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# Reforming Pensions: Lessons from Economic Theory and Some Policy Directions

**P**ension systems have wide-ranging and important effects. They influence the living standards of older people and hence the welfare of both older people and their children. They can also affect national economic performance through potential effects on the labor supply and saving. The design of pensions therefore matters. In discussing the topic, this paper draws on two of our earlier works.<sup>1</sup> It starts by setting out some central lessons from economic theory. The second section derives some policy implications of particular relevance to Latin America. The policy chapters in our two earlier books focus particularly on two countries in which we have worked: China, which is important because of its size, and Chile, which is important because its 1981 reforms were widely adopted in Latin America and elsewhere and which has become an exemplar in the pension debate. Box 1 defines some of the relevant terms. The final section concludes.

## Key Lessons from Economic Theory

Economic theory offers a series of conclusions that should frame policy design. Some of them, though apparently obvious, are frequently forgotten; others can be counterintuitive. We focus on five sets of lessons: pension systems have multiple objectives; different pension systems share risks differently, both across people and over time; there is no single best pension system; pensions should be analyzed in a second-best context, that is, taking account of market imperfections and other distortions; and a move to funding may or may not be the right policy.

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1. Barr and Diamond (2008, 2010).

### **BOX 1. Terminology**

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*Defined-benefit (DB) pensions* are systems in which the pension benefit is determined as a function of the worker's history of covered earnings. The formula may be based on the worker's final wage and length of service or on wages over a longer period (for example, a full career). A DB system may be fully or partially funded, or it may be unfunded. In a pure DB arrangement, insofar as the degree of funding is maintained, the sponsor's contributions are adjusted to meet anticipated obligations; thus, the risk of varying rates of return to pension assets falls on the sponsor.

*Defined-contribution (DC) pensions* are systems in which the benefit is determined by the value of assets accumulated toward a person's pension. Benefits may be taken as a lump sum, as a series of withdrawals, or through an annuity. The expected discounted value of benefits is thus equal to the value of assets (in technical terms, the benefits are determined actuarially).<sup>1</sup> A pure DC plan adjusts obligations to match available funds, so that the individual bears the portfolio risk.

*Fully funded pensions* pay all benefits from accumulated funds. See also partially funded pensions.

*A noncontributory pension* is based on age and years of residence.

*Notional defined-contribution (NDC) pensions* are financed on a pay-as-you-go or partially funded basis, with a person's pension bearing a quasi-actuarial relationship to his or her lifetime pension contributions.

*Partially funded pensions* pay benefits both from accumulated assets and from current contributions.

*Pay-as-you-go (PAYG) pensions* are paid out of current revenue (usually by the state, from tax revenue) rather than out of accumulated funds. Partially funded pensions are often referred to as PAYG.

*A provident fund* pays a defined-contribution pension based on the performance of a single, central fund rather than on the performance of individual accounts.

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1. The discounted value depends on the relevant interest rate and load factors.

### *Pension Systems Have Multiple Objectives*

For the individual or family, the major objectives of pensions are consumption smoothing (redistribution from one's young self to one's older self) and insurance. Governments have additional objectives, including poverty relief and redistribution. Any analysis of pension reform needs to take account of the full range of objectives alongside other policy goals, such as economic efficiency and output growth.

### *Different Pension Systems Share Risks Differently*

Separate from their redistributive effects, different pension systems share risks differently. Pension systems are subject to multiple sources of risk, and they have different underlying philosophies of who should bear those risks. This section looks at four types of pension, with a focus on how they distribute risk.

We start with two polar extremes of fully funded systems: pure funded defined-contribution (DC) plans and pure funded mandatory defined-benefit (DB) plans.<sup>2</sup> In the case of the former—also known as funded individual accounts—individual workers set aside a given fraction of their earnings to

2. See the glossary in box 1 for a brief definition of these terms.

buy private financial assets, which are accumulated until retirement. At that point, the retirees can either purchase an annuity or take a series of withdrawals from the accumulation. Fluctuations in the cumulative return on assets during working life affect the individual account holder by affecting the amount available to finance retirement. If the worker buys an annuity, he or she will have faced the risk in the pricing of annuities, reflecting both mortality projections and asset returns from this point forward. Once the annuity is purchased, however, further fluctuations in asset returns and the development of mortality compared to the projections used in pricing the annuity are borne by the insurance company, unless annuity benefits are indexed for asset returns (a variable annuity) or for mortality realizations. As the insurance company adapts to the realizations of returns and mortality, it may in turn adjust the price of its policies, the compensation it pays its workers, and the returns to its shareholders (if it is not a mutual company). If the retiree does not buy an annuity, he or she faces mortality and return risks. That is, the risks of different outcomes up to retirement fall on the individual retiree, since benefits adjust to what is in a worker's individual account at the time of retirement. Annuitization shifts risks after retirement to insurers, but the retiree still faces the risk of the pricing of annuities at the start of retirement.

In the case of pure funded mandatory defined-benefit (DB) plans, individual workers receive retirement benefits based on a formula relating benefits to their earnings history. Thus, both asset return and cohort mortality risks are managed through adjustments in contributions and are therefore borne by the workers during their working lives. That is, in order to sustain full funding for the provision of future benefits as set out in the benefit formula, contributions need to be adjusted as returns vary and mortality projections change. Since a single fund is available for all benefits and changes in contribution rates are normally uniform across workers, there is a collective dimension in that the need at any time depends on the full array of workers who share in the need for aggregate contributions. A plan does not have to be fully funded at all times—fluctuations in the degree of funding are a device for shifting risks intertemporally and, therefore, across workers born in different years. The fund may purchase annuities, shifting risks to insurance companies. A plan may have a sponsor who absorbs the risk, such as a corporate employer or the government relying on taxes in addition to contributions. The former shifts risks to current and future workers at the firm, shareholders, and possibly customers, if the company responds to a pension deficit by raising its prices. If the government is the sponsor, the risks are shifted to current and future taxpayers.

Thus, one element in the distinction between DB and DC plans is the focus on adjusting contributions or adjusting benefits. In practice, corporations and governments commonly adjust both, so that plans are not typically pure, although the labeling can affect the legislative outcome. A second element is the collective aspect of having a single fund rather than individual accounts. This opens up opportunities for risk sharing within the DB context, although governments could redistribute across individual DC accounts and may provide insurance on the rate of return, financed from outside the pension system. A central fund has lower administrative costs and avoids poor decisionmaking by workers, although it is at risk of poor investment decisions by the fund managers. However, a central fund forgoes the opportunity to have different degrees of asset return risk for workers with different levels of risk aversion.

Corporate pensions should remain close to fully funded since corporations can fail, leaving the workers with less than planned or leaving it to the government to insure the workers. While occasionally governments go bankrupt as well, this risk is not significant in countries with sound economies and effective governments. Governments can therefore have systems that are less than fully funded, but still well designed. The extreme version has no funding—something that is not standard practice since most systems maintain a buffer fund for short-run fluctuations, and government plans sometimes provide significant funding.

A third option is a pay-as-you-go (PAYG) defined-benefit system financed by social security contributions. In this arrangement, there are no assets, so the rate-of-return risk is of no significance. Instead, the risk to the plan's income comes from fluctuations in the earnings of covered workers, given the contribution rate. Since there is no opportunity for surpluses and deficits, the risks are shared among current workers through changes in contributions. If the fund can run surpluses (partial funding) or deficits (borrowing against future contributions or using previous surpluses), the risks can be shared with future workers or eased by the presence of accumulated past contributions. Any accumulation, whether positive or negative, involves risk in rates of return. There is also the risk of the evolution of mortality rates: if people live longer, the cost of paying a given level of benefits will increase.

A final option involves systems financed at least in part by general tax revenues. For example, in a noncontributory pension (referred to as a citizen's pension), the risks are shared by all taxpayers and are thus spread across generations (since future taxes as well as current taxes can change as debt varies).

In practice, plans are not pure, and countries frequently adjust both contributions and benefits, thus sharing risks between workers and pensioners. A central question for policymakers is how risks should be shared, a question with both efficiency and equity implications. As with redistribution, different answers are possible, but it is a major error to ignore the question.

### *There is No Single Best Pension System*

Policymakers face a series of constraints in pursuing the multiple objectives mentioned above, including fiscal capacity (stronger fiscal capacity makes it easier for the system to find additional revenues for a pension system); institutional capacity (stronger institutional capacity makes feasible a wider range of design options); the empirical value of behavioral parameters (such as the responsiveness of labor supply to the design of the pension system and the effect of pensions on private saving); and the shape of the pretransfer income distribution (a heavier lower tail increases the need for poverty relief).

The reason why there is no single best system is simple: policymakers at different times and in different places attach different relative weights to the various objectives; and the pattern of constraints, including political and historical constraints, will differ across countries. If objectives and constraints differ, the optimum will generally differ, as well.

### *Pensions Should Be Analyzed in a Second-Best Context*

The assessment of the optimal pension system should be made in a second-best context.<sup>3</sup> Simple theory assumes that individuals make optimal choices and that labor markets, savings institutions, and insurance markets exist and function ideally. Those assumptions do not apply to pension systems because workers and pensioners face information problems, behavioral problems, missing markets (for example, the lack of private instruments to provide indexation), and broader factors such as the inescapable existence of distortionary taxation.

Framing the argument in second-best terms starts from the multiple objectives of pension systems. Thus, policy has to optimize (not minimize or maximize) across a range of objectives, which cannot all be achieved fully at the same time. Policy has to seek the best balance between consumption smoothing, poverty relief, and insurance, and this balance will depend in each society

3. For a fuller discussion, see Barr and Diamond (2008, section 4.2 and box 9.6).

on the weights given to those and other objectives and to the different constraints that societies face.

### *A Move to Funding May or May Not Be the Right Policy*

In assessing whether, and to what extent, a move to funded pensions might increase welfare, policymakers need to ask two sets of questions.<sup>4</sup> First, is a move toward funding welfare improving? For example, does it increase output, either by increasing savings in a country that is short of saving, or by strengthening capital markets, thereby improving the efficiency with which savings are channeled into productive investment? Does it have desirable intergenerational redistributive effects? Second, even if a move toward funding is in principle welfare improving, is such a move feasible? Does the country in question have the economic conditions and institutional capacity necessary to implement schemes that are safe and administratively cheap?

The answers to these questions will vary over time and across countries. First, an increase in saving may not be the right objective, particularly in a country where the saving rate is already high (for example, China). Second, a move to funding may or may not increase saving. For example, funding through the issue of new government bonds will not do so. Similarly, increased mandatory pension saving may be largely offset by declines in voluntary private saving or by increases in government borrowing, perhaps to help finance the transition costs of a move to a regime with more funding. Third, formal capital markets may or may not allocate funds to investment more effectively than informal capital markets. Gains in the effectiveness of capital markets will depend on effective administration and on political support for improved regulation. Thus, funding may increase national saving or expand explicit public debt, or both; and it may improve the operation of capital markets. Either is possible; neither is inevitable. The economic case for funding has to be analyzed in each country.

In addition to the potential effects on output, a move to funding has intergenerational effects. If funding is to raise output growth in the future, it must increase saving today. But for saving to increase, there must be a decline in consumption, by government or by today's workers or by today's retirees. Thus, a move to funding generally imposes a burden on today's generations to the benefit of future generations, an outcome that may or may not be good policy. More generally, introducing a new PAYG system allows the early

4. For a fuller discussion, see Barr and Diamond (2008, section 6.3).

cohorts to receive larger pensions than if the new system were fully funded. Consequently, any choice between PAYG, partial funding, and full funding is also and necessarily a choice about the intergenerational distribution of income and of risks. Even if funding does increase output, the change cannot be presented as an unambiguous improvement.

The answers to these questions shed light on whether a move to funding might be optimal. A separate issue is whether it is feasible. Funded pensions make significant political demands on government and require significant institutional capacity in both the public and private sectors. The litany of funded schemes that have failed completely or that have not lived up to the promises that were made for them attests to the importance of these operational issues, as well as to the dangers of basing policy on untested and perhaps excessively optimistic predictions.

## Policy Implications

In discussing policy direction in the context of Latin America, it is helpful to start with consumption smoothing. This discussion establishes the context for examining poverty relief generally and the 2008 reforms in Chile in particular.

### *Consumption Smoothing*

It is a mistake to conflate the separate concepts of individual accounts and funding. Individual accounts can be fully funded (such as the Chilean DC scheme), partially funded, or PAYG (for example, a notional defined-contribution scheme with no reserves beyond a buffer fund to cover a few months of payments). The discussion below looks first at notional defined-contribution (NDC) pensions and then at reform options for funded individual accounts.

**NDC PENSIONS.** A recent innovation internationally, pure NDC systems mimic funded individual accounts, but on a largely or wholly pay-as-you-go basis. In the simplest such scheme, each worker pays a contribution of a fixed percentage of his or her earnings, which is credited to a notional individual account, while the workers' contributions this year largely or wholly pay this year's pensions. The government keeps a record of individual contributions, each year attributing a notional interest rate to each worker's accumulation. When the worker retires, his or her notional accumulation is converted into

an annuity. In a pure NDC system, benefits are strictly related to the size of a person's notional accumulation.<sup>5</sup> The system can also incorporate redistribution, such as minimum benefits or pension credits for caring activities, and the scheme can incorporate partial funding.

NDC schemes have a range of potential advantages. The system is simple from the point of view of the worker, and the fact that it is administered centrally keeps administrative costs low. Risk is kept low, since an unfunded NDC pension system is not affected by capital market volatility, the main source of risk to funded individual accounts. An NDC system does not require the institutional capacity to manage funded schemes. In addition, saving may be the wrong policy, or people may not want to save. Finally, NDC can be partially funded and can be the basis for a future move to full funding, so the approach may provide a starting point if financial market turbulence continues.

As discussed earlier, solid analytics should underpin the choice between NDC and funded accounts. The choice should be economic, not primarily political.

**FUNDED INDIVIDUAL ACCOUNTS.** If policymakers want a system with funded individual accounts, there are different ways to implement the policy. In the best-known arrangement, workers have significant individual choice over their pension provider, as in Chile and Sweden. Choice is generally assumed to be welfare-enhancing. Simple economics argue that policy should allow people to choose their own pension provider in a competitive market. Such choice, it is argued, benefits the individual in the same way as choice and competition for clothes, cars, restaurants, and MP3 players. That view needs to be tempered by two sets of factors, however: impediments to good choice by individuals; and the fact that choice has costs.

The model of the well-informed consumer does not hold in many areas of social policy, as demonstrated by the economics of information. In the context of pensions, there is ample evidence of poor information. Many do not understand basic concepts in finance: Orszag and Stiglitz quote the chairman of the U.S. Securities and Exchange Commission as stating that over 50 percent of Americans do not know the difference between a stock and a bond.<sup>6</sup>

5. The system is quasi-actuarial in that the interest rate attributed to a worker's notional accumulation is not the market return to financial assets, but an interest rate determined by the relevant pensions legislation—for example, the growth in the total wage bill of covered workers each year.

6. Orszag and Stiglitz (2001, p. 37).



Most people with an individual account do not understand the need to shift from equities to bonds as they age, and virtually nobody realizes the significance of administrative charges for pensions. As noted, choice has costs, and in the case of individual accounts those costs are significant: over a full career, an annual management charge of 1 percent of the individual's accumulation reduces the accumulation (and hence the pension) by 20 percent.<sup>7</sup>

Recent lessons from behavioral economics also yield powerful lessons, explaining such phenomena as procrastination (people delay saving, do not save, or do not save enough), inertia (people stay where they are), and immobilization (whereby conflicts and confusion lead people to behave passively, like a deer in the headlights).<sup>8</sup>

These bodies of theory suggest that the benefits of wide choice are likely to be very limited, and for most people likely to be outweighed by the costs of choice.<sup>9</sup> These considerations suggest a series of guidelines for the design of individual accounts:

- Use automatic enrollment;
- Keep choices simple (for most people, highly constrained choice is a deliberate and welfare-enhancing feature of good pension design, although one of the options could be to allow individual choice);
- Design a good default option for people who make no choice; and
- Decouple fund administration from fund management, with account administration centralized and fund management organized on a wholesale, competitive basis.

The U.S. Thrift Savings Plan for federal civil servants complies with these criteria.<sup>10</sup> The plan offers participants a very limited choice of portfolios. Initially there were three: a stock market index fund, a fund holding bonds issued by private firms, and a fund holding government bonds. In 2007 workers could choose from six funds, including a life-cycle option (that is, an option in which a person's portfolio shifts automatically from mainly equities to mainly bonds as he or she ages). A government agency keeps centralized records of individual portfolios. Fund management is on a wholesale basis. Investment in private sector assets is handled by private financial firms, which bid for the opportunity and which manage the same portfolios in the voluntary private market, providing insulation from political interference.

7. See Barr and Diamond (2008, Box 9.4).

8. For a fuller discussion, see Barr and Diamond (2008, Box 9.6).

9. For a fuller discussion, see Barr and Diamond (2008, section 9.3).

10. For more information, see the U.S. Thrift Savings Plan website ([www.tsp.gov](http://www.tsp.gov)).

This plan thus (a) simplifies choice for workers, respecting information constraints, (b) includes automatic enrollment, (c) has a default option, and (d) keeps administrative costs astonishingly low, at as little as 6 basis points annually, or 60 cents per \$1,000 of account balance. By the end of 2009, the program had grown to include 3.2 million active participants and 4.3 million total accounts and held assets of \$244 billion. The United Kingdom is introducing a similar arrangement.<sup>11</sup>

### *Poverty Relief*

Pure DC individual accounts provide consumption smoothing, but they do not provide adequate poverty relief for workers with limited lifetime contributions, typically as a result of low earnings, fragmented careers, or a work history substantially in the informal sector. In this regard, the post-1981 system in Chile, which is based heavily on individual accounts, offers three primary lessons: first, mandatory funded individual accounts can be part of a good reform, but such a reform is not easy and depends on complementary reforms; second, private supply and competition alone are not sufficient to keep down transactions costs or charges; and, finally, unless accompanied by a robust system of poverty relief, individual accounts do not constitute a pension system, but only part of a pension system.<sup>12</sup>

To explain the shape of Chile's 2008 reforms, it is necessary to consider the changes in the economic and social environment within which social policy operates. The contributory principle assumed that workers had long, stable employment, so that coverage would grow. History has not sustained this supposition. To explain why, consider the way the world has changed over the past sixty years. Social policy in 1950 was based on a series of assumptions: the world was made up of independent nation states; employment was generally full time and long term; international mobility was limited; the stable nuclear family with a male breadwinner and a female caregiver was the norm; and skills, once acquired, were lifelong. While these assumptions were not entirely true even then, they held well enough to be a realistic basis for social policy.

The world today is very different. There is increasing international competition. The nature of work is changing, with more fluid labor markets.

11. See the website of the U.K. National Employment Savings Trust ([www.nestpensions.org.uk](http://www.nestpensions.org.uk)).

12. Barr and Diamond (2008, p. 238).

International mobility is also increasing, and it is likely to continue to do so. The nature of the family is changing, with more fluid family structures and rising labor-market participation by women. Finally, the half-life of skills has declined.

Given this new environment, the key drivers of change when considering pension design are more diverse patterns of work, which create problems in terms of coverage for contributory benefits tied to employment, and increasingly fluid family structures, which make it difficult to base women's benefits on their husbands' contributions.

Those circumstances create a case for a noncontributory basic pension, that is, a pension financed from general taxation and awarded at a flat rate to anyone who meets an age and residence test. The Chilean Presidential Advisory Council on Pension Reform put the point succinctly: "The prevailing image at the time of the pension reform [in Chile in 1981], of a workforce composed mainly of male heads of household, with permanent jobs, contributing continuously throughout their active lives, has become less and less representative of the real situation of the country and will become even less so in the future. This means that the system designed at that point in time is also gradually losing its ability to respond to the needs of the population as a whole."<sup>13</sup> For these reasons, Chile introduced a noncontributory pension (the *Pensión Básica Solidaria*) in 2008, initially for pensioners in the poorest 40 percent of the population and rising to 60 percent when fully phased in.

The case for a non-contributory pension is that it strengthens poverty relief in terms of coverage, adequacy, and gender balance; improves incentives relative to income-tested poverty relief; provides good targeting (in that age is a useful indicator of poverty); and can assist international labor mobility. The obvious question is how to pay for such a benefit. Three instruments can match expenditures with budgetary constraints: the size of the pension, the age at which it is first paid, and the option of an affluence test, which keeps benefits from the best-off segment of the population. The Chilean mechanism for controlling beneficiaries was mentioned above. In Canada, 95 percent of older people get the full flat-rate benefit, and only 2 percent are entirely screened out. In the Netherlands, the benefit is awarded only on the basis of age and residence, with no test of income or assets. Box 2 summarizes the international experience with this type of pension.

13. Presidential Advisory Council on Pension Reform (2006).

## BOX 2. Noncontributory Pensions

A number of countries have implemented a noncontributory pension system.<sup>2</sup> High-income countries with this arrangement include Australia, Canada, the Netherlands, and New Zealand. For middle-income countries, the noncontributory pension introduced in Chile in 2008 is discussed in the text. South Africa also has a noncontributory pension, namely, the State Old Age Grant. The case is interesting in that it reaches not only urban pensioners, but also the rural elderly. The pension, which is paid to men at age 65 and women at 60, is financed from general revenue with no contribution conditions. The benefit is around half of average household income and is thus high relative to the very low incomes of most nonwhites in South Africa, but low relative to the incomes of the better off. Originally introduced as poverty relief for whites during the 1930s, the plan was gradually expanded to cover all race groups. Research suggests that it is highly effective both in terms of social policy and in the way the plan is implemented: “The South African social pension is an example of a transfer plan where eligibility is determined by age. In spite of the simplicity of the targeting indicator, the pension is effective in reaching the poorest households and those with children. . . . The South African authorities have overcome the difficulties of making cash transfers to even remote rural areas and of checking eligibility among even illiterate pensioners.”<sup>3</sup> In most urban areas, people receive the pension through bank accounts or post offices. In rural areas, government has outsourced delivery to the private sector, organized at the provincial level. At its best, the system is effective and innovative. In some areas, vehicles fitted with cash dispensers go to designated places at preordained times. Pensioners enter their identification number (or fingerprint), and their pension is paid out. Notionally, there is a government official on hand to provide help, but this facility is patchy.

A number of low-income countries also have noncontributory pensions (sometimes called social pensions), including Bolivia, Botswana, Namibia, and Nepal. Total spending is typically small in these cases (below 1 percent of GDP in Botswana, Namibia, and Nepal), and the benefit is also generally small.<sup>4</sup>

Pensions of this sort have the great potential advantage of extending coverage to people with limited contributions records, especially women and workers in the informal sector. In assessing their desirability and feasibility in a particular country, policymakers need to consider a range of factors:

—How well could the pension be targeted? The cost effectiveness of a noncontributory universal pension depends on the accuracy of age as a targeting device. In principle, the more poor people a country has, the greater the importance of poverty relief and the better-targeted a noncontributory pension will be. The extent to which age alone is a good indicator, however, will vary from country to country, depending, for example, on the extent to which old people live alone or as part of an extended family.

—Is administrative capacity sufficient? Even a simple pension has administrative requirements. The government must be able to establish people’s ages and to guard against multiple claims by one person and claims by relatives on behalf of a pensioner who has died.

—Is the cost of delivery low enough relative to the size of pension being considered?

Finally, where a government has the necessary implementation capacity, policymakers have a range of options for containing costs. First, the level of the pension can be kept low. For example, it is only 10 percent of GDP per capita in Botswana and Nepal. Second, the age at which the pension is first paid can be set high. In Nepal, only 1.1 percent of the population is older than the qualifying age. Finally, if administrative capacity permits, a further option is to pay a smaller pension at first (for example, to pensioners aged sixty-five to seventy-five) and a larger one thereafter (to those seventy-five and over).

2. For further discussion of noncontributory pensions, see Willmore (2007).

3. Case and Deaton (1998, p. 1359).

4. Willmore (2007, table 2).

## Conclusion

In considering the implications of economic theory for the design of pension systems, a number of conclusions stand out. First, the analysis should consider the pension system as a whole. Pension design affects the labor market, economic growth, the distribution of risk, and the distribution of income, including effects by gender and generation. Analysis should consider the entire pension system. There is no efficiency gain from designing one part of the system (such as individual accounts) without distortions if distortions are then placed elsewhere to accomplish other objectives. Hence, there can be no gain from an actuarial second-tier pension given the need for a poverty-relief element in the first tier. What is relevant for analysis is the combined effect of the system as a whole. Consequently, analysts must simultaneously consider the parts of the pension system that provide poverty relief and those whose primary focus is the pursuit of other objectives.

Second, the economic crisis has provided some strategic lessons. Perhaps the key lesson for pensions is the importance in any reform of explicitly asking how risk should be shared. With pure funded individual accounts, all of the risk falls on the worker, and modifications frequently leave the worker bearing a large fraction of the risk. Many (including us) regard this concentration of risk as undesirable. One way of sharing risk more widely is to buttress individual accounts with a tax-financed noncontributory pension.

Third, there are many choices, which widen as a country's economic and administrative capacity grows. To illustrate, we briefly describe pension system options for a middle-income developing country and for an advanced country.

A middle-income developing country has two main options for its first-tier pension: a noncontributory tax-financed pension (see box 1), with or without an affluence test (examples include Australia, the Netherlands, New Zealand, South Africa, and Chile); or a simple contributory PAYG pension, such as a flat-rate pension based on number of years of contributions (such as the basic state pension in the United Kingdom).

For the second tier, the options include a publicly organized earnings-related defined-benefit pension, or possibly a notional defined-contribution pension; or a provident fund defined-contribution pension (Malaysia, Singapore), in which the design of any tax concessions should consider the extent to which tax benefits are regressive. If the first tier includes a contributory pension, the second-tier mechanisms can be separate from it or integrated.

The third tier comprises voluntary defined-contribution pensions at the level of the firm or the individual; any tax benefits should be designed to avoid excessive regressivity.

In an advanced country, the options for the first-tier pension are either a contributory pension aimed at poverty relief, with a large array of possible designs (many countries use this type of system, including the United Kingdom); or a noncontributory tax-financed pension, with an affluence test (for example, Australia and South Africa) or without (for example, the Netherlands and New Zealand).

There are several options for the second tier: a publicly organized defined-benefit pension, which may be integrated with the first-tier contributory pension (the United States) or operated separately (France, Germany, and Sweden); a notional defined-contribution pension system (Sweden); an administratively cheap savings plan with access to annuities (for example, the Thrift Savings Plan in the United States); mandatory occupational funded defined-benefit pensions (this is the *de facto* system in the Netherlands); or funded defined-contribution pensions (Chile, Sweden), possibly including an anti-poverty element (Mexico).<sup>14</sup>

As in the case of the developing country, the third tier comprises voluntary defined-contribution pensions at the level of the firm or the individual; any tax benefits should be designed to avoid excessive regressivity.

Finally, for an effective pension system, two things matter above all: effective government and output growth. These factors are simple to identify but difficult to achieve. An effective government will manage a PAYG system responsibly, and it will create the macroeconomic and regulatory stability within which funded schemes can flourish. In contrast, ineffective governments are prone to make irresponsible PAYG promises and to pursue policies leading to macroeconomic instability. Robust output growth, by relaxing resource constraints, makes it easier to realize the plans of both workers and pensioners.

14. The system in the Netherlands is now moving more toward a defined-contribution arrangement.