

Designing Pension Systems for Developing Countries

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PRC WP 1995-14

Revised April 1996

Pension Research Council

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This paper was prepared for the Social Insurance and Labor Markets section of the World Bank's Education and Social Policy Department (ESP). Opinions expressed herein are those of the authors alone, and not those of the Bank nor of the institutions with which the authors are affiliated.

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Retirement system redesign is underway in many developing nations. Because these reforms are often responses to system near-insolvency, pension reforms are often targeted at solving short-term problems rather than at long term objectives. This paper examines what pension systems can and cannot hope to accomplish in the developing economy context in the longer run. The discussion is aimed at budget experts restructuring fiscal policy, experts concerned about poverty, and growth specialists seeking new sources of funds for capital market development.

We begin by identifying the key objectives of a well-functioning retirement income system, and evaluate labor market and other risks that must be taken into account in designing a viable and sustainable pension system. Recommendations that apply to virtually any institutional conditions are followed by suggestions regarding aspects of pension systems that must be designed in light of the economic and institutional circumstances prevailing in a particular country. Three prototypic pension systems are assessed with regard to their appropriateness for developing countries with diverse background conditions. We conclude that by taking due account of labor market and other risks, policymakers can design public and private pension systems in ways that will help provide greater economic security for retirees, while at the same time being efficient and equitable institutions.

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Driven by population aging and system-wide financial threats, retirement system redesign is underway in many developing countries. These reform efforts are usually undertaken with an eye on pension plans' current budget crises. As a result, experts' policy recommendations about pension reform are often made with short-term goals in mind, rather than with an understanding of what pension systems can and cannot hope to accomplish in the developing economy context in the longer run.

This paper seeks to inform policymakers' decisions about pension system design and reform. Several audiences should find our analysis of interest. Budget experts restructuring fiscal policy must worry about the fact that public pension programs are ever more costly to sustain: in some developing countries, retirement pensions already command 20% of government budgets (Mitchell, Sunden and Hsin 1994). Government revenue specialists also care about the economic effects of public and private pensions, since workers and employers can respond to the taxes used to finance these systems by moving into the informal sector. Experts concerned about poverty note with concern the rising numbers of older persons throughout the developing world and their vulnerability to economic shocks (World Bank 1994). Pensions also interest those seeking new sources of funds for capital market development, and have been used in several countries as a vehicle to privatize publicly owned assets.

We begin by clarifying what is meant by the term "pension" and identifying the most important objectives of a well-functioning retirement income system (Section 1). Section 2 then discusses labor market and other risks which must be taken into account in designing viable and sustainable pension systems. The paper then turns to ways to design pension systems to protect against these risks. Section 3 offers recommendations which would apply to virtually any institutional conditions. Other aspects of pension systems must be designed in light of the economic and institutional circumstances prevailing in a particular country. Alternative prototypic pension systems are proposed in Section 4, and

are then evaluated in Section 5 with regard to their appropriateness for prototypical developing countries with diverse background conditions.

We conclude that by taking due account of labor market and other risks, policymakers can design public and private pension systems in ways that will help provide greater economic security for retirees, while at the same time being efficient and equitable institutions. Our recommendations are summarized in Section 6.

1. Goals and features of pension systems

What is a pension?

Pensions take on many guises, so it is useful to distinguish among them at the outset. In this paper, a "**pension**" is defined to be a benefit paid to an employee who retires from his or her job after reaching a prescribed age -- say 65. When this benefit is paid regularly and periodically from the time the employee leaves his job until death, the pension benefit is called an "**annuity**." Alternatively, if a single payment is made upon retirement, it is called a "**lump-sum benefit**." Finally, a payment made to a worker who leaves the company before reaching retirement age is not a pension; this we term a "**severance payment**."

The defining feature of a pension is therefore that it is paid only after the beneficiary has grown old and retired. Accordingly, benefits available to young or middle aged workers are not consistent with the notion of a pension we use here, and which we believe is central to the original motivation for pensions.¹

A rationale for pensions

The main rationale for pensions is to protect against old-age economic insecurity. When life expectancies increase, people are more likely to outlive their working years. In consequence people begin to want and need old-age insurance, protecting them against the risk of outliving their total lifetime compensation. If people knew how long they were going to live, they might be able to partially self-insure. This could be accomplished by saving while they work, so as to draw down these savings during retirement. This is a standard

¹ The age used to define eligibility for pension payments varies across countries. Recent reviews of pensionable age practices across the OECD nations indicate that most plans commence payments at around age 60; see OECD (1992), European Commission (1994); and Mitchell (forthcoming).

optimal life cycle consumption problem, well discussed in the theoretical literature. But because lifetimes are uncertain, people want and need to insure also against the uncertainty of length of life.

The central mission of a pension system is to assure to the maximum extent possible an adequate standard of living for people in old age. "Adequacy" can be defined in at least three ways. A standard of **relative adequacy** would seek to provide a retirement benefit which is adequate relative to that person's past standard of living. If adopted, this calls for insurance, whether publicly- or privately-provided. Alternatively, a standard of **absolute adequacy** would seek to provide a retirement benefit which brings recipients' incomes up to an agreed-upon absolute standard of living (e.g., the national poverty line). If this standard were adopted, it would call for social assistance in aid of those elderly who would otherwise not reach that standard. A third possibility is **partly relative and partly absolute**. A system designed with this standard in mind would provide a larger benefit per dollar contributed for lower-income groups.² The design of a retirement income system should reflect which of the three objectives a country has chosen.

We recognize that often pensions, as economic and financial institutions, are asked to carry a host of other responsibilities in addition to what we argue here is their central mission. In Chile, for example, some applaud the national pension system for deepening the capital market and reducing what had been a burgeoning public debt under the old social security system (Baeza 1986, Baeza and Manubens 1988). Many other Latin American countries including Bolivia and Peru are following Chile's lead in designing their own pension reform programs, on grounds that their nations' macroeconomic growth will be stimulated as a result (e.g., Fittipaldi 1994). Other countries may soon follow suit: experts studying Chinese pension reform proposals tend to conclude that existing schemes there are not sustainable because they are used as a wealth transfer mechanism subsidizing poorly performing state-run companies at the expense of the better-managed firms (Friedman, no

² Many OECD nations have a system of this type. In the US for example, the main old age retirement income system ("Social Security") is redistributive in precisely this way, while a smaller program ("Supplemental Security Income") provides benefits only to low-income people, paid for by higher-income ones. In other countries such as Sweden, the bottom tier of the 2-tiered system is highly redistributive; see Ahmad et al (1993)

date; Hussain, 1994). The Provident Fund in Singapore has been held up by many as a great boon to the nation's growth because of the the subsidized housing which this fund has generated (World Bank 1994).

Pursuing subsidiary or spillover motivations for pensions often causes problems, most of which undermine the original rationale and motivation for pensions. One reason is that the desired spillover effects frequently cannot be demonstrated. For example, Chile implemented a national private pension system which has been touted as an engine of economic growth by some (Myers 1985). However analysts have not been able to identify which came first: the positive effect of these new Chilean pensions on the economy, or the fact that Chile's economic growth made it possible for the pension system to grow so quickly. Naturally, correlation does not prove causation, and it is far from clear that other countries can replicate the Chilean success story by adopting this pension scheme.

Another reason that subsidiary rationales for pensions should not be placed before the old-age security motivation is that these subsidiary motives sometimes undermine rather than enhance retirement income security. For example, in the United States, public pension fund managers who invested in so-called "socially targeted investments" appear to have reduced their plans' investment performance by measurable amounts (Mitchell and Hsin 1994). Research on Asian pensions shows that restrictions forcing the Singaporean national Provident Fund to invest only in housing reduced real rates of return for participants in that national pension system (World Bank 1994). Beneficiaries' retirement incomes may suffer to the extent that pension investments perform relatively poorly because of the pursuit of other goals.

Essential features of pension system design

Several features of pension plans must be understood in order to evaluate whether a plan is performing well or poorly. The first issue is how and to whom pension benefits are paid. A second question is how and from whom the money to pay the benefits is raised. And third, the linkage between benefits and contributions must be examined.

Under any type of pension system, it is usually the case that only those retirees who contributed to the plan during their work lives can receive benefits in old age. In the developing countries, the ability to tax workers is far from universal, which means that if the contribution principle is followed, retirement benefits are perforce limited to a fraction

of the elderly population. It is also usually the case that a worker is eligible to receive a retirement pension only upon reaching a minimum age and/or years of service requirement with the employer.

There are two basic types of pension arrangements: “defined benefit” and “defined contribution”. In a **defined benefit** (DB) plan, an eligible retiree receives a pension, the amount of which is determined by a specified benefit formula which links an individual worker's salary and years of service to a payout function. For example, a common DB pension benefit formula would define a retiree's annuity payment (P) as a function of when he retired (at age R), some basic benefit amount (B), plus a pay-linked component depending on the worker's final pay (FP), his years of service with the employer (YS), and a generosity factor (g) as follows:

$$P(R) = B + (FP * YS * g).$$

More elaborate formulas are also common, in which people with few years of service receive only B, middle tenure workers receive the payment identified above, and additional benefits accrue to people having 30 or more years of service. These nonlinearities can make DB benefit formulas quite redistributive. For example, many national social security systems are of the DB variety, and provide a minimum benefit to all participants irrespective of what they paid into the system (Mitchell forthcoming). Many company-sponsored pension plans also redistribute, often in the direction of long-tenured and highly-paid workers (Gustman et al 1994). Such nonlinearities can have a potent effect on retirement patterns, inducing certain groups of workers to retire early (the low paid in the case of social security systems, the long-timers in the case of the company plans), and having the opposite effect on higher-paid workers or those recently hired.

The second type of pension plan is known as a **defined contribution** (DC) system, where participants' benefits are directly linked with their own contributions while working and/or the contributions made by their employers on their behalf. In a DC plan, these contributions are invested, typically by professional money managers. To the extent that these funds are well-managed, the contributions will accumulate over time. Funds available at retirement are greater for those retirees who contributed more as workers. As a result, more highly-paid workers who pay more into their pension accounts also have higher retirement accumulations than do those who earned less and consequently paid less

into the plan. Also, since under a DC plan, the pension benefits are linked directly to what is contributed, these plans tend not to guarantee minimum benefits, nor to redistribute across pay and service categories.

At retirement, the DC benefits are payable in one of two forms. Some DC plans provide for the annuitization of investment accumulations so as to guarantee retirees a steady stream of retirement payments until death. Alternatively, some systems provide for retirees to take some or all of their accumulations in the form of a lump sum distribution. Finally, some systems offer a choice between the annuity and lump-sum forms (Andrews 1991).

While there are other ways to design pension plans, variants of these two formats -- the defined benefit and the defined contribution plan -- span the range of alternatives seen in most countries. Before discussing which plan, or which combination of plans, makes sense in a particular developing country context, we turn to a discussion of the types of risk confronting retirees, in order to better determine which plans can satisfy what objectives.

2. Sources of risk to consider in designing pension systems

In thinking about how to design pension systems, it is important to take into account five types of risk confronting retired workers against which they desire protection. These are individual risk, employer risk, investment risk, country risk, and international risk. Each is discussed in turn, along with their implications for pension design.

Individual risk arises for a variety of reasons. People are uncertain about their own earning capacity during their working years, because of such factors as unemployment, skill obsolescence, and poor health, as well as family disruption and premature death of the family breadwinner(s). They also face uncertainties in regard to their consumption needs when they are old: they do not know what they will need (because of the risks of poor health and disability) or for how long (because of uncertain remaining lifetime). There is evidence that many people seek to follow the accumulation pattern prescribed by the life cycle model -- that is, they try to save enough when young so as to be able to maintain consumption when retired (Hurd 1990) -- but the uncertainties in earning capacity can result in undersaving relative to the no-uncertainty "ideal". In addition even well-

intentioned people have been found to lack self-control, resulting in inadequate saving for retirement (Thaler 1994).

Depending on the way it is structured, a pension can be a partial answer to many of these individual-specific uncertainties. For instance, a defined benefit pension with a large flat benefit component reduces the uncertainty caused by variable or low earnings during one's worklife, inasmuch as it offers a minimum guaranteed retirement income. Of course, redistribution of this sort is only viable if participation in the plan is mandatory. Otherwise, the "ex-post lucky" would opt out of the redistributive plan leaving only those who turned out to be "ex-post unlucky", and the plan would not be able to meet its promises -- a problem known as "**adverse selection**".³ The problem of adverse selection has not been widely enough recognized in designing pension systems. It is likely to be a serious matter as countries such as Argentina offer workers a voluntary plan which only about a third of the workforce has apparently joined, and which they can leave at any time (Bour and Urbiztondo, 1994; FIEL 1993).

Many other pension features are also geared to reducing the consequences of individual uncertainty. Often plans offer a joint and survivors' option, providing in effect a form of life insurance in the event of the breadwinner's premature death.⁴ The self-control problem is typically dealt with by prespecifying that the employer will make regular contributions to a pension plan. Of course, the employer's contributions are largely if not entirely at the expense of workers' current pay, but the automatic nature of the

³ Adverse selection arises under the following conditions:

- The population consists of a large heterogeneous group facing different risks.
- Individuals voluntarily elect to participate.
- Individuals know whether they are high risk or low risk.
- The insurer does not know who is high risk and who low risk, or if he does know, he cannot act on that information.

It is obvious how the first three of these apply to government-run pension systems (or, for that matter, to privately-run ones). The last condition arises whenever the insurer lacks the ability to select among applicants and must pay benefits to anyone who is eligible.

⁴ In general, beneficiaries are either those who contributed to the plan, or those for whom contributions have been deposited by the employer. Joint and survivors' plans can, for a reduced benefit, cover widow/ers after the death of a retired spouse. This is quite common where life insurance markets are well enough developed to be able to price the life insurance aspect of the plan.

contribution system means that workers do not have to make a decision each month about how much, or whether, to save for retirement. Finally, longevity risk is addressed in many pension plans by requiring that benefit payments take the form of annuities. In this way, payments are guaranteed until the retiree dies, ruling out the possibility of outliving one's retirement asset accumulation.

In insurance theory, a problem known as “**moral hazard**” exists when the insured has the ability to affect the probability and/or the severity of a loss.⁵ Moral hazard arises in the context of pensions, because the decision whether to retire or to continue working is at least partially in the plan participant's control, and people often shape their work patterns in order to maximize benefit payouts. This has become quite a problem in many national social security systems. For example, in Brazil, civil servants can retire on approximately 80% of their preretirement earnings after only five years of participation in the system; as a result, many people retire quite young and the system is on the verge of bankruptcy (World Bank 1994). In Chile and in Japan, workers who contribute only a small amount to the national DC system are nevertheless guaranteed a national flat benefit from the government. In this case, moral hazard takes the form of people not contributing to the system, because they can still receive the guaranteed benefit. As a result, 45% of the Chilean workforce is not contributing to the national mandatory plan (Campbell 1994), and even in Japan only 83% of the expected revenues are collected annually (Asahi Shimbun 1991).

One way to reduce this moral hazard problem is to make payments contingent on age, rather than work status; this has the advantage of making benefits depend on something more arguably exogenous. Another solution, adopted by many private DC and a few DB plans, is to actuarially reduce benefit amounts payable to early retirees, so as not to subsidize too-early retirement. In any event, restricting benefit payouts to those attaining a particular age is best understood as an answer to the moral hazard problem.

⁵ One classic example is fire insurance. When a house is fully-insured against fire, the insured may not exercise reasonable precautions, such as installing smoke detectors. Another classic example is health insurance. When people are fully-insured, they often overuse medical services. Because of moral hazard, co-payment provisions are ubiquitous for these kinds of insurance.

Employer risk arises to the extent that the pensions promised are not backed up by a well-diversified asset pool segregated from employer assets. If the firm fails, the pension promise becomes valueless. This phenomenon is widespread around the world. In Germany, for instance, pension promises are corporate liabilities but no special asset pool exists to cover these benefits; rather, companies report only “book reserves” which survive only as long as employers avoid bankruptcy (Ahrend forthcoming; Davis 1993). A similar situation persists in Japan (Clark 1991) and is widespread among state and local pension plans in the United States (Mitchell and Hsin 1994). More generally this condition is the norm for unfunded social security systems around the world (Ahmad et al. 1991; Atkinson 1987; Bodie et al. forthcoming; Fox 1994; ILO 1994; Kohli et al. 1991).

The fact that pension promises are unfunded or underfunded means that workers, and eventually retirees, bear the uncertainty that there might not be adequate funds on hand to pay benefits, particularly in the event that their employer slides into bankruptcy. How large a risk this is depends on the employer in question, as well as the economic environment in which these promises are made. For example, German analysts report that the book reserve system has operated quite well in the past; whether this will continue in the future as the German economy responds to reunification is unknown (Ahrend forthcoming; Schmael 1988). An even more troubling development is that in some countries, companies have begun to use bankruptcy as a strategic means of reducing their pension obligations. In the U.S., for instance, the government agency which re-insures corporate underfunded pensions has found it necessary to prohibit companies from expanding pension promises prior to declaring bankruptcy and offloading their underfunded plans on the government (Bodie 1992; Ippolito 1989).

All in all, it is clear that the way in which employer risk is handled can greatly affect the security of the pension promise. Reinsurance systems may encourage moral hazard on the part of employers, enabling them to evade unfunded pension obligations without having to pay the consequences. Hence these institutions may unwittingly increase rather than reduce old-age economic insecurity.

Investment risk arises in the case of funded pension systems. The monies contributed during peoples’ working years are invested by a pension fund in the hopes of earning a positive rate of return. These risks are correlated across individuals, because in

the event that the investments do not work out well, all those who invested with a particular pension fund lose out. (Of course, the correlation of risks is highest when there is only a single pension fund.) Investment risk can be mitigated, although not eliminated, by carefully prescribing the investments that pension funds can make. More is said about this later in the paper.

National (or economy-wide) risk is a matter of concern because retirees desire some insulation against economic and other shocks affecting the economy as a whole. For example, inflation in Eastern Europe has greatly eroded the value of retirees' real pensions (Atkins 1991; Diamond 1992); similarly in Argentina, inflation eroded benefits to the point where social unrest resulted (FIEL 1994). Especially in transition economies but elsewhere too, workers and retirees face the additional risks of national political upheaval, restructuring of public and private institutions, change of government regime, civil war, and other complex developments (Szalai 1991).

Other political risks are often difficult to quantify in advance, but they also pose a serious threat to retirees' economic security. As an example, China has dramatically reduced support for state-owned enterprises and collective farms in recent years, without having a coherent replacement for the cradle-to-grave system of social support which these outmoded economic institutions provided. In consequence, China's old-age protection system is failing, with no simple resolution of the old-age security problem in sight (Hussain 1994).

Designing pension systems to better protect against these national risks requires figuring out how to hedge the country-specific macroeconomic and political risks just described. Experts suggest that this can partly be achieved by requiring that pension systems be funded, so as to reduce the risk of not having sufficient assets, and that the funds be invested in an internationally diversified portfolio of assets independent of that one country's economic and political state (Bodie and Merton 1992; Davanzo and Kautz 1992; Fields and Mitchell 1993; Kotlikoff 1994). Some government experts express reservations about such a proposal, fearing that it would reduce their control over monetary policy, and might expose the country to excess economic volatility as funds respond to small differences in international capital market returns (Davis 1993; Arrau and

Schmidt-Hebbel 1994). We believe that the benefits to retirees in terms of greater old-age income security more than outweigh the costs to policymakers.

International risk, or risk due to catastrophic global events, is the final type of risk confronting retirees. These essentially undiversifiable shocks might arise through worldwide depression, global weather shifts or environmental pollution, international epidemics, or wide-scale conflicts such as nuclear war. When an event like this occurs, there is no unaffected population and hence no one to risk-share with. In this case, even a well-designed pension plan cannot do much to guarantee retirement security. We recognize this and deem it important to confront explicitly the fact that a pension system cannot hope to guarantee an income or well-being standard in every state of the world. Indeed, as we shall show in the next section, having a method of allocating bad as well as good investment results is a central role of a well-designed pension system.

3. Designing pensions to protect against old-age economic insecurity

Having outlined the most important risks confronting retirees, we next turn to a discussion of how to design a pension system which can help protect against these risks. In this section we focus on common features which must be taken into account irrespective of the particular economic and institutional conditions of the country in question. In the next section we offer some prototypic pension plans and discuss the particular contexts in which one or the other plan might work better.

We begin by noting that it is essential to consider benefits and financing simultaneously when designing a pension system, in order to be sure that the plan achieves the goal of enhancing retiree security, that it is sustainable, and that it does not have undesirable effects on labor market incentives and income distribution. With this in mind, we would recommend the following:

•**Mandatory or voluntary participation:** Pension participation should be mandatory. A *laissez faire* approach to old-age economic security would be to let each worker designate his own benefit target and save accordingly. However, a more proactive pension designer might suggest some target contribution levels if there is concern that people save too little, perhaps because they are too myopic, they do not understand life expectancy statistics, or they simply find it difficult to exert self-control (Poterba 1994). A related concern arises if a country has a means-tested antipoverty program. If pension

contributions are voluntary, people can dissave all their lives and rely on the noncontributory retirement income system when they are old (Hubbard et al. 1994). To overcome these potential problems, it would be appropriate to establish a minimum contribution, and hence a minimum benefit, for those who would otherwise tend to save too little.

•**Minimum retirement age:** Pension benefits should be paid only to the old.

Requiring that benefits be limited to those older than age 65 or 70 ensures that people will continue working as long as they can, and limits younger peoples' access to the funds too early in life. Limiting access curtails peoples' efforts to cash out their plan due to shortsightedness or shortcoming in self-control. In sum, if participants cannot obtain benefits until they are old, the money is more likely to be there to support old-age consumption needs, which after all is the purpose of the pension system.

•**Benefit form:** Pension benefits should only be paid in the form of a life annuity.

This protects against the risk of living too long in an economic sense, whereas lump-sum benefits do not. Permitting lump-sum benefits also is subject to moral hazard (people might spend the lump-sum benefits right away and then claim a generous minimum benefit, as is offered by the government of Chile) and to adverse selection (those who reach retirement in poor health will take the lump-sum benefit, while those in good health will elect an annuity, jeopardizing the financial soundness of the retirement income system).

•**Pension coverage:** Pension benefits should be paid only to those who have paid into the system. This reduces the moral hazard of people working off the books so as to avoid paying contributions, later trying to claim retirement benefits from the system. Countries differ with regard to the size of the pension coverage pool: most developed countries mandate that all citizens be in the national pension pool, while poorer nations often exclude rural workers or laborers in the informal sector, thereby covering only a minority of the work force. In any event, requiring that benefits be offered only to those who paid into the plan increases the incentives to enter and remain in the system, curtailing moral hazard.

Some might object to these benefit guidelines on the grounds that they do not guarantee pensions to those who never worked or who worked only in the informal sector. For this reason, we recommend:

• **A single national anti-poverty program:** The same poverty alleviation program should be offered to everyone in the population, old and young alike. In the absence of such a program, pension schemes will be diverted from their primary purpose, which is to insure against economic insecurity in old age.⁶

• **Links between benefits and contributions:** Promised pension benefits should be linked to the contributions made by the individual and his/her employer.

We illustrate this point by describing a system in which pension benefits and contributions are not closely linked to each other. This is true of many national social security schemes including that in the U.S., which redistributes by paying more to some groups of retirees than they contributed while others receive less. The principal type of redistribution in this system is intergenerational: benefits paid to today's retirees exceed their contributions (with interest) several times over (Steuerle and Bakija 1994). Because that system is self-supporting, and because the economy and the population are not growing quickly, the fact that retirees now and in the past have received more from the system than they contributed implies that future generations of retirees must necessarily receive less.

Assuming that is desirable to link the contributions made to the benefits paid, there are several ways of achieving this in practice. Perhaps the most transparent case is that of a defined contribution plan in which, as discussed above, an individual worker's pension contributions over his lifetime along with investment earnings thereon equals the present value of expected pension benefits payable during retirement.⁷ Such a pension plan is said

⁶ If there is a national anti-poverty program, permitting people to access and spend their retirement benefit as a lump-sum might lead to increased old-age poverty. In this case it may be socially beneficial for people to precommit themselves to a government institution which prohibits them from spending their lump-sum cash-outs. Blinder (1988 p. 29) has called this "Ulysses paternalism after the ancient mariner of mythology who had himself tied to the mast so as not to be lured by the Siren's song".

⁷ Ignoring uncertainty the present value of an individual's contributions plus earnings from the beginning of his worklife until retirement (R) should equal the present value of his pension payments from retirement to death (D):

$$= \text{SUM} [0 \text{ to } R] \{ C_t (1+r)^{R-t} / (1+d)^t \} = \text{SUM} [0 \text{ to } R] \{ B(R)_t / (1+d)^t \},$$

where C_t is the amount contributed each year to the plan, r is the investment earnings rate on contributions, d is the discount rate, and B the annuity payment. Contributions provided by the employer are assumed to be paid by the employee, in the form of lower wages.

to be individually neutral for each person. A DC plan is also cohort-neutral in the sense that, averaged over all members of the pension-covered cohort, the present value of expected contributions (with interest) equals the present value of expected benefits.

In support of these types of pension neutrality is the argument that such a system increases workers' incentives to participate in the pension plan, since payouts are directly linked to contributions. In addition, such plans are funded, and when the assets are properly managed, a funded plan can diversify away company risk and even some amount of national risk (if international investments are allowed).

DC plans are sometimes criticized, in our view unfairly. One alleged drawback is that DC plans do not guarantee a minimum level of old-age income. How much of a concern this is, depends on why benefits are low. One reason is that a low-skilled worker's retiree benefits are low because his contributions were low; of course his contributions were low because his lifetime earnings were low. As noted above, rather than being a reason to reform the pension system, this suggests the need to establish a single poverty program covering older people and others alike. A second reason the DC benefits might be low is that the worker and/or employer evaded contribution obligations by working in the informal sector. In general, we see no good reason to subsidize system evasion.

A final explanation for low DC payments is that the pension fund experienced poor investment returns. Sometimes this is due to mismanagement, which points to the need for regulating pension fund management. Other times, the explanation for poor returns is that the fund was insufficiently diversified, which reinforces the reasons for holding an international portfolio. In any event, there is always some residual uninsurable risk that a pension fund cannot guarantee. But still, a defined contribution plan tends to perform better on these grounds than does a defined benefit plan.

Another method of linking benefit payments to contributions is to maintain cohort-neutrality but not individual neutrality. That is, there might be a balance at the cohort level between the expected present value of what each cohort pays in and what they get out, but there can be redistribution among members of a given cohort -- for instance, in favor of workers with low and interrupted earnings patterns. Such redistribution could be

achieved by a defined benefit plan with the benefit formula containing both a flat component and a contribution-linked component. The poorer members of the cohort in question would receive relatively more from such a DB plan than they would from a conventional DC plan, with these higher benefits being paid for in the form of reduced benefits for those who earned and contributed more during their lifetimes.

Such a plan might seem appealing *ex ante*, but it suffers from the difficulty that *ex post*, workers who know they are. Above-average earners have a strong incentive to opt out of the system if possible, which is precisely why they must not be allowed to, or the system fails to be viable as a redistributive venture. If the flat benefit component is large enough, workers may seek to "hide" earnings so as to reduce what is in effect a high marginal tax on earnings.⁸ In general, moral hazard and adverse selection problems are substantial in such a system.

DC plans are sometimes criticized for being subject to investment risks. This is true, but DB plans are no less vulnerable. In the eventuality of a national or international calamity, the pension plan's promises would be only as solid as the value of the assets backing the plan. Putting it a different way, if asset values fall, a DB plan may become underfunded. For cohort neutrality to be maintained, there would then have to be some mechanism to reduce participants' benefits. Seen in this light, the DB plan is just as vulnerable to investment risk as a DC plan, and suffers from additional problems as well.

For these reasons, it appears that a DC plan would be a better way of linking benefits to contributions than would a cohort-neutral DB plan. We shall have more to say about this in Section 4.

• Intergenerational redistribution: Intergenerational redistribution should not be built into the pension system.

In our view, intergenerational redistribution should be handled as a straightforward transfer instead of hidden in a pension system's contribution and benefit rates. One objection to this view is that future generations may live in a more prosperous world than

⁸ Even if earnings cannot be hidden, better-off workers may choose to retire earlier so as to avoid paying social security taxes.

the current one. This is often offered as a rationale for a pay-as-you-go (PAYGO) unfunded pension. Unfortunately, as many are now aware, PAYGO systems cannot guarantee that future generations of workers will experience better luck and have the productivity levels to sustain the current level of benefits for today's retirees. In fact, this is precisely the problem faced today by many formerly socialist economies, whose pension systems are crumbling due to the lack of an economic base to generate income and tax revenue (Atkins 1991; Diamond 1992; Fox 1994; James and Vittas forthcoming; Szalai 1991).

Another reason for avoiding intergenerational redistribution is that there is a significant risk of government moral hazard when unfunded promises are permitted to be transferred across time. Specifically, if a government promises benefits to retirees today, it often tends to leave it to future governments to figure out how to pay for these benefits. In addition, intergenerational risk pooling suffers from the lack of a mechanism to ensure that future generations will be willing to pick up the tab for a previous generation's ill fortune. We suggest that it is very risky to design a pension which relies completely on future, and in some cases as yet unborn, generations to pay for the benefits given to today's retirees.

•Program funding: Pensions should be fully funded and invested in as well-diversified a set of assets as possible.

Pension funds should be fully-funded to assure that money is available to pay all of the benefits promised. As the system matures, full funding would create a huge amount of capital under the control of pension funds. This raises two questions: How the funds are to be invested and by whom.

Regardless of whether the system is organized as a single government-managed fund or as a number of privately-operated ones, a carefully drawn-up charter will be needed to prescribe allowable investments. In actual practice it appears that many countries seriously limit their pension plan investment holdings. Some nations require that their retirement system investments be restricted to certain domestic holdings. For example, Chile's privatized pension system has been required to invest only in Chilean government bonds and Chilean stocks until very recently, and even now foreign asset holdings cannot exceed government-specified levels. Support for domestic home ownership is a goal of the Provident Funds in Singapore and Malaysia and of the new national pension plan in Mexico (World Bank 1994).

In our view, forcing pension funds to invest contributions solely in developing country domestic assets does not provide adequate protection against national political and economic risk. This is particularly a problem for very small countries, where international diversification of funds would be preferred. The issue is made more complex by the possibility of government moral hazard. This arises because from time to time, governments have been known to “raid” the assets of pension funds, directly or indirectly, in order to fulfill other government goals. In some countries pension funds seeking inflation protection can purchase indexed government bonds; however at several junctures over time the government declared “holidays” from inflation indexation, thus reducing the rate of return on pension contributions (Khan 1994). To protect against these risks, we favor internationally-diversified pension fund investments.

•**Program management and monitoring.** Publicly- and privately-run pension systems each have their advantages and disadvantages.

In examining pension plans around the world, it is evident that a great deal needs to be done to make pension systems more administratively efficient, better monitored, and better regulated. Administrative costs of running defined benefit-type social security systems are quite high, particularly for small countries. For example, in Latin America and the Caribbean, administration costs were six times as large a fraction of contributions as compared to OECD nations (Mitchell et al. 1994; Mitchell and Sunden 1994).

Some respond that the answer is to do as Chile did, namely to privatize the pension system administration so that workers can search for the best return on their retirement contributions. However, recent studies demonstrate that this is no panacea: that DC system reports administrative costs which are several times higher than public plans in Chile, which in turn are higher than the administrative costs of private plans in other countries (Reid and Mitchell 1995; Valdes Prieto 1993).

•**Omissions:** Not all risks should be or can be insured.

Some risks are in principle insurable, but inevitably some are not, as discussed in Section 2. When workers and retirees, employers, and governments can exert some control over the insured outcomes, a pension system must take into account potential adverse selection and moral hazard problems. What this means is that a pension system should not promise to insure against every eventuality. Also, even if full insurance were feasible, it is

ordinarily not desirable (Rothschild and Stiglitz 1976). Some advocates suggest that given a cause of economic insecurity, “let's provide a benefit to protect against it”. Pension system designers must resist such pressures and plan systems based on sound fiscal and insurance principles.

4. Pension prototypes for developing countries

In the preceding section, we recommended certain structural features of pensions for developing countries regardless of their circumstances. These considerations do not imply a unique structure for a pension system. Rather, several different pension structures are potentially consistent with these recommendations.

In this section, we consider three possible prototype systems. The first is the creation of a funded national defined contribution (DC) plan which emphasizes individual neutrality, or the ex ante equality between individual contributions and benefits. The second, a mandated funded defined benefit (DB) pension plan with strong redistributive features, emphasizes cohort neutrality while avoiding intergenerational transfers. The third is an innovative “fund shares” (FS) approach, to be described below in detail.

•A mandatory defined contribution pension system.

The essence of a DC plan is that contributions are made, these contributions are invested, and pension benefits are paid out of the available accumulations when the worker retires.

The prototypical DC pension system we propose for analysis is a mandatory one which covers all workers. The alternative is a voluntary system, but we discard this as a viable instrument for retirement savings. This is because a voluntary system would simply provide an option to save for retirement, and as such, would be no different from an optional savings account, already available in many developing nations. As a rule there seems to be little call for creating such a system, since it would perform no new economic function. Furthermore, a voluntary system would be subject to adverse selection. For these reasons, a mandatory system is recommended.

Funds contributed to this national DC plan would be invested according to internationally determined performance standards. Benefit levels would vary with investment performance though retirement income targets would be used to set

contribution levels. Also, in order to insure against the uncertain length of life, benefits would be paid in the form of annuities rather than as lump sums.

In order to assure that the DC plan benefits are actually used for old-age economic security rather than an early-out program, the system should pay benefits only after attainment of some age. A retirement age such as 65 or 70 might be a reasonable choice for a developing country. Pension benefits should not be granted after having completed a particular length of service with an employer or years of contribution into the system (unless old age has been reached).

Because a DC system pays out according to the individual equity principle, people who contribute more as workers receive larger benefits as retirees. Under a simple DC plan, no minimum pension can be guaranteed: that is, someone who did not work in covered employment and therefore did not contribute to the system would receive no benefits.

The Chilean AFP system is a national DC plan, but it is quite different from the prototype DC plan just discussed. Most importantly, participation in the Chilean system is not mandatory and coverage is far from nationwide. A recent study reported that less than half of all private sector workers contribute to the plan including most informal-sector workers (Campbell 1994). Of course the size of the informal sector is ultimately endogenous, and system nonparticipation could be encouraged by the fact that indigent retirees may receive a separate flat benefit provided by a government agency separate from the AFP system (World Bank 1994). Also, in Chile, well-off pensioners may obtain a substantial portion of their benefit in the form of a lump sum, which runs the risk of adverse selection on the annuity side and of suboptimal protection against the economic risk of outliving one's savings.

Another concern in the Chilean case is that the DC pension plans were until recently prohibited from diversifying internationally. Even though they could invest as much as 12% of their portfolio in non-Chilean assets, the major pension funds still invested only 2-3% outside the country as of 1994 (El Mercurio 1994). This means that the system is not as well-protected against economy-wide risk as it might be. For all these reasons, the Chilean system is far from being a prototypic illustration of the kind of national DC plan to be analyzed.

• **A mandatory fully-funded defined benefit pension system.**

A mandatory fully-funded DB pension system would be similar to the mandatory DC pension system just discussed with one important difference: the DB plan would be redistributive, because the benefit formula would offer a large fixed benefit to everyone and only a small contributions-related variable component.

One advantage of this system, compared with a DC system, is that benefit levels could be targeted at some minimum level of adequacy. Of course funding shortfalls could result from lower-than-expected investment returns, undermining this benefit targeting. A consequence of making the plan redistributive, of course, is that it would have to be mandatory; otherwise, adverse selection would undermine its financial viability. Even so, evasion is a likely problem. Redistributive DB plans also face what may be an irresistible temptation to raise benefits without raising the taxes to pay for them, thereby garnering the thanks -- and votes -- of current beneficiaries. Stringent fiscal controls would have to be put into place in order to prevent this temptation from becoming a reality, and a mechanism would have to be designed to deal with the consequences of investment underperformance and consequent DB plan underfunding. In order to maintain the criterion of cohort neutrality, inadequate funding would have to lead to benefit cuts or increases in contributions, or both.

• **A mandatory fund shares system**

A clear disadvantage of a funded DB plan is that the link between contributions and benefits can only be made subject to the uncertainties to which all economies are subject. In the event that contributions turn out to be inadequate to meet the promised benefit level, the system would face a shortfall. In most countries, there has been no explicit agreement before the fact, about how to spread this shortfall among members of the recipient cohort. As a result, unfunded deficits tend to be passed on to future generations. While a DC plan avoids this pitfall, as we have just seen, it is not redistributive.

A third possibility is what we call a “**fund shares**” (FS) system. This would work like the DC and DB systems described above in many respects: it would be mandatory, the contributions would be invested by money managers, and a fund for paying retirement benefits would thereby be created. The novelty of the Fund Shares approach comes in on

the benefit side: what it promises is that all contributors receive shares in their birth cohort's benefit account, perhaps on a redistributive basis.

To illustrate, suppose the system were to offer one full share for all contributions (plus investment earnings) up to a moderate income threshold level; a partial share for contributions beyond that amount up to a second, higher, threshold; and yet a smaller share for contributions above that amount. Denote by S_{ij} the shares accrued by individual i in birth cohort j . Let S_j denote the total number of shares accrued by everyone in birth cohort j , and F_j be the amount of this fund for those born in birth cohort j . Then the value of each share would be F_j/S_j . The retirement benefit of individual i in cohort j would equal his or her number of shares multiplied by the per-share value:

$$B_{ij} = S_{ij} * (F_j / S_j).$$

The annual retirement benefit is the annuitized value of B_{ij} . In order to enhance the transparency of such a system, participants can be told: "Your contributions buy shares in the fund, the precise value of which depends on our ability to invest the funds profitably on your behalf."

In this proposed fund shares system, redistribution in favor of the low-income elderly is achieved through the fund shares formula. Redistribution is possible in a second way, which is to means-test the benefits.⁹ Direct means-testing is administratively difficult and open to potential abuse. In certain societies, it would be culturally difficult, even humiliating, to ask for benefits from the state rather than from the eldest son. An administratively and culturally feasible alternative might be to provide benefits to everyone but to subject the benefits to income tax, which could work in countries with widespread tax coverage. Care should be taken, however, to avoid imposing such high tax rates that strong incentives are created for tax avoidance if not outright tax evasion.

A redistributive FS system has two advantages. The first is that, unlike a DC system, these shares would not have to be proportional to the amounts contributed, thus affording the designers of the retirement income system a redistributive degree of freedom.

⁹ Benefits are means-tested when recipients must prove that they are needy and deserving of benefits.

The second advantage is that, unlike a DB system, the Fund Shares system would have a built-in mechanism for spreading any gains or shortfalls that might arise because of unexpected returns on the fund's investments. The mechanism, very simply, is that if less money is available in the fund for cohort j, retiree benefits are reduced in proportion to the number of shares they own; conversely all cohort members gain if the economy grows faster than expected.

To the best of our knowledge, this is the first time that such a system has been proposed. Below, we consider how it might work in the context of two prototype developing economies.

A note on other pension options

In the pension literature, some analysts have suggested that a two-tiered or even multiple tiered system would be useful. Some propose mixing a dual DB and DC option, and even a three-tiered plan with two of the tiers being offered by the government and the third offered by the private sector (World Bank 1994). In our view, if private insurers wish to create pension funds and compete for business, and if workers or employers want to contribute to such funds, they should be allowed to. However it is not clear why governments should either encourage or discourage such funds.

On the whole, there are both costs and benefits from multiple-tier systems. Adding additional tiers allows pension systems to be more closely targeted to meeting particular employee groups' insurance and retirement savings needs. However, having other systems will also tend to generate more administrative costs and may offer opportunity for more obfuscation, neither of which would increase old age income security. Certainly mandating duplication or triplication of pension systems becomes less desirable if the primary system can be well-designed so as to protect against as much of the insurable risk as possible, while generating relatively few economic inefficiencies.

5. Selecting a pension system for specific developing country contexts

In this section, we examine the relevance of each of these three pension types for two prototypic developing countries: a middle-income newly-industrializing economy (NIE) and a low-income less-developed country (LDC). What differentiates these are the institutional and political infrastructures available in the country.

Pension options for a middle income newly industrializing economy

A prototypic newly industrialized economy has several key characteristics relevant to the present discussion. Most often it has a stable government which is free to act on its perception of the public interest and is not held hostage to populist sentiments. It has a system in place for raising taxes and distributing social benefits: elements include a national social security number or identity card, a largely formal labor market, adherence to a tax system with some avoidance but no massive fraud. It has a well-developed banking system, which will happily receive deposits. Inflation is at moderate levels -- say, 10% per year.

All of the pension options we have proposed for consideration are fully-funded. Presumably, contributions would be collected at the workplace -- a practical option for a country with primarily formal employment. Many countries have found it advantageous to require that contributions be paid equally by workers and by employers. No one should be fooled into thinking that this is the ultimate incidence, however: there is good reason to believe that a large part of the employer's share is shifted to the workers in the form of lower current pay (Hamermesh 1993).

A mandatory system would collect money from as many workers and employers as is administratively feasible. The funds would be put into an account and invested so as to generate retirement benefits for that worker and/or spouse on retirement.¹⁰ Specifically, the funds must not be used to provide retirement benefits to others, and particularly to retirees from some other cohort (currently alive or in the future).

A mandatory system may be run by the government but it need not be. One alternative is to mandate that pension contributions be made to one or more competitive firms chosen from a list of approved money managers. The main advantage of a government-run system is the administrative economies of scale that can be realized by having a single entity collecting contributions, a single large investor, and a single payer of benefits. Disadvantages are the risk of fraud and malfeasance -- not only outright theft but also the much more likely possibility of using the money in the pension fund in ways that would facilitate the reelection of the ruling powers (i.e., government moral hazard).

¹⁰ The latter would be through a joint and survivors option, as discussed in footnote 4.

In a privately-run system, pension plans would compete against one another, thereby offering higher rates of return on contributions than would be offered by a monopoly. One disadvantage of a privately-run system is that socially wasteful advertising expenditures will be made. Also, the pension funds would need to be carefully regulated in order to prevent them from making excessively risky investments in the hopes of registering higher rates of return in order to attract more investment dollars -- another socially wasteful expenditure.

In a country with a strong, honest, benevolent government, the advantages of a government-run system are likely to outweigh the risk of fraud and deliberate malfeasance. There nevertheless remains the risk of inadvertent malfeasance: investing the money in government bonds that fund current government expenditures, leaving no real resources for future pension benefits. For this reason, as discussed above, the allowed investments would have to be carefully prescribed and regulated.

Where the three types of systems discussed in Section 4 differ is in the structure of benefits. What should be the relationship between benefits paid and contributions received? The options are:

- Under a defined contribution system, each dollar of contributions plus investment earnings buys one dollar's worth of benefit entitlement paid as an annuity. Specifically, the present value of the expected benefits (PVEB) equals the present value of expected contributions, with interest (PVEC). Such a system is said to possess "individual neutrality".

- Under a defined benefit system, there is no necessary link between the individual's own contributions and the value of the benefits he or she receives. If the system is fully-funded -- a feature we insist upon -- the present discounted value of expected benefits for each cohort would equal the present discounted value of contributions plus earnings. Such a system is said to possess "cohort neutrality", but it is not necessarily individually-neutral.

- Under a fund shares system, shares are assigned to each participant based on contributions made but not on a dollar-for-dollar basis. Each share would, however, buy a pro-rata fraction of the funds, payable as benefits during retirement. This too possesses cohort-neutrality but need not require individual-neutrality.

Which of these three benefit structures would be best suited for the prototypic newly industrializing economy? Consider first the defined benefit option. A fully funded system could be created whereby $PVEB = PVEC$ for a birth cohort or some other pre-defined group. Within that group, the system could be redistributive if desired -- thus, for example, the poor might receive a higher benefit/contribution ratio at the expense of others. As long as $PVEB = PVEC$ for the cohort, the entire system would be in actuarial balance. The difficulty of doing it this way, and the reason that we do not recommend it even for the prototypic NIE, is that such countries are unlikely to possess the actuarial data and expertise needed to create an actuarially neutral system. In addition, DB plans often fail to meet their full funding targets in practice, leading to undesirable intergenerational transfers, distortions in behavior, and inadequate benefits. This is the problem currently faced by national social security systems all over the world.

Alternative choices are either the defined contribution or the fund shares (FS) option. The DC approach is actually a special case of the FS system in which each dollar contributed with investment earnings entitles the participant to buy one share; in the FS redistributive case, low-earnings workers would receive proportionately more shares. It is therefore evident that the choice between these two plans is actually a choice between redistributing through the pension system or not.

In some cases governments may prefer a pension system which offers some minimal insurance against the risk of being a poor worker -- which, in the absence of redistribution, implies having a low pension in retirement. In an actuarially neutral system, this requires transferring from better-off to less well-off workers and retirees, but not across generations. The FS option can achieve this.

Irrespective of whether the DC or the FS plan is created, there remains the issue of partial coverage and transition: namely, some would receive no or low benefits from the plan. For example, people who are now retired would receive no benefits. People about to retire and who contributed to the new system for only a short time would receive very little, because they had only a short contribution period and they get back only their money's worth and no more. People who worked their entire lives in the informal sector would not pay contributions into the plan, and hence would be ineligible to receive benefit payments. What should be done for these people?

Following the logic of a fully funded system, and particularly in the case of the DC plan, the simple answer is “nothing”. That is to say, a country cannot solve all social problems with a pension system, and adopting a retirement plan intended to foster retirement income security cannot eliminate all retiree poverty. While some may find this conclusion politically difficult, it is economically straightforward. Those who receive benefits in the future will have paid for them, and no one will get something for nothing.¹¹

Pension options for a lower-income developing country.

A pension system may be much more difficult to implement in a poor and economically unstable country such as many in Latin America and the Caribbean or in Africa. The coverage and benefit target goals may differ dramatically, as compared with more advanced economies. In a country which is predominantly comprised of subsistence agricultural workers, it is unlikely that a comprehensive pension system can be implemented covering the entire population. Existence of a large informal sector need not be a drawback to pension reform in these countries, however, if the goal of the pension system it is to cover those who contribute to the plan.

Having collected the funds, the next question is whether records are kept in such a way as to adequately identify who the beneficiaries are and how much their accumulations are worth. In this light, computerized systems are likely to offer more assurance that records are being well kept as compared to the practice in many countries, where workers must maintain their own pension record via a paper passbook which is all too easy to lose or counterfeit. More advanced communications and record-keeping will no doubt inspire greater confidence on the part of the participants. Part of the plan trustees' responsibility is also to provide information to participants, and more up-to-date systems will better meet these needs. Data management and tracking functions offered by competitive private firms may be superior to government record-keeping, in some countries.

The next question is how the pension funds will be managed. One important determinant of pension fund success is investment management experience which appears to be in short supply in many of the poorer developing countries. Most poor countries do

¹¹ We reemphasize the likely need for an across the board antipoverty program, separate from an old-age program.

not have vigorous and well-regulated national capital markets, implying that domestic assets may be difficult to evaluate. Another complication is that many developing countries have a relatively undeveloped banking system, making it difficult for local institutions to handle large sums of money in an orderly fashion (Stiglitz 1993). In the absence of such a well-functioning system, it may be more sensible to turn the funds over to competitively chosen money managers to invest internationally.

Another factor challenging pension reformers in poor developing countries is that insurers have had relatively little experience pricing annuities, and annuity markets are evidently quite thin (Diamond 1993). This is not surprising inasmuch as life expectancy data are unavailable, and adverse selection is likely to be quite substantial if annuities are sold to individuals.¹² In addition, as development proceeds, life tables might be expected to change rapidly. As a result, pensioners might only have the option to obtain quite expensive annuities, making the plans somewhat less appealing. Also insurance companies in many Latin American countries have not had a particularly stable existence, particularly where insurer bankruptcy has been a persistent problem (FIEL 1993). Insurance reforms would help increase pension security. Possibly international consortia of insurance risk pools could be negotiated by developing country governments, making it more feasible to benefit from international data gathering as well as learn from international efforts to regulate insurers.

In any developing country, the success or failure of a pension system must eventually depend on that country's economic and political stability. In many countries inflation has exacted a toll on retirees who relied on non-indexed social security benefits; in other nations, benefits have been cut as governments changed (Mesa-Lago 1989, 1990; Marquez and Acevedo 1994; Grosh 1990). Demographic trends instill even more concern about future benefits, since it is increasingly likely that benefit promises under today's unfunded pay-as-you-go systems will not be met.

¹² In the United States, studies show that adverse selection raises the price of individual annuities substantially; see Friedman and Warshawsky (1990). We have been unable to locate similar studies for developing countries.

Against this backdrop, what type of pension system can be recommended? Once again a fully-funded plan is likely to be most effective at producing increased retirement income security, as we have argued before. As in the NIE country case, it makes most sense to collect contributions at the workers' place of employment, though the potential for evasion is far more widespread than in the NIE case because of the proportionately larger size of the informal sector. Of critical importance is the requirement that the funds be put into an account and invested, preferably in an internationally diversified portfolio with careful reporting and disclosure requirements. Some have argued that having the pension plans compete against each other serves to deepen domestic capital markets; while this may be true, it is not a compelling reason to have pension funds restricted to purely local investments.

As before, the remaining question is how to decide among the three methods of paying benefits in the case of a poor developing country. Here we argue that the "individual neutrality" of the DC plan is key in making sure that the present value of expected benefits (PVEB) are equal to the present value of expected contributions, with interest (PVEC). This is more practical than either of the two redistributive systems, namely the DB and the FS plans, since evasion is so widespread and capital flows so difficult to restrain. Also, lacking adequate actuarial sophistication and good actuarial data, it is not clear how anyone could compute cohort-wide expected benefit payouts. Lacking these data, it seems more practical to set up individual worker accounts which employees contribute to and can track individually.

Again, the question of transition arises. People currently retired would not receive benefits under a fully funded DC system, while those near retirement would find their benefits to be quite low. In Chile this transition problem was "solved" by maintaining an unfunded government DB plan on the side, which covers those with inadequate benefits under the new plan, both now and in the future. The danger of this arrangement is that people may "game" the system by working informally thereby receiving a pension while avoiding contributions.

6. Conclusions

In this paper we have outlined the fundamental role that a well-designed pension system can play in the developing country context, which is to provide economic security for

retirees from the labor market. Existing old-age systems in many nations fall short of this goal today. Often this shortfall has arisen because system designers promised benefits that could not be delivered, placing the elderly at substantial risk of economic and political shocks.

It is sometimes said that developing countries do not need pensions. We disagree. In many developing countries, it could even be argued that a mechanism to ensure old-age security is more critical than in richer nations, inasmuch as these countries often experience more inflation and economic fluctuations than do their developed counterparts.

Another argument sometimes made is that poor countries cannot afford pensions. It is certainly true that private pensions of the type found in North America, Europe or Japan might not be feasible or desirable. It is also the case that unfunded defined benefit plans commonly found in many developed and developing countries are simply not affordable. Nevertheless we contend that this does not mean that all pensions are infeasible -- just that different structures and formats should be emphasized.

So if pensions are needed and affordable, how can pension systems be better designed so as to protect against the five risks (individual, employer, investment, national, and international) confronting workers who reach retirement age? Not all of these risks can be insured against fully, and furthermore some of the mechanisms used to provide insurance suffer from problems of adverse selection and moral hazard. However, a well-designed pension system can provide additional economic security as compared to the status quo. Such a system would:

- Be mandatory.
- Maintain a tight link between benefits and contributions, both at the individual and generational levels.
- Invest contributions in a sensibly internationally-diversified portfolio.
- Be fully funded.
- Pay benefits only to the old.
- Pay out pensions as annuities rather than as lump sums.

Only in this way can individual risk, employer risk, investment risk, and national risk be reduced, leaving the fifth source of risk, international risk, uncovered as it is in any event.

As for the form that benefits should take, we have examined three alternatives: a defined contribution model, a defined benefit model, and a new “fund shares” mechanism of determining benefit levels. Under the FS scheme, pension contributions made by employers and/or workers would be invested and would accumulate value in a pension fund, and individual workers would accumulate shares in this fund, though not necessarily on a dollar-for-dollar basis. Such a scheme would allow for redistribution in favor of the lower-earning members of the pension cohort and would automatically allocate gaps between projected and actual investment earnings. We propose such a scheme should be considered by middle-income developing countries with largely formal labor markets, a well-functioning tax and benefit system, and reasonable political and economic stability. For a poorer developing economy which lacks these features, a defined contribution structure would seem the better choice.

Our assessment of pension structures also points to several pitfalls that should be avoided. Most importantly, it is self-evident that pension systems in any country, but particularly in low-income countries, should not promise more than they can be expected to deliver. People at low levels of subsistence might make incorrect and perhaps irrevocable decisions, such as to retire early if promised a generous retirement pension, and they then lack recourse when benefit payments must be cut.

Another issue is that pension funds should be managed for the beneficiaries, and not as a source of revenue that politicians can use for their own purposes. Additionally, pension programs should not be used to subsidize early retirement. As has been seen so often in Western Europe over the last decade, what at first seems to be an inexpensive method of getting older workers to leave their jobs turns out to be extraordinarily costly and unfunded social program requiring unsustainable payroll taxes to run (Jacobs et al 1993).

A final consideration is that pension programs should not be used as a means to “buy out” workers during economic transformation. In some former socialist countries, it has been deemed necessary to cut government workforces by large numbers, and one method of doing so has been to offer civil servants generous early retirement pensions. Because these promises were not previously funded, the pensions impose long-term and

large costs on a shrinking tax base. A well-functioning pension system cannot sustain this sort of buy-out.

What can development agencies do to strengthen the chances for well-designed pension systems and to increase the prospects for useful pension reform? Several options seem useful. First, many pension experts agree that aid agencies could do a great deal to help improve the functioning of world-wide capital and insurance markets, which could help pension plans better achieve their goals (Diamond 1993; Kotlikoff 1994). Development agencies could help develop an internationally diversified portfolio of assets which would help countries pool economy-wide risks (Fields and Mitchell 1993; Kotlikoff 1994). International agencies could also offer technical assistance to countries that wish to reform their systems or create new ones but are unsure as to how.

Perhaps the most important role of international agencies in pension reform arena is to help governments curb the issuance of pension promises which simply cannot be met. It is irresponsible for politicians to promise workers generous pension benefits, payable at a young retirement age or after only a few years of service. These are not sustainable offers, and they do a disservice to pensioners whose benefits will likely be cut as well as to taxpayers whose taxes will undoubtedly rise to help cover the shortfalls.

The challenges are many, but so are the opportunities. World-wide population aging, combined with serious financial instability in national social security systems, make pension reform and redesign urgently necessary.

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