primary DB plan and supplemental DC plan, particularly for a mobile work force. This is especially true for individuals who stop working early, those who "job hop," and those with short life expectancy. Participants who allocate part of their contributions to a co-operative hybrid product will benefit from the risk pooling and full interest experience of the annuity.

Much work remains to be done to help current and future retirees make effective retirement income and estate planning decisions. One area for future research is to apply the lessons from behavioral finance to retirement plan distribution design. Research is needed to understand how to frame annuity choices and prices in a way that participants can better can understand the trade-offs and consequences of their decisions. The next generation of life-cycle products could also incorporate hybrid features that help participants diversify risk and enhance retirement security both to and through retirement.

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ENDNOTES

1 Department of Labor (2013) data indicate that, for private sector workers, defined contribution (DC) plan participation first surpassed defined benefit (DB) plan participation in 1992. There were more than twice as many total DC participants as DB participants and more than four times as many active DC participants in 2011.

2 Benartzi and Thaler (2007) provide a good overview on how behavior biases may effect retirement. Lusardi and Mitchell (2014) discuss the importance of financial literacy to improving decision making.

3 Many of the institutions within the TIAA-CREF system have multiple retirement plans and the system includes 401(a), 401(k), 403(b), 415 and 457 type plans.

4 See Greenough (1990) and the TIAA-CREF website.

5 A guaranteed interest rate of 3% percent is applied to all premiums remitted since 1979. When declared, additional amounts remain in effect for a 12 month period beginning March 1st of each year. Some newer contracts have an index guarantee rate that can be between 1% and 3%.

6 Previous studies by Ameriks (2000) and Rugh (2004) did not consider this a distinct asset class.

7 Or a participant may choose to transfer part of their existing stock of other retirement investment assets into TIAA.

8 There are actually 8 versions of TIAA which differ primarily by type of retirement plan. The versions vary by guaranteed return and liquidity of the asset. Generally, the greater the liquidity of the account, the lower the guaranteed minimum rate of return.

9 A certainty period guarantees payment for a specific number of years regardless of annuitant mortality. Because the payment can be made as a lump sum at annuitant's death, it is akin to a declining value term life insurance policy.

10 The length of the TPA period will depend on which version of TIAA the participant holds. The typical transfer period is 10 payments over 9 years and 1 day. Some employers' plans do not allow TPAs.

11 The guarantee is determined by the 5-year Constant Maturity Treasury (CMT) less 125 basis points with a minimum bound of 1% and a maximum guarantee of 3%.

12 This is especially true since the early 1980s.

13 $100×1.0310=$134.39; 100 * 1.05 * 1.039 = 137

14 We reduce the Barclays return by 18 basis points as a proxy for bond fund expenses.

15 Participants can log into their accounts on the TIAA-CREF web site and see their current TIAA accumulations by vintage as well as their overall average earning rate.

16 The annuity settlement crediting rate is the interest rate used, in conjunction with the mortality rate assumption, to determine the amount of income an annuity generates.

17 "Contingency reserves" are rainy day funds, and all insurers need to have some level of these reserves. These reserves come from the spread that companies earn on the money invested.

18 The latter option is similar to a 10 year annuity certain.

19 Guaranteed minimum rates have been fairly stable through this period.

20 See Bernartzi and Thaler (2007) and Lusardi and Mitchell (2014).

21 See Bernartzi, Previtero and Thaler (2011) for a discussing of annuity puzzles.

22 See Greenough (1990) for a discussion of the creation of CREF.

23 See Ameriks (2002) for a discussion of different income distribution options.