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Abstract

Defined contribution plans are providing an increasing share of retirement income in a number of countries around the world. With this type of plan, concern has been raised as to the amount of risk that workers bear. One response has been to incorporate rate of return guarantees in the plan design. This article surveys the types of guarantees that have been provided in voluntary defined contribution plans around the world. The prevalence and types of guarantees differ considerably between voluntary and mandatory defined contribution plans. Voluntary plans that provide a rate of return guarantee often guarantee a fixed rate of return, while that is rarely done in mandatory plans. A fixed guarantee set at a level where it is effective provides more protection against downward rate of return fluctuations than a relative guarantee, where the guarantee level fluctuates with an index. Some voluntary defined contribution plans provide a guarantee using an associated defined benefit plan. That approach provides a possible model for countries with a social security system where a mandatory defined contribution plan is combined with a mandatory defined benefit plan.

Retirement Guarantees in Voluntary Defined Contribution Plans

A key feature of most defined contribution (DC) pension plans is that the participant bears the financial market risk of plan investments. This risk can be reduced a number of ways. It can be reduced by means of an investment strategy, where diversified portfolio can limit the investment of pension funds to relatively low risk portfolios. Alternatively, investing in guaranteed products can reduce capital market risk exposure. It can also be limited by government oversight and regulation of pension funds and financial markets (see Walliser, forthcoming). In addition, DC arrangements can be developed to credit workers a different, less volatile rate of return than the rate actually received on the workers' defined contribution accounts. A rate of return guarantee is one way of delinking the rate of return received on the workers' portfolios from the rate of return credited to workers.

This chapter explores the conceptual basis for a rate of return guarantee as an option for voluntary defined contribution plans. It does so by analyzing different possible features of rate of return guarantees. In considering possible features, the analysis is not limited to features that currently would be allowed for ERISA plans in the United States,[1] but rather it also considers a range of possible features. Rather than attempting a complete catalogue of guarantees operating in voluntary defined contribution plans around the world, we discuss the guarantees in selected countries.[2] We draw several conclusions as to possible lessons learned for countries considering a rate of return guarantee in either a voluntary or a mandatory defined contribution system.

Types of Guarantees

The definition of a "voluntary" plan is not completely straightforward. The definition used here is that voluntary plans are those which are not mandated by government. These plans

include, however, plans that workers must participate in if they work for a particular employer, in a particular industry, or belong to a particular union. Thus, we include plans that are mandated by labor agreements between trade unions and employers.

Our focus is on rate of return guarantees in defined contribution plans during the accumulation phase, before the worker retires. To better understand how guarantees work, we consider a simple two-period model where in the first period, the worker contributes C_1 to his defined contribution pension account. This is used to purchase A_1 shares of assets at a price of p_1 per share. It is useful to separate the effects of capital value changes, through changes in the asset price p_1, from rate of return changes, because guarantees often treat these differently. The worker receives a nominal rate of return of i per share, so at the start of the second period he has assets worth p_2A_2, where the price of assets in period 2 is p_2:

$$C_1 = p_1 A_1 \qquad (1)$$

$$p_2A_2 = (1+i)\, p_1A_1 + (p_2 - p_1)A_1 + C_2 \qquad (2)$$

$$= (ip_1 + p_2)A_1 \qquad (3)$$

In a defined contribution plan without a guarantee, the worker receives the value of his account balance as determined solely by investment earnings and capital gains or losses on his initial purchase of assets.

Financial market variables that may be guaranteed in this context consist of the nominal rate of return i, and the initial asset price p_1. Alternatively, the two variables may be jointly guaranteed. For example, if the rate of return includes capital gains and losses, the value $(1+i)\, p_1$ is guaranteed. Expressing the nominal rate of return as approximately equaling the real rate of return r plus the inflation rate π,

$$p_2A_2 = [(r + \pi)p_1 + p_2\,]A_1 \qquad (4)$$

Here the rate of return guarantee may be tied to the inflation rate π, or it can be set at a real rate of π plus a constant.

In practice, guarantees tend to be expressed three ways. First are rate of return guarantees, which typically are a guarantee jointly of the asset price and rate of return, since they incorporate capital gains and losses in the calculation of the rate of return. Second are minimum benefit guarantees. Here the guarantee is over the terminal value of the account. Third are capital value guarantees. These are guarantees that the rate of return will not fall below zero and the initial asset price will not change.

The Structure of Rate of Return Guarantees

Further clarification of the structure of rate of return guarantees focuses on four aspects of guarantees:[3] the rate of return that is guaranteed; the risk management technique used to control rate of return risk; the characteristics of the guarantee; and the institution providing the capital that backs the guarantee. Understanding these aspects of rate of return guarantees is important both for analyzing existing guarantees and for creating alternative designs as part of a pension or social security reform. These aspects are summarized in Table 1.

Table 1 here

The rate of return to be guaranteed may be classified according to various characteristics. First, it may be real or nominal; a real guarantee is indexed for inflation. Second, it may be fixed or relative. A fixed guarantee is linked to a particular rate, while a relative guarantee is linked to a capital market index. Third, it may be for a calendar year, a rolling multi-month period (ranging typically 12 to 36 months), or cumulative from a set date.

There are three methods of managing risk—hedging, insuring, and diversifying (Bodie, Hammond, and Mitchell 2000). Rate of return guarantees typically involve either hedging or

insuring or both. Hedging involves eliminating the risk of a loss by sacrificing some or all of the potential for gain. Insuring involves paying an insurance premium to eliminate the risk of losing a larger amount. The insurance premium may be not readily observable, such as the reduced wage the worker presumably receives in exchange for a working for an employer that provides a guarantee for a defined contribution plan. The method used affects the type of guarantee provided.

The guarantee can be analyzed in terms of the risk and expected return the worker faces when the guarantee is in place. First, the guarantee can be a point guarantee or a minimum guarantee with income participation. With a point guarantee, the worker receives a specified rate of return, either nominal or real. The employer or the institution providing the guarantee receives the entire rate of return above the guarantee level when the actual rate of return exceeds the guarantee level. A point guarantee is similar to a cash balance plan. For the period of the guarantee, the rate of return the worker receives bears no relationship to the rate of return received on the underlying investments. Alternatively, with a minimum guarantee, the worker can receive the entire rate of return above the guarantee level or the employer or the institution providing the guarantee may receive part of it. This type of guarantee may also specify a maximum.

The guarantee may provide catastrophic protection, or it may provide rate of return smoothing. The guarantee can be set for a low rate of return so that it only provides "catastrophic" protection and rarely affects the rate of return received by the participant, or it can be set fairly high so that it provides rate of return smoothing over time.

The guarantee may be voluntary or mandatory. The voluntary or mandatory aspect can apply differently to employers and employees. For example, it could be voluntary for

employers, but employers that provide it could make it mandatory for their employees. Alternatively, it could be mandated that employers offer a guarantee as an option, but it would be voluntary for employees to choose that option.

The guarantee may contain some risk that it will be changed. The guarantee may be viewed as an enduring promise or the guarantee may have a set period for which it applies, such as a year, with the expectation that it would be reset. The risk that the guarantee will be changed is greater the higher is the guarantee and the lower the capital backing the guarantee. It is also greater for fixed nominal guarantees than it is for real guarantees or guarantees that are set relative to an index because those guarantees have greater built in flexibility.

The guarantee can be provided by different institutions. It can be provided by the employer out of the employer's operating funds on a pay-as-you-go or funded basis. It can be provide by a defined contribution pension fund through an associated reserve fund. It can be provided by an associated defined benefit fund, which operates as a reserve fund. It can be provided by a pension fund management company. It can be provided through the purchase of a guaranteed product from an insurance company or the government. In a voluntary system, the ultimate financing source of the guarantee may be the employee, who may finance the guarantee indirectly through receiving lower compensation in other respects to offset the cost of the guarantee.

Rate of Return Guarantees in Voluntary DC Plans Around the World

The format just developed is useful for classifying the types of rate of return guarantees provided across a sample of voluntary defined contribution pension systems around the world. The survey covers the range of types of guarantees provided, but it is not exhaustive in terms of countries covered. The guarantee provided is discussed first, followed by a discussion of the

financial backing for the guarantee. The countries are listed in alphabetical order. Table 2 provides a list of these countries and the associated plan features of interest described below.

Table 2 here

Belgium. Belgium has a draft law in process that would guarantee a return of 3.25 percent on employer contributions and 3.75 percent on employee contributions. It is expected that most contributions would be employer contributions. The guarantee would not be on annual rates of return, but rather it would apply over the period that the worker participated in the plan (Payne 2002).

Brazil. The majority of pension assets in voluntary pension plans in Latin America is held in Brazil (Turner 2002). Here, financial service providers offer pension funds that are available to any worker or firm, called "open" pension funds. These plans may be either group or individual plans. When they are defined contribution plans, they have been required to provide a guaranteed real rate of return of six percent annually (Kane 1998). A portion of the excess return that varies across plans is also paid into the worker's account. This portion increases with worker tenure up to five years on average and reaches a maximum of 50 to 75 percent. The excess return can be received as an annual payment to the worker or allowed to accumulate in the worker's account (World Bank 2000). Thus, the guarantee g is for a six percent real rate of return, with the rate of return b the worker receives being higher if the actual real rate of return r on the portfolio is higher:

$$g = 6\% \text{ real} \qquad (5)$$

$$b = \max(6\% \text{ real}, 6\% \text{ real} + \alpha[r - 6\% \text{ real}]) \qquad (6)$$

where α is the sharing rate (or participation rate) for rates of return above six percent real, which varies by worker tenure.

Fixed rate guarantees backed by financial market investments are limited by the rates of return available in the market. Because Brazil historically has had high real rates of return, it has been possible for pension funds to meet the real rate of return guarantee by investing in Brazilian securities markets. But real rates of return have declined recently, so these guarantees are no longer provided on new accounts.

Denmark. In Denmark, more than 80 percent of all employees are members of trade unions and they are covered by pensions that are mandated by labor agreements with employers (Herbertsson et al. 2000). Danish occupational pension plans are almost exclusively DC plans that purchase insurance contracts, which generally provide a guaranteed rate of return.

While the government sets a maximum on the guaranteed rate allowed, participants may receive a higher rate of return if the fund's investment experience permits paying such a rate. Excess yields above the guaranteed rate, however, are first allocated to reserve funds. The reserve funds are used to meet the guarantee when the rate of return falls below the guarantee level, and they also pay for bonuses above the guarantee level, depending on the reserve fund level. Following stock market declines precipitated by the terrorist attacks of September 11, 2001, the Danish insurance group PFA announced that its bonus reserves had been completely depleted and that it was no longer able to comply with the capital requirements under Danish law (Wheelan 2001).

For many years, the maximum guarantee rate was set at 4.5 percent nominal for many years; it was lowered to 3.5 percent between 1994 and 1999; and since 1999, it has been 1.5 percent on new insurance policies. In 2001, the guaranteed rate on old policies was lowered from 4.5 percent to 2.0 percent (Jarvenpas 2001). It was reduced because lower market interest rates have made it difficult to provide a higher guarantee. Contracts written before 1994 still

provided the 4.5 percent guarantee through 2001. When the rate of return received on pension funds exceeds 4.5 percent, however, all participants received a similar rate. This created an inequity between holders of old and new contracts when the actual market rate is less than 4.5 percent.

The level of the guaranteed rate is restricted by the European Union (EU) 3 Directive on Life Assurance. That Directive limits an interest guarantee to no more than 60 percent of the return gross of taxes on government bonds. Because Denmark has a 26 percent tax on the interest income received by life insurance companies and pension funds, the low guaranteed rate provided to participants in the late 1990s could not be higher given the low market interest rates. The tax reduces the amount of investment income received that is available for paying to workers.

Germany. Germany launched a new system of supplementary pensions in 2001. In order to receive preferential tax treatment, these pensions must guarantee the nominal value of contributions at retirement. The guarantee is thus equivalent to a guarantee of a zero percent nominal rate of return (see Maurer, forthcoming). Some pension funds in Germany provide a higher guarantee. For example, the pension for the construction industry, called ZukunftPlus, guarantees a minimum return of 3.5 percent (EIRO 2001). Volkswagen has introduced a plan that guarantees a minimum return of three percent.

Japan. Japanese law permitted companies to offer defined contribution plans in 2001 (see Clark and Mitchell 2002). These require that workers have three investment options (IBIS 2002). One of these options must provide a guarantee of the contributions made, as in Germany. This guarantee can be expressed as

$$g = 0\% \text{ rate of return} \qquad (7)$$

$$b = \max(0\%, i) \qquad (8)$$

New Zealand. The National Provident Fund in New Zealand has guaranteed to credit members' accounts with a minimum annual rate of return of four percent nominal. This fund was established primarily for the employees of local governments, and it is now closed to new members. To manage this guarantee, the Fund Board adopted an asset allocation strategy that is conservative by New Zealand standards. It has invested 60 percent in fixed interest bearing assets and cash, and 40 percent in equities and property.

The Board operates a reserve fund, as in Denmark, whereby in good investment years, part of the investment returns are placed in the reserve fund, which can be drawn on when investment returns fall below four percent. The objective is to build the reserve fund up to 10 percent of the members' account balances. The government acts as the ultimate guarantor if the pension fund exhausts its assets but still has benefit obligations.

Because of difficulty in meeting the guarantee due to lower market interest rates, the Board managing the National Provident Fund changed the guarantee to a minimum of a four percent nominal per year, compounded from April 1, 2000 to the date a member elects to receive his or her benefit from the scheme. The longer the period used to calculate the rate of return that is guaranteed, the less costly is the guarantee because a shortfall in some months can be compensated for by a higher return than the guarantee level in other months. With this guarantee, the actual rate received in any year could be less than four percent. Each year, the actual rate of return received is credited to the account.

When the worker exits the plan, the actual amount in the plan is compared to the amount that would have been in the worker's account if the worker had received a rate of four percent during the entire period. If the actual amount is less, the government will make up the

difference. Thus, the guarantee and the actual rate received can be expressed as:

$$g = 4\% \text{ from April 1, 2000} \qquad (9)$$

$$b = \max(g, i) \qquad (10)$$

where here i represents the actual average rate received since April 1, 2000. This change requires maintaining a shadow account for each member to track the minimum four percent rate. The annual statement received by the member shows the performance of the actual account and that of the four percent minimum account.

Sweden. Sweden's supplementary pension for blue-collar workers is negotiated between the national trade union confederation and the Swedish employers' confederation. Since 1998, it has offered a guaranteed rate of return as an option. That option is an insurance fund that provides a stable rate of return with a guaranteed minimum rate of return, which is set by the Financial Supervisory Board. The minimum rate of return is set in the range of three to four percent (EIRO 1998).

United Kingdom. Private sector DC plans in the United Kingdom have been much less prevalent than DB plans, covering only one percent of employees in 1994-95 (Whitehouse 1998). There has been some movement, of late, towards DC plans, with many DB plans being closed to new entrants (*The Economist* 2002; Reid 2002). As an investment option for defined contribution plans, some U.K. investment banks or mutual funds (unit trusts) offer funds that purchase put options to guarantee their return (Valdés-Prieto 1998). Barclay's Bank marketed a guaranteed rate of return fund using put options, but it has stopped doing so because of little demand for the product at the price it was able to offer it.

Some employers offer a defined benefit and defined contribution plan in combination, like a floor-offset plan in the U.S. The worker receives the higher of the two benefits. If the DC

plan receives a low rate of return, the worker will receive the benefit promised by the DB plan. Thus, the guarantee is that the worker will receive the benefit provided by the DB plan, with the worker receiving the benefit from the DC plan if that is higher:

g = DB benefit (11)

b = max(DB benefit, DC benefit) (12)

A few companies, such as the pharmaceutical company Zeneca, offer a defined contribution plan for younger employees but then allow them to transfer, at guaranteed rates, into a defined benefit plan at some specified age.

As in a number of other countries, life insurance companies provide products with guaranteed rates of return in the U.K. Government-issued inflation indexed bonds have been available for nearly two decades, and these can be used to provide a guaranteed real rate of return. Because of the availability of these bonds, participants in occupational defined contribution plans can purchase insurance company products from at least nine insurance companies that provide a guaranteed real rate of return (Brown, Mitchell and Poterba 2000).

United States**.** In the United States, pension plans not governed by the Employee Retirement Income Security Act of 1974 (ERISA), which covers most private sector plans, have greater latitude in structuring rate of return guarantees. These non-ERISA plans include church plans, plans for government employees, and non-qualified plans for top executives. This section provides information on some of the types of guarantees that are used in the United States. Table 3 provides a summary of these features.

Table 3 here

Church Plans. Church plans and other non-profit plans in the United States are subject to fewer constraints than are most other private sector plans, since they are exempt from parts of the

Employee Retirement Income Security Act of 1974 (ERISA). A plan sponsored by the United Methodist Church offers a guarantee called the "base interest credit", the level of which is annually by the Church's General Board of Pension and Health Benefits (General Board 2002). The guarantee for this DC church plan is backed by a reserve fund financed by part of the rate of return received on the fund in years when the rate of return exceeds a fixed amount (6.5 percent for many years, reduced to three percent in 2001). If the actual rate of return exceeds the guaranteed rate of return, the excess rate of return goes into the reserve fund. Twice a year, the reserve fund is evaluated, and if it exceeds the target level, an extra distribution is made to the accounts of participants. The plan may credit a rate of return higher than the guarantee even if the actual return received in a year is lower if the reserve fund is sufficiently large. Thus, the guarantee and actual rate of return received are as follows:

$$g = 3\% \tag{13}$$

$$b = \max[3\%,\ 3\% \text{ plus bonus if reserve fund greater than minimum}] \tag{14}$$

The reserve fund consists of assets of the pension fund not allocated to participant accounts. They are assets that exceed the known obligations of the plan. The target level of the reserve fund is set as a percentage of the assets to be guaranteed and is higher, the greater is the volatility of the guaranteed assets. The reserve fund is set so that in most years it will be adequate to compensate for a fall in the value of the assets in the portfolio of the pension fund, though there is a small probability that the reserve fund will not be large enough to fund the guaranteed rate of return in a year.[4] In the Methodist Church plan, if the reserve fund is completely depleted, as happened in 2002, the plan can generate an unfunded liability. That situation arises when the reserve fund has been exhausted and the total asset amount credited to workers' accounts exceeds the total assets in the fund. This is not a problem for short periods, so

long as the fund has sufficient assets to meet its cash flow requirements for benefit payments.

When a plan sets a fixed nominal interest rate as the guarantee rate, its ability to guarantee that rate is affected by the level of rates of return in financial markets, which is affected by the inflation rate. Thus, a higher level of guarantee has been deemed appropriate during periods of relatively high inflation and high nominal rates of return as compared to times of lower inflation. A nominal guarantee that is adjusted with respect to the level of financial market returns thus can resemble a real guarantee.

For younger workers, the effect on participant account balances of a rate of return guarantee provided by a reserve fund is unclear over the long term. The total credits paid to participants depend on the investment returns received by the pension plan. Over the short term, the guarantee does affect the level of credits, and it may be a particularly valuable feature for workers nearing retirement, who are assured that they will have a guaranteed minimum asset account balance at retirement.

The Young Men's Christian Association (YMCA), which meets the Internal Revenue Code requirements for a church plan, provides a different form of guarantee for its defined contribution pension plan, one that also makes use of a reserve fund. Every November, the plan Board of Trustees meets to set the one-year rate of return to be credited to participants' accounts for the following year. While the Methodist Church attempts to avoid changes in its guarantee, the YMCA guarantee varies from year to year. If the Board of Trustees decides that the Fund's reserves are sufficiently large, it can declare extra interest credits to active participants, in addition to the amount that it guarantees for the year, and it makes extra payments to retirees.

Reserve funds, such as those used by the Methodist Church and the YMCA, can allow for

rate of return smoothing over time. The guarantee is financed by the participants of the pension fund, since the reserve fund in these two plans is made up entirely of investment earnings on the plan assets that have not been allocated to the accounts of individual workers. Nonetheless, in the corporate sector, reserve funds are not permitted under the Employee Retirement Income Security Act of 1974 (ERISA). This is because the law stipulates that all investment earnings must be allocated to the accounts of individual participants.

U.S. State Retirement Systems. Public sector plans in the U.S. are exempt from many of the substantive requirements of ERISA which provides them greater opportunity to offer defined contribution guarantees. One option available to public employees of the State of Indiana is a guaranteed return tied to the actuarially assumed rate used for the associated defined benefit fund, with the guarantee (after fees and expenses) fixed at 8.25 percent (Turner 2000). The Guaranteed Fund is backed by the funds of the defined benefit plan in which all state employees are required to participate. The principal amount of an investment in the defined contribution plan does not fluctuate but grows based upon an interest crediting rate determined annually by the Board of Trustees.[5] This investment option is guaranteed under Indiana law, and the crediting rate is applied to the balance of the member's pension account at the end of each fiscal year. Guaranteed Fund investments include bonds, large capitalization stocks, small capitalization stocks, and other types of diversified investments. The guarantee is one of several options that workers participating in the plans can select.

Along similar lines, the defined contribution (401(a)) plan of the Ohio State Teachers' Retirement System in 2001 began providing a guaranteed 7.75 percent annual rate of return backed by the system's defined benefit plan (Kennedy and Jacobius 2001). This Total Guaranteed Return Choice is one of the options provided by the plan. Participants choosing the

option in future years may be offered a higher or lower guaranteed return. The guarantee is offered to participants who leave their money in the fund for five years. Workers who withdraw from the option before five years must pay a 10 percent penalty. Thus, the guarantee and penalty provide an incentive for workers not to change their investment options and, instead, to stay in the plan for at least five years. The asset allocation of the Ohio investment portfolio parallels that of the system's $55 billion defined benefit plan. Shortfalls are to be made up from the funds of the defined benefit plan, and any excess must be placed in the defined benefit plan. This approach combines a hedge and insurance. The hedge aspect is that the workers give up returns above the guaranteed level in exchange for not getting returns below that level. The insurance aspect is provided by the defined benefit plan, on the view that there will be sufficient funds to pay the guaranteed rate of return. Since workers are free to choose this option or alternative options, those choosing the option presumably pay no implicit (and clearly no explicit) insurance premium.

TIAA- CREF (the Teachers Insurance and Annuity Association College Retirement Equities Fund) offers the TIAA Traditional Annuity. TIAA-CREF covers 12,000 nonprofit institutions, including government and private universities, other educational institutions, and some museums. The TIAA Traditional Annuity guarantees the participant's principal and a specified interest rate, plus it offers the opportunity for a higher return through dividends.

Government employees of three Texas counties--Galveston, Mattagorda and Brazora--withdrew from Social Security in 1981.[6] These counties replaced the Social Security program benefits for their workers with a system of individual defined contribution accounts known as the Alternate Plans.[7] These plans offer employees a guaranteed minimum nominal rate of return of four percent, with workers and the insurance company sharing returns above that benchmark. To

do this, managers of the Alternate Plans purchased Group Fixed Annuity Contracts from a private insurance company, the American United Life Insurance Company. The portfolios holding plan contributions are invested only in fixed-rate marketable securities (government bonds, corporate bonds, and preferred stocks) as well as bank certificates of deposit (GAO 1999). The annual interest rate earned on Galveston's investments averaged 4.6 percent real, or 8.6 percent nominal, for the years 1981-98 (Wilson 1999).

Guarantees in the Private For-Profit Sector. U.S. private sector employers have provided defined contribution guarantees financed through the purchase of insurance products. These offer plan participants relatively safe low-yield investments which are ultimately covered by some type of state solvency system, but these funds typically cap the amount of coverage. Stable-value instruments include guaranteed investment contracts (GICs) offered by insurance companies, as well as banking investment contracts (BICs) offered by banks. BICs marketed by the banking industry are insured by the Federal Deposit Insurance Corporation (FDIC), whereas GICs are covered by state-regulated solvency funds. A 1992 survey of large employers sponsoring 401(k) plans in the United States found that over half of the assets of these plans were invested in Guaranteed Income Contracts (Watson Wyatt 1993). A more recent study found a lower prevalence of these contracts, with 20 percent of thrift and savings plans in medium and large private establishments offering Guaranteed Income Contracts as an option for the investment of employee contributions (US Department of Labor 1999).

In the U.S., cash balance plans provide a fixed rate of return on the individuals account, but are financed like defined benefit plans. With a cash balance plan, workers have an individual account but it is not funded. Instead, the worker's account is credited with the contribution made on behalf of the worker and the guaranteed rate of return; it is unrelated to the underlying assets

held by the plan. These plans are hybrids in that they have features of both defined benefit and defined contribution plans, and are legally defined benefit plans for solvency fund purposes.

Floor offset plans are hybrid plans that provide a guaranteed minimum benefit. A floor offset plan is actually a combination of a defined benefit plan linked with a defined contribution plan. Often, the two are structured so that retirees tend to receive only a benefit from the defined contribution plan, but if that plan fails to provide the guaranteed minimum benefit, the defined benefit plan makes up the difference. Floor offset plans are generally structured so that the worker bears most of the financial market risk, with the floor plan taking over only in the case of a serious market downturn (Robinson and Small 1993).

Evaluation

In most cases, guarantees in voluntary defined contribution plans offer fixed nominal rates of return over a calendar year. In some countries, the guarantees are provided by insurance companies, while in other cases, the guarantees are backed by a reserve fund or an associated defined benefit plan. In several instances, guarantees of a fixed nominal rate have had to be revised to a lower rate because of declining rates of return in capital markets. There have also been cases where reserve funds have proved to be inadequate and have been exhausted, creating unfunded liabilities for the guarantors.[8]

The rate of return guarantees discussed would appear to have relatively few behavioral effects on workers, since typically the participant does not determine investments in his pension account, reducing the potential for moral hazard. The guarantee could affect the extent that workers take on risk in their nonpension investments, since it makes their investment in their defined contribution plan relatively low risk. In terms of labor market effects, guarantees may affect the timing of job change and retirement. This is because workers can have greater

certainty as to the level of their account balance in the future and thus are better able to plan for a specific retirement date.

Defined contribution plans are growing in importance in retirement income systems around the world. Thus, it is important to investigate ways that these plans might be improved. Rate of return guarantees are one approach to reduce the financial market risk that workers bear in them. The rate of return guarantees used by voluntary plans may provide useful experience for structuring mandatory defined contribution systems, as well as for reform of voluntary defined contribution systems.

TABLE 1. Structure of Rate of Return Guarantees in Voluntary DC Plans

Aspect of Guarantee	Options	Discussion
Rate of Return	Real or nominal Fixed or relative Timing	Adjustment for inflation Particular rate or index Reference period
Method of Risk Management	Hedging Insuring	Sacrificing gain Insurance premium
The Guarantee	Point vs. minimum Catastrophic vs. smoothing Voluntary vs. mandatory Longevity	Risk and expected return faced by worker
Institutional Backing	Employer PAYG or funded Associated reserve fund Associated DB fund Fund management co. Guaranteed product	Explicit sources of financing

Source: Authors' compilation.

TABLE 2. Voluntary DC Plan Guarantees Surveyed, by Country

Country and Plan Design	Noteworthy Features
Brazil:	
Open pension funds	Required real rate of return 6% per annum; portion of excess return paid into workers' account based on tenure; unavailable on new accounts
Denmark:	
Occupational plans	Insurance contracts provide guaranteed rate with maximum set by government and further restricted by EU; participant may receive excess yields above allocation to reserve funds; maximum guaranteed rate declining with fall in market interest rates
Germany:	
▪ Supplementary scheme	New system (2001) must guarantee nominal value of total principal contributed by retirement to receive favorable tax treatment
▪ Existing occupational plans	Guaranteed minimum rate of return available in some plans
Japan:	
New supplementary plans	New system (2001) mandates have three investment options, including guarantee of total principal contributed
New Zealand:	
National Provident Fund	Primarily for employee of local governments, now closed to new entrants; fund credits member accounts with nominal return equal to 4% per annum financed through conservative asset allocation and use of reserve fund; government backs shortfall
Sweden:	
Supplementary plans	Specific to blue-collar workers as negotiated by their trade union and employers; minimum guarantee is one option with the return set historically in a range of 3-4% by the Financial Supervisory Board
United Kingdom:	
▪ Investment option for DC plans	Investment banks and mutual funds (unit trusts) may offer funds that purchase put options to guarantee a certain return
▪ Combined DB-DC plan	Worker receives the higher of the two benefits calculated

Source: Authors' compilation.

TABLE 3. Descriptive List of Plans Surveyed in the United States

Tax Code/Sector and Plan Design	Noteworthy Features of the Guarantee
Church Plans	
▪ United Methodist Church	Base interest credit set annually by oversight board and backed by reserve fund financed by portion of returns in better-than-average years
▪ YMCA sec. 401(a) plan	Guarantee set annually by board of trustees for following year and backed by reserve fund; if fund reserves warrant, trustees may declare extra interest credits to active participants and even retirees
Public Sector Retirement Systems	
▪ State of Indiana Guaranteed Fund	DC plan option available to all state employees; backed by DB plan in which all employees are required to participate; guaranteed under Indiana state law; principal growth based on interest credit rate determined each year by the board of trustees
▪ Ohio STRS sec. 401(a) plan	New plan option (2001) offering a 7.75 return p.a. backed by DB plan; initial entrants must remain in option for 5 years, whereas future participants may receive a higher or lower guaranteed return; excess returns on investment placed in the DB plan
▪ TIAA Traditional Annuity	Primarily for college and university professors. Guarantees principal and specified interest rate, while offering opportunity for greater growth through dividends.
▪ Texas' counties Alternate Plans	Investments in fixed income marketable securities provide guaranteed minimum nominal rate of 4% with workers and insurer sharing excess returns
Private For-Profit Sector Plans	
▪ Cash balance plans	Technically hybrid form (DB with DC features); provides fixed rate of return on notional individual accounts unrelated to underlying plan assets; available for both private and public sector plans.
▪ Floor offset plans	Provide guaranteed minimum benefit by linking returns from DB and DC plan; often structured so that workers bear more of the financial risk

Source: Authors' compilation.

Notes: YMCA = Young Men's Christian Association; STRS = State Teachers Retirement System; TIAA = Teachers Insurance and Annuity Association; DB = defined benefit; DC = defined contribution.

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Endnotes

[1] The Employee Retirement Income Security Act of 1974 (ERISA) requires most private-sector retirement plans in the United Sates to satisfy minimum coverage, participation, vesting, funding, and fiduciary requirements as a means of improving retirement income security for plan participants.

[2] An earlier survey of rate of return guarantees for mandatory defined contribution plans is described in Turner and Rajnes (2001).

[3] See Turner (2001).

[4] In the Chilean mandatory pension system, if the reserve fund of a pension fund management company is completely exhausted, the company is declared insolvent and is disbanded (Gillion et al. 2000).

[5] See Public Employees' Retirement Fund of Indiana (2002) at <www.state.in.us/perf/glossary/index.html>.

[6] Before the Social Security Act was amended in 1983, state and local governments that had previously participated in Social Security were permitted to opt out.

[7] The Alternate Plans are a secondary source of retirement income for these workers in the three Texas counties. Their primary retirement benefit is provided under the Texas County and District Retirement System, another defined contribution plan, which also provides disability and survivor benefits (GAO 1999).

[8] One important area not addressed in this chapter involves the costing of these guarantees. For recent research see Hansen and Miltersen (2000), Jensen and Sorensen (2000), Feldstein and Ranguelova (2000), and Lachance and Mitchell (forthcoming).