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Revista de Análisis Económico, Vol. 14, N° 1, pp. 67-120 (Junio 1999)

DO INVESTMENT REGULATIONS COMPROMISE PENSION FUND PERFORMANCE? EVIDENCE FROM LATIN AMERICA

P.S. SRINIVAS*
JUAN YERMO*
The World Bank

Abstract

The paper assesses the impact of regulatory regimes on the market performance of private pension funds in Latin American countries that have undertaken reforms of their pension systems. It focuses in particular on the effects of "draconian" regulation, a set of rules on the industry's structure, investment regime, and performance. The conclusion is that while such rules may have achieved their basic objective of safeguarding workers' retirement savings from financial systems that lack transparency and solidity, they are not without costs. These rules limit opportunities for diversification, and, as a consequence, hamper the performance of pension funds.

* Srinivas is a Financial Economist and Yermo is a Consultant. Both are in the Finance, Private Sector, and Infrastructure Department, Latin America and the Caribbean Region, The World Bank. The views and opinions expressed in the paper are the authors' own and not necessarily those of the World Bank or its members. Comments of Estelle James, Arun Muralidhar, Hemant Shah, Salvador Valdés-Prieto, and Dimitri Vittas are gratefully acknowledged. We also acknowledge comments from an anonymous referee. Readers' comments are welcome. Please address any correspondence to P.S. Srinivas e-mail: psrinivas@worldbank.org or Juan Yermo e:mail: jyermo@worldbank.org

I. Motivation and Main Findings

The "three-pillar approach" has become the standard model for developing countries considering pension system reform.[1] In this model old age poverty alleviation is channeled through a government-funded first pillar. A second pillar is assigned the sole task of transforming workers' mandatory contributions into retirement income. A voluntary third pillar is provided for additional retirement savings beyond the mandated minimum. While different designs of the second pillar are available, the recent pension reforms in Latin America all have three basic components: (i) privatization, or creation of individual retirement accounts; (ii) diversification, implying investments in multiple asset classes; and (iii) prefunding, or having adequate assets to pay promised or desired benefits (Geanakoplos, Mitchell, and Zeldes, 1998).

In the typical application of this model in Latin America, the second pillar is mandatory, privately managed, individual account-based, and defined contribution (hence pre-funded by definition).[2] In addition, the pension industry's structure, conduct, and performance are subject to strict institutional constraints, or "draconian"[3] rules. A new pension fund management industry with multiple managers is set up to manage mandatory retirement savings. Usually an administrator can manage only one fund. Restrictions are imposed on the kinds of investments and asset allocation that can be made by the private pension funds, but these are gradually lifted over time. The performance of the funds may also be subject to controls, typically limits on the deviation of a fund's rate of return from the industry average.

Besides political economy reasons and economic justifications, the main financial arguments in favor of the three-pillar approach include (i) *individual choice:* the individual can now take responsibility for her financial future and choose who manages her pension assets from multiple asset managers; (ii) *competition between fund managers:* the existence of multiple managers will ensure the best performance for the workers; (iii) *limited risk:* the stringent investment regulations will ensure good performance with low-risk portfolios; and (iv) *reasonable pensions:* the performance of private funds will ensure adequate pensions to retiring workers.

This paper assesses the role of draconian investment regulations in the new pension systems of Latin America. The following question is addressed: Has the regulatory framework allowed the purported financial benefits of the three-pillar model to be achieved? The first part of this paper summarizes the literature on the costs and benefits of draconian regulation, which has developed from work by Vittas (1996, 1998a, 1998c), Shah (1997), James (1998), Queisser (1998a), and Davis (1998). The main justification for these regulations is that, given the mandatory nature of contributions, the state has a fiduciary responsibility to ensure the safety of retirement assets and the soundness of the institutions that manage them. By isolating pension assets and their managers from weak financial institutions and markets, it is hoped that the risk of underperformance spreading to pension assets will be minimized. Shah (1997) focuses on the problems of such

regulation and presents evidence which shows that it creates obstacles to diversification, hence imposing significant financial costs on workers.

This paper contributes evidence to this debate through empirical examinations of the financial performance of pension funds. Performance benchmarks are used to evaluate the impact of regulation in three Latin American countries, Chile, Peru, and Argentina. Three benchmarks are used: the performance of pension funds relative to one another; the performance of the pension fund industry relative to market indexes of stocks and bonds; and the performance of the pension fund industry relative to alternative investment instruments, such as time deposits and mutual funds.

This paper finds that in terms of asset allocation and pension fund performance, the notion of worker choice is a myth. Performance and investment rules have ensured that almost all funds in a given country perform identically, and this pattern is repeated across countries. This similarity in performance is driven by almost identical asset allocations across managers. Hence, any substantive choice that may have been available to the workers from competition among managers has been removed by regulation. Essentially, the current regulatory system ensures that there is no product differentiation and, therefore, the systems take no account of differences in risk aversion, longevity, and wage profiles.

This paper assesses the cost of restricting asset allocation at the domestic level.[4] The risk-adjusted performance of pension portfolios is compared against market indexes of stocks and bonds. On a gross basis (before fees), pension funds have not performed well relative to these indexes. When fees are taken into account, the performance of pension funds is much worse. In some countries, pension fund investments have also been more volatile than available alternatives. Hence regulation has not ensured that pension fund performance is necessarily low risk or high return.

Performance is also evaluated using expected replacement rates as a benchmark. In a deterministic setting, it is shown that if the future performance of pension funds continues as in the past, replacement rates obtained by workers of different wage and age characteristics will be significantly lower than they would have been with alternative investment opportunities. Replacement rates are also lower under the actual pension fund asset allocation than under a fixed allocation between market indexes of stocks and bonds that produced returns with the same volatility as that of the pension funds.

Finally, the paper evaluates the consequences of restricting pension savings to a single new instrument (the pension fund account). While this may have curtailed the benefits that arise from diversifying retirement savings across existing financial instruments and intermediaries which were subject to less strict investment regulations, the evidence shows that some of these alternatives, like mutual funds, did not offer a better performance on a net basis (after fees) except over short time horizons (less than fifteen years). On the other hand, passively managed funds which track market indexes would have significantly outperformed the pension funds.

The above results raise several policy concerns. If the client in the second pillar of the reformed system is the contributing worker and the objective is to

ensure that she has a respectable replacement rate at retirement, most second pillars as currently designed are unlikely to achieve their objectives. Current regulations are severely restricting worker choice and jeopardizing performance. If the claimed benefits of the reforms are to be realized, therefore, there is an urgent need for rethinking the present regulatory model and evaluating alternatives. Important policy issues that need to be addressed within the context of the current model are: What are the design options available to ensure that real choices are available? Which financial institutions should be allowed to participate in the pension industry? How tight should investment allocation limits be? At a broader level, several questions arise: Should worker choice be an objective of reform models in the first place, or would models without worker choice work better in a mandatory context? Are there alternatives to the existing model of private management of pension funds? Is the "standard" second pillar as currently implemented the best possible standard?

This paper is structured as follows: Section II presents a comparative analysis of pension reforms in Latin America, including a description of the regulatory regimes in place across the region. Section III presents the arguments for and against draconian regulation of pension funds. Section IV provides a description of the data used in the empirical evaluation of the next section. Section V presents the assessment of the impact of draconian rules. Section VI presents policy implications of the results, and suggests avenues for future work. Finally, Section VII provides a conclusion.

II. Regulation in the Latin American Pension Reform Model

Many countries are replacing existing pay-as-you-go (PAYG),[5] defined benefit, and unfunded systems, with some version of a three-pillar approach.[6] While individual pension reform models differ in important respects, the basic model has several identifiable features. The reformed pension systems are usually comprised of (i) a subsistence level, defined-benefit first pillar providing benefits for all or a large portion of the population, usually financed from general government revenues; (ii) a mandatory, individual account-based, privately managed, defined-contribution second pillar; and (iii) a third pillar that allows for additional voluntary savings over and beyond the first two pillars. Annex A Table A1 provides a summary of pension system reforms in several Latin American countries. Given the focus of this paper, the following discussion concentrates on the second pillar, which is expected to provide the bulk of retirement benefits for the formal sector workforce.

2.1. Overall structure and supervision

In all countries in Latin America that have undertaken pension reform, a separate and new pension fund industry was established to administer and invest workers' contributions to the second pillar.[7] The new industry has shown

an impressive growth pattern, mobilizing large amounts of assets. In Chile, pension funds are the leading institutional investors, managing a total of US$ 32 billion at the end of 1997, or 44 percent of GDP. The next-largest pension system in relative terms is in Argentina (3 percent of GDP). In terms of workers affiliated with the new systems, the largest is that of Mexico, with 11.3 million workers, followed by Argentina with 5.4 million workers (December 1997 figures).

In most countries, the industry is regulated and supervised by an independent agency which is dedicated exclusively to this task.[8] The regulatory agency oversees the functioning of the system and ensures that the pension fund administrators fulfill the many requirements they are subject to. These include minimum capital requirements, commission structure, reporting requirements, and rules governing transfer of participants between administrators.

In a few countries (Colombia, Mexico, and Uruguay, and most recently Peru) the government offers some form of rate-of-return or benefit guarantee of second pillar pensions. In Colombia workers are allowed back into the public defined benefit PAYG scheme every three years. In Uruguay the state pension fund (República AFAP) offers a minimum real rate of return guarantee of 2 percent per year. In addition, Uruguay has retained a significantly reduced defined benefit PAYG pension pillar. In Mexico the Central Bank offers an account that guarantees a 2 percent real annual yield for the initial four years of the system. After this period all workers will be in the privatized system. In addition, workers transitioning from the old to the new system have the option at retirement of taking their benefits under the old system upon rendering their accumulated assets in the privatized system. For nonparticipants (or participants who do not fulfill the vesting requirements) some countries have social assistance benefits (Argentina, Bolivia, Chile, and Uruguay) that form part of the first pillar. In Peru there is no minimum pension guarantee.

2.2. Prudential regulation

In all Latin American countries pension funds are subject to a set of prudential controls, similar to those imposed on other institutional investors, such as mutual funds. Prudential rules are designed to mitigate or effectively ensure against agency problems and systemic risks. This regulatory framework includes a set of prudential standards and rules to (i) avoid fraud (fiduciary standards, accounting and auditing standards, information disclosure and insider trading rules, investor protection rules); (ii) reduce overexposure to specific risks (minimum diversification requirements by issuer and security, minimum risk-rating of investible securities); (iii) mitigate conflicts of interest (such as limits on self-investment); and (iv) limit market power (limits on concentration of share ownership). In addition to controlling these risks, governments may provide explicit guarantees to protect individuals against some of these risks. Governments may also compensate investors against fraud and the purchase of inappropriate retirement products due to investor ignorance.

As the region's leader in pension reform, Chile has developed a regime of prudential regulation that has served as a basis for other countries undertaking reform. Pension funds can only invest in securities that have been approved by the regulator. All securities must be risk-rated, which has resulted in an artificial rating system being introduced for stocks.[9] Minimum risk rating for fixed-income securities is investment grade (BBB or equivalent). Concentration of ownership is limited through ceilings on the portion of a specific bond issue or a firm's equity that any fund can hold, currently set at 20 percent and 7 percent, respectively. These limits are further restricted by minimum diversification requirements which mandate that fixed-income securities of the same issuer may not represent more than 7 percent of the fund's total assets. A specific firm's equity may not represent more than 5 percent of the fund's assets. To avoid conflicts of interest, the limits are set lower for issuers that have financial interests in the pension fund managing companies.

2.3. Draconian regulations

"Draconian" regulations are specific controls imposed on the structure, conduct, and performance of the pension fund industry, in addition to the minimum standards of prudential regulation.[10] They have been introduced with various degrees of strictness in all the Latin American countries that have reformed their pension systems.

Industry Structure Regulation

All countries have introduced the following restrictions in the industry structure:

- There is a single investment instrument in the second pillar, the specially created private pension fund accounts.
- The administration of those funds is restricted to companies exclusively dedicated to providing pension services, such as collection of contributions,[11] asset management, reporting to affiliate, and payment of benefits. Associated activities, such as custody of assets and the provision of life and disability insurance, are carried out by separate institutions.
- The administrators may manage only one fund each, though in two countries (Mexico and Colombia) the regulation contemplates allowing administrators to manage more than one fund.
- Ownership of the pension fund administrators was not open to existing financial institutions in some countries (Bolivia, Chile, Mexico, Peru).

Investment Regulation

Portfolio limits have been introduced in all countries. Table A2 provides details on the investment guidelines in seven Latin American countries as of May 1998.

Although legislation in some countries allows a more liberal investment regime, regulators have imposed tighter restrictions. These cases are highlighted in Table A3. In relative terms the most liberal regimes are those of Chile, Argentina, Colombia, and Peru (probably in that order). They are the only countries where investments in equity and foreign securities are allowed.[12] In Bolivia, although the limits on shares and foreign assets have been set at very high levels, funds also have to invest a minimum absolute amount in government bonds.[13] In general, government debt holdings are encouraged at the expense of equity and foreign assets.

Uruguay and Mexico have the most restrictive investment regimes, although, as in Bolivia, they are supposed to be only temporary measures. In Uruguay pension funds are subject to both minimum and maximum limits on investments in government securities. The band is expressed as a percentage of the portfolio, and there is a phased program in which the band is to fall from 80 to 100 percent in 1996 to 40 to 60 percent in 2000. By law the amount beyond the band can be invested in any security, but there is so far very little availability of instruments other than time deposits. In Mexico only fixed-income instruments (largely government securities) have been approved thus far by the regulator.[14]

Investment guidelines applicable to pension fund investments have evolved over time in line with the experience of the regulators and the development of the domestic financial markets. The general trend in this evolution has been toward liberalization of the investment regime. This has implied increases in the proportion of investments allowed in stocks, foreign assets, types of bonds, and investments in less liquid asset classes such as real estate and venture capital. As an example, Table A4 presents the evolution of the investment regime in Chile since the pension reform in 1981.

Performance Regulation

Some countries (Argentina, Chile, Colombia, Peru, and Uruguay) also subject pension funds to relative profitability rules, which require funds to achieve rates of return above a prescribed minimum, which is typically set as a function of the industry average. Chile and Argentina define their profitability band in relative terms as the minimum of (i) 2 percentage points above/below the average annual return of the industry, and (ii) 50 percent (70 percent in Argentina) above/below the average return.[15] Compliance with this regulation is checked by the regulator on a monthly basis.[16]

In Peru, the minimum return is calculated as in Chile and Argentina, but it is not guaranteed by the government. There is no maximum return constraint either, the ceiling having been eliminated in the November 1996 amendment.[17] In Uruguay, the guarantee is expressed in both absolute and relative terms. As mentioned above, the state pension fund, República AFAP, guarantees a minimum real rate of return of 2 percent per year. The rest of the AFAPs have to create a guarantee fund (similar to the reserve fund in Chile and Argentina) against which resources are drawn if the return of their portfolios falls below the industry aver-

age by more than 2 percent. There is also a limit on the maximum return that funds can earn.[18] In Colombia the minimum return is calculated as the arithmetic average of the return of the pension fund industry[19] over three years, and the return over three years of a market portfolio.[20] No ceiling is placed on the returns that pension funds can obtain. The regulator checks compliance with the stipulated minimum return on a three-month basis.

III. Rationale and Impact of Draconian Regulation

Government intervention in markets can be justified to the extent that there is some form of market failure. There are two standard sources of market failure in financial systems: missing markets and asymmetric information. In funded, private pension systems these problems create three types of risks for the investor: (i) *systematic market risk:* investment risk that cannot be eliminated through diversification; (ii) *systemic risk:* asymmetric information problems such as those in banking systems leading to bank runs, making financial systems fragile, and threatening pension funds with bankruptcy; and (iii) *agency risks:* because trading in financial markets often takes place between parties with different information, a moral hazard problem may arise, such as fund mismanagement.[21]

Given the mandatory nature of contributions, it is understandable that governments will want to control these risks which threaten the viability and success of the new pension systems. The history of financial fragility in Latin American countries and the incipiency of their capital markets would seem to make draconian regulation more necessary, even when prudential regulatory standards for financial markets have been established.

While draconian rules may achieve their main purpose –to isolate pension assets from systemic and agency risks– they are not cost free. These rules restrict investment opportunities and, as a result, hamper the performance of the system. While viability may be ensured, the success of the system may be thwarted. By limiting diversification and competition, these rules create non-systematic or diversifiable market risk and raise administrative costs.

3.1. Regulation of industry structure

Rationale

The decision to have a unique savings instrument, the pension fund account, is based primarily on the complexity of regulating and supervising a multi-instrument industry. In countries that have experienced financial crises, the creation of a new instrument subject to a fresh set of regulations may make the reform more attractive, and may increase the confidence of the population in the success of the new system. This argument has some caveats, however. If some financial intermediaries performed badly, it must have been due to one of two factors: either the market (economy) also performed badly, or an adequate regulatory framework

was not in place. In the first case, there is no a priori reason to expect newly created instruments to perform any better. The second case provides a justification for improving the existing regulatory framework, not necessarily for creating another one.[22]

The restriction on the activities of pension fund administrators can be justified as a way to avoid conflicts of interest and create ease of regulation. By limiting the number of funds per administrator to one, the moral hazard problem arising from minimum pension guarantees has also been largely eliminated. Since workers can choose only one fund manager (who offers only one portfolio), there is little question of them taking "excessive risks." A similar case can be made with respect to the incentive problem of pension fund managers. Since workers with different income levels are affiliated with any given fund, and each fund manager can manage only one fund, fund managers have no incentive to make wild bets because the government guarantees only the pensions of low-income workers.[23]

The ownership rules were imposed in order to bite into the market power position of existing intermediaries (especially banks) and to reduce exposure to their (in many instances weak) balance sheets. This restriction was especially necessary in countries with weak banking systems, or where mutual funds had a bad performance record. In practice, many existing intermediaries have circumvented this rule by investing indirectly, through holding companies or subsidiaries, in the pension fund administrators. However, the pension fund managers are well capitalized in all countries.

Adverse Effects

The most important adverse effect arises from the diversification costs created by limiting investment to a single instrument. In the Latin American model, workers are unable to spread their retirement savings across financial intermediaries or investment products with long performance records. Nor can they use their mandatory retirement savings to make direct investments, such as housing. In addition, workers have had to finance the start-up costs of the new retirement accounts and the establishment of pension fund managers as separate legal entities through fees and commissions on their salaries. As argued by Shah (1997), this industry design restricts competition in what is otherwise a competitive industry (asset management), and raises administrative costs for the participants.

The restriction of one fund per administrator also has significant costs at the individual level, since workers cannot choose the optimal portfolio that best suits their age, career, and risk-aversion profiles. As a result, the potential benefits of increased worker choice in defined contribution schemes are unrealized. In defined benefit schemes, on the other hand, such restrictions are normal, but they are at least partly compensated by the benefits generated by spreading risks across workers (see Muralidhar and Van der Wouden, 1998a).

By insulating the new industry from existing financial intermediaries, the ownership and asset segregation restrictions have also limited use of existing

infrastructures, raising administrative costs in the process. With an adequate prudential regulatory and supervisory framework for other market players, the justification for imposing such constraints on the structure of the industry disappears.

3.2. Regulation of industry conduct: asset allocation limits

Rationale

Vittas (1996) distinguishes between "draconian" and "relaxed" investment regulations, the latter consisting of the prudent person concept that is applied in Australia, Ireland, the Netherlands, the United Kingdom, the United States and, more recently, Canada and the Czech Republic. In draconian regimes, limits are established on the portion of a fund that can be invested in particular assets or asset classes. Apart from Latin America they are also applied to private pension funds in Belgium, France, Norway, Portugal, and Switzerland, among other Organization for Economic Cooperation and Development (OECD) countries, and in some transition economies such as Hungary and Poland (Davis, 1995; Blommenstein, 1997).[24]

Four main arguments have been suggested to justify portfolio limits:[25]

- Lack of experience in fund management and, in particular, absence of adequate risk assessment models, may lead pension funds to take "excessive risks."
- Fragile financial markets may put at risk the sustainability of the pension reform.
- Limiting the maximum risk that a fund can take on alleviates the moral hazard problem created by government pension guarantees.

The transition cost to a funded pension system may be prohibitively high for developing countries (with already large explicit debt burdens).

Vittas (1996) argues that portfolio restrictions might be necessary in the initial stages of pension reform when there is a lack of qualified asset managers, and capital markets lack strength and transparency. Just like restrictions on industry structure, asset allocation limits are a way of isolating pension assets from agency and systemic risks in capital markets. As a consequence, self-regulation of the prudent-person rule type may not be viable in countries where capital market infrastructure is underdeveloped and prudential controls are not in place.

The role of portfolio limits in alleviating moral hazard for the participants and the fund managers does not seem necessary, since the constraint of one fund per pension fund manager already forces fund managers to invest in similar portfolios. Clearly, if more than one fund could be offered, this justification may be reinstated.

The government debt argument is also supported by theoretical models (Corsetti and Schmidt-Hebbel, 1997), but it is mainly a case for floors on investment in

government securities (as currently in place in Bolivia and Uruguay), and not for portfolio limits, let alone limits on government securities. If new pension funds are not willing to hold the massive explicit debt burden created by the privatization of social security, interest rates would be driven up, which in turn would worsen government finances and crowd out private investment. Irrespective of the limits, a minimum investment in government securities in the early life of the system is guaranteed in view of the incipient nature of capital markets in many developing countries at the time of reform.

Two further qualifications need to be made. First, the validity of these arguments is mainly of a temporary nature. Over time, fund management efficiency improves as managers become more experienced, the adoption of prudential standards increases, and the costs of the transition are amortized. As the aims of regulation are reached, therefore, we should see Latin American countries relax their asset restrictions, as has happened in Chile, and eventually move toward prudent man rules.

Second, other regulatory controls (for example, controls on ownership) can create a discrepancy between the effective limit that the funds are subject to and the one stipulated in the regulation. In Chile, for example, the 7 percent limit on the fraction of a company's equity that any pension fund can own becomes binding for the larger funds long before the current limit of 37 percent on the overall investment by the fund in equities (Walker, 1993a). Iglesias (1990) calculated that, because of the 7 percent constraint, the effective limit on equities for the largest Chilean funds was around 14.8 percent, while the regulated limit at the time (the late 1980s) was set at 30 percent of the portfolio.

Adverse Effects

Placing external limits on investments in specific asset classes can have three main adverse effects:

- Portfolio diversification is limited, creating nonsystematic or diversifiable market risk. Since most regulated portfolio limits do not derive from formal asset allocation models, the highest returns can only be reached at higher risk than in an unconstrained regime.
- Pension funds control disproportionate shares of some of the markets for those securities in which they are allowed to invest. As a consequence, they cannot trade in these markets without affecting prices.
- To the extent that investment in private securities is limited, capital market development is hampered.

The main argument against draconian regulation is the first one –that portfolio diversification is limited– and is the one that will be evaluated in this paper. Modern portfolio theory provides the most critical perspective on portfolio limits. Externally imposed portfolio limits hamper the ability of fund managers to earn the highest possible risk-adjusted return.[26] In general, expected returns (or ex-

pected replacement rates) as high as in an unconstrained system can only be reached with higher levels of risk. Or, for a given level of risk, the expected retirement income of workers will be lower. Given the limited supply of investment instruments in developing countries, and the established fact that asset allocation is the most important determinant of rates of return to pension funds,[27] limiting diversification is likely to be very costly.

It can be argued, however, that investors may be able to rebalance the portfolios of their voluntary retirement savings and thereby offset the constraint imposed by investment limits on their mandatory accounts.[28] In developing countries this option is probably open only to the small minority who have accumulated a great deal of wealth. For most of the population the contribution to the mandatory pension system is likely to represent a very significant portion of their total pension savings for retirement. Portfolio limits, therefore, are likely to be both costly and inequitable.

Large concentrations of holdings in certain asset classes are increasingly a problem in the more mature systems, like the Chilean system, where pension funds own over 50 percent of some markets (for example, in 1997 they owned 54 percent of the mortgage bond market and 52 percent of all government securities). This concentration could cause liquidity problems for the industry, especially in the light of performance regulation. Since any change in asset allocation is more likely an industrywide phenomenon, with all pension funds wanting to sell or buy at the same time, it strongly affects market prices. This situation also forces funds to only gradually change their asset allocation, sometimes long after the investment regime has been liberalized.

Uthoff (1997) has provided some evidence on the final argument regarding capital market development. He shows how the positive impact of pension funds on capital market development in Chile was very limited during the first 10 years of the system. Investment rules directed most pension savings toward government securities and mortgage bonds. Uthoff attributes the observed improvement in the growth of investment by domestic companies over the period to stabilizing macroeconomic policies and reform of the banking system.

There is more evidence on the effect of asset restrictions in OECD countries and on their theoretical implications, but there has been no detailed analysis of the Latin American experience. Davis (1998) found that in OECD countries where there is a prudent man rule, funds invest a higher share of their assets in equities than in countries where there are asset restrictions. He also found that during 1967–90 the average real return in prudent man countries was 3.4 percent, as compared with 2.9 percent in countries which applied asset restrictions.[29] A higher return per se, however, is not evidence of distortions and inefficiency. Fund managers in countries with asset restrictions may be more risk averse than those with prudent rules. There could also be a source of bias if market rates of return in countries with prudent man regulatory regimes were higher than in those with draconian regimes. What needs to be investigated is the effect of the rules on risk-adjusted performance relative to the market, as is done in this paper.

In a theoretical study, Chisari and Dal Bó (1996) looked at the effect of portfolio limits on the efficient frontier in Argentina, and found significant efficiency losses arising from the regulation. Eliminating some of the limits would allow funds to halve the level of risk in their portfolios at high nominal rates of return (more than 30 percent per year). Calibrating the regulatory framework allows one to delineate the range of potential distortions. However, the extent of distortions actually created depends on the risk aversion of investors and the risk/return profile of returns in the country's capital markets. In general, the more risk averse individuals and fund managers are, and the higher the expected return in a country relative to the assumed risk, the less distortionary the asset restrictions will be.

Otermin and Zablotzky (1996) carried out an empirical analysis of Administradora de Fondos de Jubilaciones y Pensiones (AFJP) performance in Argentina, and found that with one exception, all pension funds performed better than a passive strategy of investing in a bond index. They also found some evidence of persistency in returns and of timing ability by some funds. They acknowledge, however, that these results are biased by the fact that approximately 25 percent of the assets of the Argentine pension funds are in an "investment" account that is not marked to market (that is, not evaluated at market prices). Walker (1993a, 1993b) looked at differences in risk-adjusted returns between Chilean pension funds. He found that in small funds the equity portion of pension fund portfolios performed better than those of bigger funds. He attributes this to the limits on investment in individual securities (7 percent of a company's equity). In the fixed-income portion of the portfolios he could not find significant differences.

3.3. Regulation of performance: profitability rules

Rationale

The main justification for profitability rules has been to reduce the risk of underperformance of specific funds relative to the industry average. Since contributions were mandatory and investment was restricted to a single instrument, the specially designed pension fund account, governments have felt an obligation to ensure that workers' retirement income will not be affected by adverse performance of a given fund.

If diversification was possible across pension funds and across investment instruments (pension fund accounts, mutual fund accounts, time deposits) it would be possible to reduce the exposure to one particular pension fund to an adequate level. In Latin America, however, the restrictions on industry structure and the investment regime have significantly reduced the extent of diversification possible. Therefore, to the extent that these other restrictions are necessary, profitability rules can be justified as a risk-reducing method. If these restrictions were eliminated, the competitive nature of the asset management business would make the current form of performance regulation unnecessary.[30]

Adverse Effects

Profitability rules are a very distortionary way of eliminating fund-specific risks. It is argued (see Vittas, 1998c and Queisser, 1998a) that they exacerbate the herd behavior that characterizes the investment industry. Smaller fund managers behave like Stackelberg followers (see Tirole, 1988), choosing their portfolios in relation to the bigger funds, which have a greater weight on the industry average return. Free from intense rate-of-return competition, the bigger funds have an incentive to opt for lower risk/return options, like bank deposits and bonds. In addition, the return ceiling imposed in some countries, such as Argentina, Chile, and Uruguay, creates a moral hazard for fund managers since for a given level of risk, there is no incentive to reach a return above the imposed ceiling (the optimal point in the portfolio efficiency frontier is not reached).[31] Finally, profitability rules create a moral hazard problem for participants since returns no longer serve as a comparison benchmark. This forces funds to compete through vigorous advertising and marketing campaigns, with the costs passed on to consumers in the form of higher commissions.

Portfolio homogeneity can be explained by other factors. The limit of one fund per administrator forces all administrators to have a similarly balanced portfolio, irrespective of the characteristics of the participants. The low liquidity of markets also tends to encourage concentration in asset choice, since funds cannot easily take advantage of buying or selling opportunities. Finally, yardstick competition is well extended throughout the pension fund industry, so that even in the absence of explicit rules, it is likely that funds would present their returns in relation to that of other administrators. As argued by Vittas (1998b), such effects would lead to herding behavior even in the absence of performance rules. What is unique about the Latin American countries, however, is the practical elimination of incentives to achieve above-average returns and the lack of diversity in portfolio choices.[32]

Unlike asset restrictions, profitability rules are not easy to find in other countries. In Brazil a minimum real rate of return of 6 percent is applied to nonoccupational private pension funds. In Switzerland, a minimum nominal rate of return of 4 percent is applicable, while in Singapore it is set at 2.5 percent. In all these cases the rate of return is set in absolute terms, unlike the Latin American cases (Argentina, Chile, Colombia, Peru, and Uruguay), where rates are set in relative terms. Absolute profitability rules are probably even more distorting than relative ones. They create an incentive to invest in fixed-income securities, especially when the evaluation period is short.[33]

There is little evidence on the impact of profitability rules on investment regime and fund performance. A 1997 study by Ramirez Tomic found that herding by Chilean pension funds had actually decreased slightly after the fluctuation band around the minimum rate of return was narrowed. This provides no confirmation of the hypothesis that this form of regulation is the main reason for the uniformity of pension fund portfolios.

IV. Data

The data used in the study in Section V have been obtained from pension superintendents, central banks, stock exchanges, capital market supervisory agencies, and market sources. Details are provided in Annex B. All data and analyses are in local currency and in real terms unless otherwise specified. The data cover the following items for each country:[34]

- *Pension fund data.* Gross monthly returns by fund managers from the date of inception of each system until May 1998. Administration fees were obtained from Shah (1997),[35] Queisser (1998b), and the *Pension Superintendency* (1998).

- *Mutual fund data.* Monthly returns by fund manager from December 1987 until May 1998 (only for Chile). Returns are reported net of fees.

- *Benchmark data.* (i) Stock market total return indexes in local currency for each country, are available in the International Finance Corporation (IFC) Emerging Markets Database (IFCG total return index);[36] (ii) bond indexes and deposit rates as available either from central banks or stock exchanges. In the case of Chile, the bond index used was that constructed by the Santiago Exchange, which is a weighted average of mortgage-backed, corporate and government securities of different maturities. In the case of Argentina, the index used, one for government securities only, is published by a private Argentine bank.[37] Deposit rates are those for terms of less than one year.[38]

- *Choice of countries.* Tables A1, A2, and A3 contain comparative data on pension systems and investment regimes for most countries in Latin America that have undertaken pension reforms. However, analysis of performance has been focused on three countries–Argentina, Chile, and Peru. These three countries have a reasonably long pension fund data series required for meaningful analysis, and have data for other market returns that are required for comparative analysis.

V. An Evaluation of the Costs of Draconian Regulation

Pension reform efforts should be evaluated using two basic social welfare criteria: efficiency and equity.[39] In this paper we use two methods to assess the efficiency costs of draconian rules. First, pension fund risk-adjusted gross returns and net-of-fees returns are used as indicators of financial performance. Second, expected replacement rates are calculated using a simple model of wages, life expectancy, and time in the workforce. The estimations are based on past pension fund performance and projected future returns.

The main objective of the empirical study is to isolate the efficiency costs that each of the three forms of "draconian" regulation (performance, conduct, and structure) has created. To do so three forms of performance benchmarking are proposed:

- Benchmarking pension funds relative to one another.
- Benchmarking the performance of the pension funds' portfolios relative to various market indexes.
- Benchmarking the after-fees performance of the pension fund industry to other available financial instruments/intermediaries (time deposits, mutual funds, and synthetic index funds).

The first two exercises will help evaluate the effect of performance rules and investment limits. Additional tests are carried out to isolate the relative impact of each type of regulation. The final exercise isolates the effect of limiting investment to a single instrument –the pension fund account– as opposed to permitting investment of contributions in instruments offered by other intermediaries.

While market benchmark comparison is common in the pension fund industry in developed countries, it is as yet nonexistent in Latin American pension systems.[40] Absolute returns are often quoted as signs of the success of the new systems. Rate-of-return performance, however, should be judged relative to some relevant market benchmark. This paper provides these comparisons.

5.1. Performance across pension funds

Herd behavior has become a defining characteristic of the pension fund industry in Latin America. Tables 1 and 2 summarize annual return correlations (based on monthly data)[41] across pension funds in Chile and Peru from the inception of each system to May 1998. The average correlations between the returns of any two funds in a given country are very high: 0.98 for Chile, 0.93 for Peru, and 0.87 for Argentina (see Table 3). Given the restrictions on asset allocation and the consistently high correlation between each two pension funds, these correlations imply nearly identical investment and asset allocation across pension funds.

A similar picture emerges from direct observation of the asset allocation of different pension funds at any point in time. Figures 1 and 2 show the allocation of the portfolios of Peruvian pension funds to equities and government securities for January to May 1998. Differences in allocation across funds are negligible for these two asset classes, which together account for about 60 percent of the funds' portfolios.

TABLE 1

PERU: MONTHLY CORRELATION BETWEEN PENSION FUND RETURNS, 1993-1998

	AFP 1	AFP 2	AFP 3	AFP 4	AFP 5	Ind. Avg.
AFP 1						
AFP 2	0.99					
AFP 3	0.97	0.96				
AFP 4	0.97	0.98	0.95			
AFP 5	0.98	0.98	0.95	0.97		
AFP 6	0.91	0.91	0.87	0.90	0.88	
Average	0.96	0.96	0.92	0.93	0.88	0.93

AFP = Administradora de Fondos de Pensiones.
Note: Returns are annualized based on monthly data. Only those funds that have been functioning throughout the life of the new system are included.
Source: Authors' calculations.

TABLE 2

CHILE: ANNUAL CORRELATION BETWEEN PENSION FUND RETURNS, 1981-1995

	AFP 1	AFP 2	AFP 3	AFP 4	AFP 5	AFP 6	AFP 7	Ind. Average
AFP1								
AFP2	0.96							
AFP3	0.98	0.97						
AFP4	0.94	0.97	0.98					
AFP5	0.98	0.98	0.98	0.95				
AFP6	0.99	0.95	0.97	0.94	0.96			
AFP7	0.99	0.97	0.99	0.97	0.97	0.99		
AFP8	0.98	0.98	0.99	0.98	0.99	0.97	0.99	
Average	0.97	0.97	0.98	0.96	0.97	0.98	0.99	0.98

AFP = Administradora de Fondos de Pensiones.
Note: Returns are annualized based on monthly data. Only those funds that have been functioning throughout the life of the new system are included.
Source: Superintendency of AFPs.

TABLE 3

ARGENTINA: MONTHLY CORRELATION BETWEEN PENSION FUND RETURNS, 1994-1998

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Ind. Avg.
AFP1																						
AFP2	0.70																					
AFP3	0.92	0.77																				
AFP4	0.92	0.74	0.96																			
AFP5	0.86	0.75	0.95	0.97																		
AFP6	0.75	0.79	0.92	0.78	0.82																	
AFP7	0.86	0.73	0.94	0.93	0.91	0.62																
AFP8	0.78	0.69	0.87	0.89	0.87	0.59	0.85															
AFP9	0.87	0.72	0.94	0.98	0.98	0.78	0.92	0.83														
AFP10	0.68	0.58	0.81	0.83	0.84	0.51	0.75	0.67	0.85													
AFP11	0.75	0.43	0.77	0.76	0.76	0.59	0.74	0.67	0.75	0.55												
AFP12	0.95	0.79	0.92	0.95	0.97	0.76	0.90	0.88	0.95	0.82	0.80											
AFP13	0.67	0.61	0.91	0.89	0.86	0.58	0.90	0.80	0.89	0.68	0.59	0.80										
AFP14	0.90	0.73	0.94	0.97	0.99	0.78	0.91	0.86	0.98	0.86	0.79	0.98	0.85									
AFP15	0.90	0.69	0.91	0.95	0.92	0.76	0.84	0.80	0.91	0.69	0.67	0.93	0.74	0.94								
AFP16	0.83	0.77	0.93	0.95	0.96	0.77	0.90	0.86	0.95	0.71	0.80	0.96	0.85	0.95	0.90							
AFP17	0.93	0.74	0.97	0.98	0.98	0.81	0.93	0.89	0.97	0.84	0.76	0.96	0.90	0.98	0.94	0.94						
AFP18	0.82	0.92	0.87	0.86	0.87	0.80	0.83	0.80	0.84	0.72	0.73	0.90	0.70	0.86	0.80	0.89	0.85					
AFP19	0.90	0.81	0.95	0.95	0.97	0.91	0.91	0.88	0.95	0.77	0.79	0.96	0.85	0.96	0.89	0.96	0.97	0.90				
AFP20	0.88	0.75	0.94	0.94	0.93	0.70	0.91	0.88	0.91	0.76	0.61	0.93	0.87	0.93	0.91	0.92	0.94	0.83	0.92			
AFP21	0.86	0.69	0.93	0.97	0.98	0.70	0.91	0.87	0.97	0.82	0.75	0.97	0.86	0.99	0.94	0.96	0.97	0.83	0.94	0.94		
AFP22	0.81	0.75	0.93	0.93	0.96	0.81	0.89	0.83	0.94	0.79	0.77	0.93	0.83	0.95	0.86	0.94	0.93	0.87	0.95	0.91	0.94	
Avg.	0.84	0.72	0.91	0.92	0.92	0.72	0.87	0.82	0.91	0.75	0.73	0.93	0.83	0.94	0.89	0.94	0.93	0.86	0.94	0.92	0.94	0.87

AFP = Administradora de Fondos de Pensiones.
Note: Returns are annualized based on monthly data. Only those funds that have been functioning throughout the life of the new system are included.
Source: Authors' calculations.

FIGURE 1

PERCENT OF PERUVIAN PORTFOLIO INVESTED IN EQUITIES BY AFP, JANUARY TO MAY 1998
(% of total)

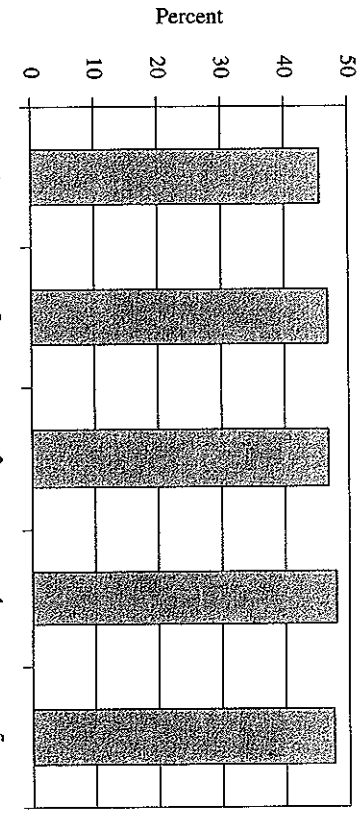
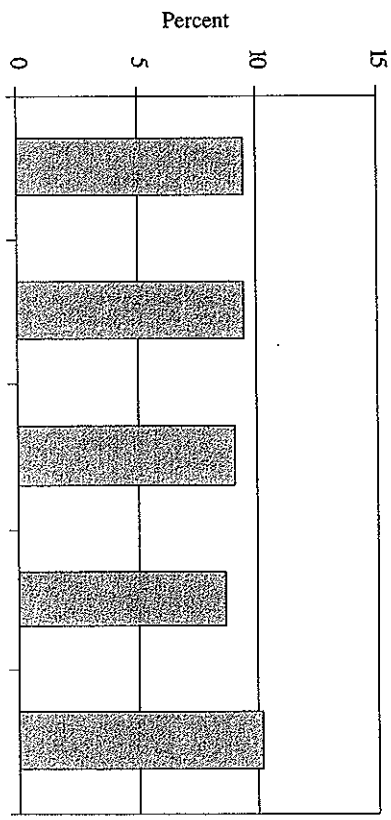


FIGURE 2

PERCENT OF PERUVIAN PORTFOLIO INVESTED IN GOVERNMENT SECURITIES BY AFP, JANUARY TO MAY 1998
(% of total)



The evidence shows that regardless of the pension fund they choose, all workers obtain a similar return. Further research is required to determine which of the various draconian rules (the limit of one fund per administrator, investment limits, and performance rules) have caused this result, and what is the impact of other factors like the limited supply of liquid securities in many markets and yardstick competition among fund managers. It is an undeniable fact, however, that the combination of these regulations has reduced (almost eliminated) the risk of below-industry-average performance by specific fund managers, and have exacerbated portfolio mimicking among pension funds.

The impact of draconian regulations has been to ensure that workers have no real choice among asset managers as measured by actual performance. There is no reason to transfer from one manager to another if performance is identical. Hence, from a performance perspective, the argument that the established model of pension reform "empowers" workers is on weak ground. There is also no way for a worker to plan her financial future, since only one risk/return option is actually available. In the current model therefore, workers ostensibly have a choice, but de facto, through draconian rules, this choice has been removed.

5.2. Performance against market indexes

Having established that individual pension fund performance is very close to the industry average, the next issue examined is whether the industry average performance compares favorably with simple, passive investment strategies in three countries (Chile, Peru and Argentina). The question asked here is what would the performance of pension funds have been if they had been allowed to invest using simple investment strategies such as indexing.[43] This will provide empirical evidence on the impact that the investment regime has on asset allocation and the risk-adjusted performance of workers' retirement assets. To isolate the effect of the investment regime from that of profitability rules, this section also analyzes how changes in portfolio limits affect the performance of pension funds in Chile.

The passive investment strategy used for the evaluation is a portfolio composed of a weighted average of two market return indexes for each country, one for equity instruments (IFCG stock market index for each country) and a local bond index.[44] Given the different risk/return characteristics of debt and equity, the choice of weights will determine the expected return and the volatility of the passive portfolio. The value of the weights for the two indexes has been chosen to reflect a broad spectrum of time horizons and risk-aversion profiles. The following four passive portfolios have been constructed as benchmarks to evaluate pension fund performance:

- *"Balanced" portfolio:* Sixty percent of the assets of pension funds are invested in equities (IFCG index) and 40 percent in bonds. This is a typical asset allocation of many pension funds in the U.S. market.[45]

- *Risk-matching portfolio:* The weights of the two indexes (equity and bonds) are chosen so that the volatility of returns (risk) of the composite portfolio matches that of actual pension fund returns over the specified period.

- *Return-matching portfolio:* The weights of the two indexes (equity and bonds) are chosen so that the expected return of the composite portfolio matches that of actual pension funds over the specified period.

- *Conservative portfolio:* Ten percent of the assets of pension funds are invested in the equities index and 90 percent in the bond index.

The risk-matching and the return-matching portfolios are used as a measure of risk-adjusted performance. In particular, if the actual return to pension funds is higher than that of the risk-matching market benchmark, it can be concluded that pension funds have performed better than a simple strategy of passive investing in market indexes. Similarly, if the volatility of pension fund returns is lower than that of the return-matching benchmark, it can be concluded that pension funds have improved on the passive investment strategy.[46]

Three measures of performance against market indexes are used: risk/return performance, replacement rate performance, and net-of-fees performance.

Risk/Return performance

The first measure of performance is gross-of-fees[47] returns adjusted for the level of risk assumed. In addition to the different benchmarks described above, a naïve strategy of investing in time deposits is also reported for reference purposes.[48]

Chile

The performance analysis for Chile is started in December 1982, the first year for which there are monthly observations of annual returns. The sample period was split in three to reflect changes in the investment regime. The first period (1982-86) was one of strict limits, when, in particular, investment in stocks was not allowed. The second period (1987-92) covers the time period after the partial liberalization of the investment regime in 1985 (when investment in stocks was first allowed), which led to a very gradual shift[49] in the funds' portfolios toward stocks, as shown in Table 4.[50] Finally, the third period (1993-98) was one when pension funds took full advantage of the new liberalized regime.[51]

TABLE 4

CHILE: INVESTMENT REGIME, 1981-97

	Government Securities %	Mortgage Bonds %	Time Deposits %	Company Stocks %	Investment Fund Shares %	Foreign Securities %	Corporate Bonds %
1981	28	9	62	0	0	0	1
1982	26	47	27	0	0	0	1
1983	45	51	3	0	0	0	2
1984	42	43	13	0	0	0	2
1985	42	35	21	0	0	0	1
1986	47	26	23	4	0	0	1
1987	41	21	29	6	0	0	3
1988	35	21	30	8	0	0	6
1989	42	18	22	10	0	0	9
1990	44	16	18	11	0	0	11
1991	38	13	13	24	0	0	11
1992	41	14	11	24	0	0	10
1993	39	13	8	32	0	1	7
1994	40	14	6	32	1	1	6
1995	39	16	7	30	3	0	5
1996	42	18	7	25	3	1	5
1997	40	17	14	23	3	1	3

Source: Superintendency of AFPs.

Overall performance. As shown in Table 5, the actual performance of the pension fund industry since the inception of the system compares adversely with what may have been obtained under an investment regime that does not restrict investment in stocks. The 10.2 percent real return of the pension funds over the past 15 years (December 1982 to December 1997) is lower than the 17.4 percent that could have been realized and had they been able to invest in the balanced benchmark. The risk-adjusted performance of the average pension fund is also worse than the market benchmark: the risk-matching benchmark[52] had a return of 11.5 percent over the same period. In fact, the average pension fund return only beats two benchmarks on an absolute basis, the conservative portfolio (9.2 percent) and the yield on time deposits (6.5 percent), both of which had a lower volatility.

TABLE 5

CHILE: PENSION FUND AND BENCHMARK PERFORMANCE, 1982–97

	5 years		10 years		15 years	
	Avg. Return %	Std. Dev. %	Avg. Return %	Std. Dev. %	Avg. Return %	Std. Dev. %
AFP	7.7	8.6	9.7	9.5	10.2	9.0
IFCG	6.6	22.9	20.8	37.2	21.9	43.3
BOND	6.6	0.4	6.9	1.0	7.1	1.2
MB (balanced)	7.0	13.7	15.9	22.2	17.4	25.7
MB (risk-matching)	7.0	8.6	11.0	9.5	11.5	9.0
MB (return-matching)	n/a	n/a	9.7	6.0	10.2	7.1
MB (conservative)	6.8	2.1	8.5	3.6	9.2	3.9
Deposit rate	6.4	0.6	6.1	1.7	6.5	2.4

Source: Authors' calculations.

The results over the last 10 years are also unfavorable to the pension funds. Their return (9.7 percent) is lower than both the balanced and the risk-matching benchmarks (15.9 percent and 11.0 percent, respectively). A measure of the risk-adjusted performance of pension funds is given by the risk-matching and the return-matching benchmarks.[53] For contributions made in December 1987, workers could have gained from higher returns for the given level of risk chosen by the funds (risk-matching benchmark), or, alternatively, they could have reduced the level of risk chosen given the actual return achieved by the pension funds (return-matching benchmark), if the pension funds had been allowed to invest passively in market indexes.

Over the last five years pension funds beat all the benchmarks. In fact, pension fund returns are higher than both the stock market and the bond market indexes (IFCG and BOND in Table 6). Hence, no combination of these indexes exists that would produce a return-matching benchmark.[54]

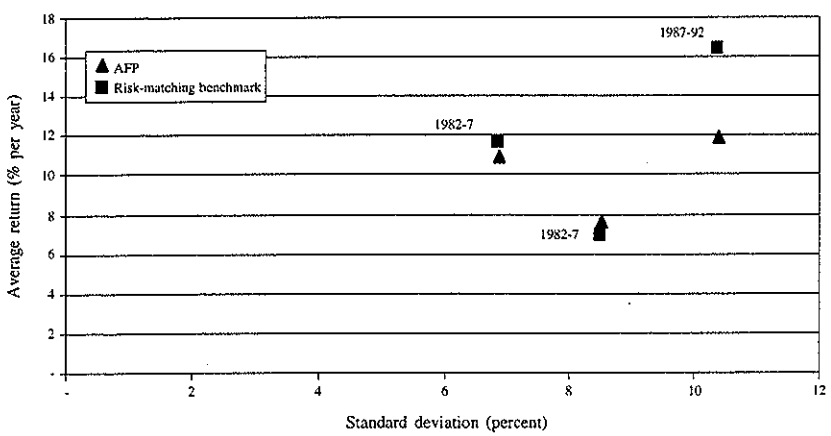
Evolution of risk-adjusted performance. The profile for pension fund returns relative to the market benchmarks roughly concords with the pattern implied by the time period segmentation and the history of the investment regime. As the investment regime was liberalized in the last 10 years, the pension funds became increasingly more aggressive, as shown in Table 4. This can also be seen in Table 5. While the volatility of the balanced market benchmark has fallen significantly (the standard deviation has decreased from 25.7 percent in the last 15 years to 13.7 percent in the last five years), that of the funds' portfolios has remained more stable (standard deviation has decreased from 9.0 percent to 8.6 percent).

While this shift in portfolio allocation has led to a consistent and significant improvement in the performance of pension funds in absolute terms, risk-adjusted performance has been more volatile. In Figure 3 the sample has been divided into three periods, 1982 to 1987, 1987 to 1992 and 1992 to 1997. The return of the pension funds is below that of the risk-matching benchmark in the first two periods, but above it in the last period. While this may be interpreted as a result of a shift in the risk/return frontier of the pension funds and hence of the relaxation of portfolio limits[55], the improvement in risk-adjusted performance between the first and last period is very marginal.

The relatively good risk-adjusted performance of the pension funds in the first period, when investment in equities were not allowed, is itself largely a consequence of the large negative returns experienced by Chilean equities in 1983 (over 20 percent) against the positive returns enjoyed by fixed income instruments (about 10 percent). This large disparity in performance in a single year drives the risk-adjusted performance of the pension funds from 1982 to 1987, which highlights the complexity of drawing implications on performance over short time periods.

FIGURE 3

CHILE EVOLUTION OF RETURNS, 1982-97:
PENSIONS (AFP) AND RISK-MATCHING BENCHMARK



Peru

Pension funds have returned an average real return of 7.7 percent over the past four years (see Table 6). However, their actual performance has been much worse than if the pension funds had invested in term deposits, which have returned 10.1 percent over the same period.[56] Meanwhile, the market portfolio in Peru (made up of only the stock market index)[57] has returned almost double what the pension funds returned (14.6 percent), although at a higher level of volatility.

The underperformance of pension funds relative to the deposit rate can be traced to the low returns in the Peruvian stock market in 1995 and 1996. The investment regime in Peru is already one of the most liberal in Latin America, while investment in equities is highest in Peru (about 45 percent of assets in May 1998). To the extent that the performance of the stock market improves over the medium term, the Peruvian system should be well prepared to benefit from it.

TABLE 6

PERU: PENSION FUND AND BENCHMARK PERFORMANCE, 1993-97

	1 year		3 years		4 years	
	Avg. Return %	Std. Dev. %	Avg. Return %	Std. Dev. %	Avg. Return %	Std. Dev. %
AFP	11.1	5.2	7.3	3.9	7.7	3.8
MB	15.0	16.1	8.4	14.7	14.6	18.9
Deposit rate	9.0	0.6	6.6	1.6	10.1	5.8

Source: Authors' calculations.

Argentina

Pension funds have performed better than the balanced market benchmark on a risk-adjusted basis. They have returned 11.9 percent in real terms over the last three years, a little above the market benchmark return of 11.5 percent, and at a much lower volatility (see Table 7). On risk-adjusted terms, the performance of pension funds appears to be impressive. There is no combination of the stock and bond index that matches the volatility of the average pension fund return. Hence, the risk-matching benchmark is not reported. A similar measure of risk-adjusted performance is given by the return-matching benchmark.[58] The volatility of this benchmark is more than twice that of the pension funds, which shows that pension funds have performed much better than the indexes on a risk-adjusted basis. This would seem to confirm the evidence provided by Otermin and Zablotzky (1996). However, it is important to keep in mind that approximately a quarter of the assets of the Argentine pension funds are in an "investment" account –created after the Mexican peso devaluation in 1994– to avoid marking to market fixed income securities that lost significant value during the crisis. Hence, any "return" figures for the Argentine pension fund industry should be interpreted with caution, since they are likely to be significantly overstated.[59]

TABLE 7

ARGENTINA: PENSION FUND AND BENCHMARK PERFORMANCE, 1994-97
(% per year)

	1 year		3 years	
	Avg. Return %	Std. Dev. %	Avg. Return %	Std. Dev. %
AFJP	12.7	6.7	11.9	5.0
IFCG	19.6	22.1	12.8	18.7
BOND	2.5	7.8	8.9	13.1
MB (balanced)	12.7	15.7	11.5	15.2
MB (return-matching)	12.7	16.0	11.9	13.5
MB (conservative)	4.2	9.1	9.3	13.1
Deposit rate	7.8	0.8	6.6	3.5

Source: Authors' calculations.

Like Peru, Argentina started with a much more liberal investment regime than did Chile. In particular, the limit of 35 percent on equities is close to the portion of the balanced market benchmark corresponding to the equity index (40 percent). Future performance, therefore, should not be severely affected by investment regulation.

Replacement rate performance

The previous section presented a comparison of pension fund performance with market benchmarks. This analysis is useful in determining the performance of pension funds as a financial intermediary. Given that the objective of pension fund investors is to achieve a given replacement rate[60] after retirement, the replacement rate should also be a relevant benchmark with which to judge performance.

In an asset-liability framework, replacement rates are determined jointly by the contribution policy (the contribution rate) and the investment policy (how assets are invested). However, because contribution rates are fixed by the government at the beginning of the new systems, the investment regime is the only determinant of replacement rates. Assuming the contribution rate is fixed, this section shows whether, ex post, the expected replacement rates implied by the investment regime are adequate.[61] These replacement rates are then compared to

those that would have been obtained had the pension funds operated under a different investment regime. This analysis will determine whether portfolio limits are too strict, and whether pension funds are making adequate risk/return choices in their asset allocation. In essence, the replacement rate approach allows the ability to choose among the schedule of asset allocations.[62]

To evaluate the performance of pension funds in Chile from a replacement rate perspective, various deterministic[63] scenarios for workers of different characteristics are constructed. The worker is assumed to contribute 10 percent of her salary every year[64] to the pension fund. The returns to the investment over the first 16 years are given by the actual average return on the pension funds before fees (or the alternative market portfolio). Differences in future performance are neutralized by assuming that the future returns to all portfolios are identical to that of the pension funds –7.5 percent in real terms– the average of the pension fund industry over the last five years. Life span is assumed to be known with certainty: life expectancy after retirement is assumed to be 20 years. The accumulated balances are assumed to be used in equal amounts over each year of retirement. This annuity is assumed to have no cost.[65] The only factors that change in the different scenarios are salary growth (0 percent per year and 2 percent per year) and length of working life (16[66], 25, and 40 years).

Two benchmarks were used for the comparison:

- *Risk-matching benchmark.* This is the replacement rate that would be achieved if pension funds had obtained the actual gross returns of the risk-matching portfolio between 1981 and 1997, and 7.5 percent per year thereafter. This portfolio is a combination of the IFCG equity index and the bond index that provides the same return volatility as that actually obtained by the pension funds.

- *Balanced portfolio benchmark.* This is the replacement rate that would be achieved if pension funds had obtained the actual gross returns of the balanced portfolio (60 percent in stocks and 40 percent in bonds) between 1981 and 1997, and 7.5 percent per year thereafter.

The results of the simulation exercise are summarized in Table 8. A worker who contributed continuously to the new system for 16 years, retired in 1997, and lived for another 20 years would have received an annual income from the private pension system equivalent to 19 percent of her salary at retirement.[67] A worker who retires in 2006 (25-year contribution period) could expect a replacement rate of 44 percent. Workers who retire in 2021 (and who therefore have only made contributions to the new system) could expect a replacement rate of 143 percent.

TABLE 8

CHILE: EXPECTED REPLACEMENT RATES,
0% PER YEAR SALARY GROWTH

N° of Years of Contributions	AFP %	MB (risk-matching) %	MB (balanced) %
16	19	22	41
25	44	49	86
40	143	158	268

Source: Authors' calculations.

Regardless of their contribution period or their age when the new system was established, workers could expect higher replacement rates under the alternative investment regimes.[68] The gap in replacement rates ranges from 10 percent higher than that of the pension funds for the 40-year contribution period under the scenario with the risk-matching benchmark, to 116 percent higher than that of the pension funds for the 16-year contribution period under the scenario with the balanced benchmark. These results are consistent with the findings from the previous sections.

As shown in Table 9, the relative performance of pension funds is very similar if one assumes a 2 percent per year growth rate in salaries. The maximum difference is once again with the balanced benchmark for the 40-year contribution period (replacement rate is 106 percent higher). The smallest difference is with the risk-matching benchmark for the 16-year contribution period (replacement rate is 7.3 percent higher). In absolute terms, however, replacement rates are much lower. For example, workers who retire in 2021 (and who therefore have made contributions only to the new system) could expect 82 percent under the pension fund scenario with salary growth of 2 percent per year. This compares with 143 percent when one assumes no salary growth in real terms.

TABLE 9

CHILE: EXPECTED REPLACEMENT RATES,
2% PER YEAR SALARY GROWTH

N° of Years of Contributions	AFP %	MB (risk-matching) %	MB (balanced) %
16	16	18	33
25	32	35	59
40	82	89	143

Source: Authors' calculations.

The pension fund with actual returns does worse than the two alternatives for all combinations of age and life expectancy. Moreover, it must be kept in mind that these results are based on an optimistic scenario. We have assumed that pension fund returns will be as high as they have been in the recent past (7.5 percent per year),[69] and the market benchmarks will not perform any better than the pension funds. If future relative performance mirrors the past, the gap in replacement rates would be much higher.

Net-of-Fees performance

The previous two sections investigated the performance of pension funds on a gross basis; that is, before fees. In this section the return of pension funds net of fees is calculated for Chile. Because pension funds in Chile (and other Latin American countries)[70] charge fees as a percentage of salary (front-load fee), the fees need to be transformed into a return equivalent. There are at least two ways in which this can be done. One is by calculating the internal rate of return to total contributions (including fees). This is the method used by Shah (1997). An alternate methodology, used in this section, is to transform the salary-based fees into their asset-based equivalent.

This second method consists of calculating the asset-based fee (that is, commission as a percentage of managed assets) that yields the same level of accumulated assets at retirement as the salary-based fee. In all simulations salaries grow at the rate of inflation.[71] Gross returns were fixed at 7.5 percent per year for the time period after 1997 (the average return of pension funds over the last five years), and commission rates were set at the December 1997 level (2.3 percent of salary). The projection period was extended to 40 years, which permits an unbiased comparison between the different investment options for workers with long career spans.[72]

Using this methodology it was estimated that the commission charged by the pension funds over the last 15 years is equivalent to a 5.5 percent charge on assets. When the investment period is projected to 40 years the fee falls to an estimated 1.4 percent per year.

As can be seen in Table 10, the fees charged by pension funds significantly diminish the returns to portfolios. Once fees are taken into account, pension fund returns are reduced by 54 percent over the 15-year horizon, and 17 percent over the 40-year horizon. The performance of pension funds relative to the benchmarks is, as can be expected, very similar to the gross return calculation of the above section on Risk-Return Performance. Pension fund performance is worse than both the risk-matching and balanced market benchmarks. For a $ 100 investment made in December 1982, a pension fund investor would have realized $ 200 in December 1997. The same money invested in the balanced benchmark would have been worth $ 547 had the pension funds invested in the balanced index fund. Workers who retired before 1997[73] would therefore have been much better off had the investment regime been more relaxed.

TABLE 10

CHILE: CUMULATIVE NET RETURNS 1982-97/1982-2022
(% per year)

	Actual: 1982-97	Projected: 1982-2022
AFP	4.7	7.0
MB (balanced)	12.0	9.7
MB (risk-matching)	6.0	7.5
Deposit Rate	1.1	n/a

Source: Authors' calculations.

For workers who retire in December 2022 and who contribute for the entire 40-year period,[74] pension funds also perform worse than the balanced benchmark. One-hundred dollars invested in December 1982 would be worth $ 1,500 in 2022 under the actual investment regime, and $ 4,060 had pension funds been able to invest in the balanced benchmark. Given that the downward effect on the net returns of pension funds is inversely proportional to the length of the investment period, workers in between the two extremes would also have got a better deal had pension funds been able to invest in the balanced benchmark.

It must be noted that these results represent a conservative scenario. Administrative costs should be much lower under an investment strategy of following an index than under active fund management. While pension funds are certainly not very active fund managers, a strategy of passive management would probably be less costly.[75] In the case of investment in bank deposits, administrative costs would certainly be much lower. We have also assumed the same gross return over the extrapolation period for the balanced benchmark as for the pension funds (7.5 percent). This benchmark, however, offers a higher point in the risk/return frontier than the average pension fund.[76]

5.3. Performance against other investment instruments

In this section the net-of-fees performance of pension funds is evaluated against that of alternative investment instruments. This exercise allows us to determine whether restricting the investment of workers' contributions to a single instrument, the pension fund account, has lowered the yield on contributions relative to what it could have been potentially achieved.[77] The focus is on Chile, the country with the longest data series of pension fund returns. Two benchmarks are proposed: term deposit yields and mutual fund returns. The comparison is done on a net-of-fees basis, because in addition to the investment regime, the performance of a particular instrument is determined by the fees charged by the financial intermediary that supplies that instrument.

Bank deposits are a low-cost, low-risk, low-return form of investing for retirement. Rates for "medium-term" deposits (90 to 365 days) are therefore used as a basic benchmark in this evaluation.[78] Mutual funds provide a degree of investment sophistication similar to that of pension funds. A comparison with mutual funds, therefore, is a relevant benchmark against which to evaluate the performance of pension funds.[79]

There is an important limitation when using these instruments as benchmarks. In Chile, these products normally require a minimum investment of around $ 1,000, which is higher than the balance in many pension fund accounts. Hence, a low-income investor would not have had access to these alternatives. Pension funds, on the other hand, are obliged to open accounts for all workers who request to do so. Opening an account for a low-income worker, therefore, has a high cost which is cross-subsidized with the commissions of higher-income individuals. Such cross-subsidies do not occur in bank deposits and mutual funds.

This argument, however, is less relevant for bank deposits, because fees are very small compared to those of institutional investors.[80] Hence, it can be argued that net returns would have been only slightly higher if banks had been forced to open deposit accounts to all those who requested them, regardless of the size of their deposit. In the case of mutual funds, which may have fixed and running costs at least as high as those of pension funds as a result of their similar investment policy, the results will be highly biased upward.

Like pension funds, banks and mutual funds charge investors a commission for the services they offer, including account administration and asset management. The structure of the commission, however, is different from that of the pension funds in Latin America. Commissions on bank deposits are calculated as a premium on the bank's borrowing rate. Mutual funds and index funds usually charge fees as a percentage of assets held. Both bank deposits and mutual funds report their returns on a net-of-fees basis.

To compare net returns, the salary-based commissions of pension funds were transformed into their asset-based equivalent, as was done in the previous section. The asset-based fee was calculated as that which would yield the same level of accumulated assets at retirement as the salary-based fee. In the simulation it was assumed that salaries grow at the rate of inflation.[81] Gross returns were fixed at 7.5 percent per year for the time period after 1997 (the average return of pension funds over the last five years), and commission rates were set at the December 1997 level (2.3 percent of salary). The projection period was extended to 40 years, which permits an unbiased comparison between the different investment options for workers with long contribution records.

Using this methodology for the period starting in December 1987,[82] it was calculated that the asset-based equivalent fee of pension funds is 4.8 percent for the 10-year investment period, and 0.9 percent for the 40-year horizon. These charges (especially those based on the projection period) compare positively against those of mutual funds. In 1997, equity mutual funds charged on average 6 percent over assets managed, while fixed-income funds charged on average 2.5 percent. It was assumed that mutual fund commissions were held at their 1997 level into the projection period.[83]

Table 11 depicts the scenario for an average worker who contributed to the pension funds during the specified periods, 1987 to 1997 and 1987 to 2027. Returns are shown net of fees and are cumulative.

TABLE 11

CHILE: CUMULATIVE NET RETURNS, 1987-97/1987-2027
(% per year)

	Actual: 1987-97 %	Projected: 1987-2027 %
AFP	4.9	7.1
MF (risk-matching)	6.8	4.7
Deposit rate	6.1	n/a

Source: Authors' calculations.

Bank deposits. For workers with high enough income to make bank deposits, this option would have offered a higher net return during 1987–97 than the pension fund. A pension fund account returned an average of 4.9 percent per year over this period, compared to 6.1 percent per year in a term deposit. The results are especially unfavorable to the pension funds considering the much lower volatility of the deposit rate. For longer horizons, as the bias of front-loaded commissions wears away, deposits would become an increasingly less attractive option.[84]

Mutual funds. To isolate the effect of structure restrictions from that of portfolio limits (to which mutual funds are not subject), a risk-matching mutual fund return is constructed in a similar manner as the risk-matching portfolio of the previous section. The return is calculated by weighting each of the average of three types of mutual funds (money market, fixed income, and equity or variable income) by the proportion that will ensure the same volatility of returns as the pension funds.[85] The weights used for Chile were 29 percent for the equity or variable income funds, and 35.5 percent for each of the money market and fixed-income funds. In this way the effect of structure constraints is isolated from (i) investment regulations, which have a significant impact, as well, since mutual funds are not subject to investment limits,[86] and (ii) individual preferences, since workers can choose between mutual funds with different asset allocation strategies. The fee for this risk-matching mutual fund was assumed to be 3.5 percent over assets.

As shown in Table 12, mutual fund performance compares positively against pension fund performance on a short investment horizon (10 years), but adversely on the long horizon (the retirement horizon of 40 years).[87] By construction, the volatility (risk) of the return to the mutual funds matches the volatility (risk) of the return of the pension funds. Hence, returns are comparable on a risk-adjusted basis. Starting in 1987 and up to 1997, the average worker would have been better off with the mutual funds than the pension funds. For workers who retire after 1997, however, the average mutual fund becomes an increasingly less attractive investment option than the average pension fund.[88] Over the projected 40-year period (1987–2027), the average pension fund offered an estimated net return of 7.3 percent per year, much higher than that of the risk-matching mutual fund (4.7 percent). This adverse performance of mutual funds can be largely attributed to their much higher fees.[89] These results suggest that unless competition drives down mutual fund fees, allowing workers the alternative of investing in mutual funds may not be beneficial. In Chile active fund management by mutual funds has not paid off in terms of higher returns.

5.4. Summary of results

The most important findings from the analysis are:

- Asset allocation is very similar across pension funds. Fund managers are practically indistinguishable in terms of asset-allocation and investment strategies (returns across pension funds are highly correlated).
- Pension fund performance in absolute terms has varied across countries and time periods. Chilean pension funds have underperformed the balanced market benchmark since the inception of the system. The return of this benchmark could only have been achieved with a more liberal investment regime. In the last five years, however, pension funds have beaten all the market benchmarks. Pension funds in Peru have underperformed the deposit rate and the stock market index in the last four years. The "stellar" performance of the Argentine pension fund industry, which beat the market benchmark, is likely to have been driven by the 25 percent of the industry's assets in the "investment account" which does not report market returns.
- Relaxing the investment regime allows better portfolio diversification, and seems to improve risk-adjusted performance. The liberalization of asset restrictions in Chile in the mid-80s led to a shift in the asset allocation of pension funds, taking it closer to the balanced market portfolio with a 60/40 equity/bond distribution. As a result, risk-adjusted performance of pension funds in the last five years (1992-97) shows a significant improvement relative to the previous five years (1987-92). On the other hand, risk-adjusted performance in the last five years does not seem to have improved much relative to the first five years (1982-7).
- The tight regulatory regime in place in the early years of the Chilean system will have drastic implications for workers' retirement income. Expected replacement rates will be significantly lower than what they would have been under a liberal investment regime which permitted the replication of the asset allocation of the market benchmark. In risk-adjusted terms, however, the expected replacement rates would be only slightly higher.
- Limiting the investment of mandatory savings to a single instrument has had mixed results. In Chile cumulative yields on bank deposits have not been far below the net returns of pension funds and have been much more stable. Mutual funds, on the other hand, were not an attractive alternative to pension funds, except, possibly, for very short time horizons.

5.5. Evidence from other Latin American countries

The evidence from the previous sections has been drawn from the early reformers. These are countries that, in comparison with later reformers, have more flexible regulatory regimes. The performance of pension funds relative to the market in these countries should be treated as best-case scenarios. In countries such as Bolivia, Mexico, and Uruguay, where pension funds are currently investing only in government securities, the relative performance of pension funds is likely to be much worse.

Table 12 presents a summary of the performance of pension funds in other Latin American countries that have reformed their pension systems. To-date gross real returns are lowest in those countries that have reformed their pension systems most recently, Bolivia and Mexico. Until March 1998, the Bolivian pension funds had returned 1.8 percent, while until May 1988, Mexican funds had returned 3.6 percent. By way of comparison, in the first year of the reform the Chilean funds obtained a very healthy 23 percent, while Argentine funds obtained 12 percent. Once fees are taken into account, the performance of the pension fund industry in these countries becomes a serious cause of concern. If performance does not improve over the medium term in countries such as Bolivia and Mexico, it is unlikely that their new pension systems will offer adequate replacement rates to their workers.

TABLE 12

PENSION FUND REAL ANNUAL RETURNS

Country	Period	Real Return %	Fees/Salary %
Chile	Dec 81-Dec 97	11.2	2.3
Argentina	Dec 94-Dec 97	11.9	2.5
Peru	Dec 93-Dec 97	7.7	2.3
Colombia	Jul 94-Jun 98	7.5	1.6
Uruguay	Jun 96-May 98	9.8	2.1
Bolivia	May 98-March 98	1.8	1.0
Mexico	Jul 98-May 98	3.6	1.9

Note: Fees do not include insurance premium, and are of December 1997, except Colombia (3/97) and Mexico (4/97).
Real returns are annualized cumulative values, except for Bolivia and Mexico (return over 10 months) and Colombia (annual average of three-year return).
Sources: Pension Fund Regulators, Queisser (1998a), and authors' calculations.

VI. Policy Implications

Five main policy implications follow from the performance analysis.

First, investment regulations should not be continued in the long run. They should be relaxed as soon as system viability can be guaranteed, existing financial intermediaries and capital markets are adequately regulated, and the appropriate supervisory authorities are in place. Even before these steps are taken, however, it is essential that governments evaluate what the potential costs from the regulatory framework are likely to be, since the net benefits to workers from the pension reform may be lower than expected.

Second, in countries where there are mandatory, defined contribution pension systems governments should encourage the development of market indexes and benchmarks. It is critical to realize that there is no absolute in investment performance. This is especially true in a mandated savings environment. It is not enough to say that a country's pension funds did well because they returned 7.9 percent in real terms net of fees over the last 16 years. The key question is how well did pension funds do relative to other investments in the market. Regulators should publicly provide such comparisons so that workers can judge how good the "real" returns to their portfolios are. These benchmark comparisons should include gross and (actual and projected) net returns and averages, as well as cumulative returns.

Third, benchmark comparisons should include forecasts of replacement rates at retirement based on simple actuarial models. Since the purpose of a pension fund is to provide a certain level of replacement of wages after retirement, the replacement rate should be an important benchmark against which pension fund performance is judged. Again, the question is not whether the replacement rate obtained is "adequate" in some absolute sense. The performance standard should be what is the best replacement rate that a worker could have obtained in the market. If pension funds perform poorly, the only loser is the worker.

Fourth, passive management should be included as an option for investment. Passively managed funds that replicate market benchmarks are generally cheaper to administer than active funds and often perform better than active funds on a net-of-fees basis. One of these options could be direct investment in bank deposits. Although it is to be expected that long-term returns on deposits will be lower than on riskier assets, commissions charged on deposits also tend to be very small compared to those charged by financial intermediaries that invest in capital markets. In developing countries, where financial systems are dominated by banks and capital markets are incipient, the difference in administrative costs and risk may actually more than compensate for the lower long-term returns on deposits.

Finally, different commission structures should be available, so that workers that are only in the system for a short period (those who were old when the system was reformed or those with short career spans) are not penalized by specific commission structures. In general, financial intermediaries that charge commissions over the account balance (for example, bank deposits) may offer a better net-of-fees performance to workers who are near their retirement when the reform takes place than those which charge fees as a percentage of salaries (like pension funds in Latin America).

VII. Conclusion

Arguments in favor of pension reform have used the importance of this asset in workers' lives and the responsibility of the government to put in place systems that give workers an "ownership" of their pension assets and places them in "control" over their financial future. This paper has provided evidence that draconian regulations have negated many of the arguments put forward in favor of organizing a privatized pension fund industry in the standard way in which it has been organized thus far in several countries.

Because workers can invest only in pension funds offering very similar returns, they obviously have no choice in determining their own financial future. They have their own accounts, but they have no effective say in what happens with them. In such a scenario, it is unclear what the real benefits are of individual choice over multiple pension fund managers. Considering the findings on pension fund performance, and the concern that administrative costs of private pension systems are high, it appears that workers are not getting a great deal on their pension assets. Thus, policymakers should examine alternate models of regulation and of industry structure. Either workers should be allowed real choices and regulations relaxed, or a significantly simpler (and potentially cheaper) industry structure without worker choice should be adopted.

If lack of worker choice is accepted, one industry structure option is to centralize the asset collection function of the fund managers and "privatize" only the asset management function. In this model, the pension fund managers would compete for funds, not workers. A central body (the regulator) would allocate the funds across fund managers purely on the basis of performance. Workers would have no choice of asset managers. They would get the "industry average" return. Because fund managers no longer market their services to a "retail" client base, this is also likely to reduce the administrative costs of the system significantly. These benefits, however, would have to be weighed against the risk of government mismanagement of the bidding process for private fund managers.

Alternatively, if worker choice was introduced by offering funds with different risk/return characteristics, and draconian rules were relaxed, it may still be possible to reduce the risk of underperformance of one fund by permitting diversification across funds. This structure, however, is likely to drive up administrative costs since the total number of accounts would increase and asset managers would have an incentive to encourage participants to move between the different funds they offer. Centralizing account management and limiting the type of funds to two or three may help contain these costs, but it is difficult to decide which structure would be most suitable until evidence is provided on the magnitude of these costs. The much higher commissions charged by mutual funds than pension funds in Chile may be an extreme case, but it suggests that allowing alternative investment instruments can have more costs than benefits, especially if it leads to more active fund management and marketing campaigns by financial intermediaries.

Pension reform has not been as successful as claimed in fulfilling its other main potential benefit, achieving high returns and replacement rates. In Chile, pension funds realized lower returns over the period 1982 to 1997 than could have been achieved under a more liberal investment regime. The average pension fund return since 1982 has also been lower than that of a market benchmark with the same volatility, which indicates that pension funds did not choose an efficient asset allocation or risk-return combination. Given the short time horizon, it is difficult to determine whether this was due to the existence of portfolio limits. The evidence collected, however, seems to suggest that risk-adjusted performance has improved somehow with the liberalization of the investment regime.

These results have highlighted some contradictions in the government's role in the new pension systems. In Latin America governments have given priority to one objective –the safety of retirement assets– to the detriment of the financial performance of those assets. In fact, in none of the countries that have introduced private pension systems do governments oversee the absolute performance of the system (except, to some extent, in Colombia). Only the relative performance of funds against each other is regulated and supervised (and only in a few countries). Because governments are ultimately responsible for the success of the system, achieving the highest returns at reasonable levels of risk should also be a primary objective of the regulation.

If individuals have the option of rebalancing their asset portfolios to reach an adequate level of diversification, the costs of draconian regulatory regimes may be small. For many workers in developing countries, however, savings through mandatory pension contributions are likely to be one of their most significant assets in life (the other large asset being their homes). Governments therefore have a responsibility to ensure that mandatory pension funds are managed well. Thus, it is not unnatural that in developing countries with histories of poor asset management industries, governments would want to regulate the pension fund industry. To the extent that regulation of the private pension fund industry sets the benchmark for how well the governments should be regulating other financial intermediaries, pension fund regulation is a learning experience for governments. However, it is critical that governments assess the real implications of the regulations in place.

ANNEX A

TABLE A1

COMPARISON OF REFORMED PENSION SYSTEMS IN LATIN AMERICA

Country / Year implemented	Chile 1981	Peru 1993	Argentina 1994	Colombia 1994	Uruguay 1995	Mexico 1997	Bolivia 1997
Reform Features: Nature of the Reform	Public defined benefit (PAYG) changed to private defined contribution (all workers)	Public PAYG changed to choice between public PAYG and private defined contribution	Public split into public PAYG and private defined contribution	Public PAYG changed to choice between public PAYG and private defined contribution	Public PAYG restructured, alongside a new private defined contribution (private sector workers under age 40)	Public PAYG changed to private defined contribution (for private sector workers only)	Public PAYG, changed to private defined contribution (all workers)
Estimated implicit PAYG debt at time of reform, as % of GDP	126% (in 1980) (through 2030)	37% (termination liability)	N/A	61.6% (through 2025)	300%	141.5% (in 1994) (through 2069)	40%
Transition arrangements: What happens to old system?	Phased out	Continues with changes	Continues with changes	Continues with changes	Continues with changes	Eliminated[j]	Eliminated[n]
Is current labor force allowed to remain in old scheme?	No	Yes	Yes	Yes	No[i]	No[k]	No[p]
Is new system mandatory for new labor force entrants?	Yes	No	No	No	Yes For under 40s	Yes	Yes
Can workers switch back to public system?	No	No (after June 1996)	No	Yes, every three years	Public & private run parallel	No[l]	No
Recognition bonds	Yes	Yes[a]	Yes[d]	Yes[g]	No	No[m]	No[q]
Profile of new pension scheme: State old-age safety net	Minimum Pension Guarantee (MPG) Social Assistance	MPG[b] Social Assistance	Flat and minimum pension	MPG Social Assistance	MPG, qualified with earned-income ceiling	MPG Social Quota Social Assistance	No MPG Bolivida[r]
Mandatory pillar guarantee	Relative to average salary	None	Relative to average salary	One minimum wage	Relative to average salary	One minimum wage; price indexed	None
Total contribution rate for new system (% of wage)							
⇒ For old age annuity	10	Private: 8 (10 on 1/97) Public: 11 (max 13)	8	10	27.5[i]	6.5 + 5.0 + (1-5.5)[n]	14.5[s]
⇒ Disability/survivors/ adm	3	0.3	3	3.5	With earned income-based ceilings on contributions	4.0	2.0 + 2.0[t]
⇒ Public pillar and social assistance	General revenues	1	16[e]	1		General revenues	Revenue from privatization program

Total contribution rate: ⇒ Before reform ⇒ after reform	19 13	9 13.3	27 27	8 (private sec.) 13.5-14.5[h]	27.5 27.5	15.5 16.5 - 21.0	8.5[u] 14.5
Commission structure	*Fixed*: although variable on contributions, on combination, no discounts	*Fixed*: on assets, on contributions, or both, with discounts	*Variable*: on assets, on contributions, or both, no discounts	*Variable:* on contributions only, any discount uniform to all affiliates	*Fixed*: on assets, on contributions, or both, with discounts	*Freely set & fixed annually*: on contributions, on assets, or both, with discounts	*Fixed*: on assets, on contributions, or both, no discounts
Comparative commission, as % of coverage pay (assumes one-time frontload)	2.30%	2.34%	2.54%	1.62%	2.05%	1.94%	1.00%
Profitability Rules ⇒ Maximum rate of return	Benchmark relative to market average	None[c]	Benchmark relative to market average	None	Benchmark relative to market average	None	None
⇒ Minimum rate of return	"	Benchmark relative to market average	"	Benchmark relative to synthetic portfolio	"	None	None
⇒ Govt return guarantee	Yes	None[c]	Yes	Yes	Yes[x]	N/A[y]	N/A
Government minimum pension guarantee	Relative to average salary	None	Relative to average salary	One minimum wage	Public pension calculated on salary level, up to ceiling of 5,000 pesos/month[k]	One minimum wage (price indexed)	Universal *Bolivida* annuity
Maximum percentage of portfolio allowed in: ⇒ Domestic equities ⇒ Foreign securities ⇒ Govt securities (in 1997)	37 12 50	40 5 30	35 10 50	30 10 50	0 0 70- 90	0 0 100	50-90[v] 10-50 At least US$180/year
Affiliates in the reformed system in 1997: ⇒ Total affiliates ⇒ % of economically active population (ILO)	5,000,000 89.2%	1,400,000 21.3%	5,400,000[f] 40.9%	1,800,000 29%	383, 000[f] 29.3%	11,300,000 30.8%	328,884 23.3%
N° of fund managers	17	5	18	8	6	17	2
N° of funds per manager	One	One	One	More than one permitted	One	More than one permitted[w]	One
Assets under management: ⇒ Total assets as of December 1997 ⇒ As a % of GDP	US$ 32.3 billion 44%	US$ 1.5 billion 2.4%	US$ 8.8 billion 2.9%	US$ 1.3 billion 1.3%	US$ 191 million 1%	US$ 760 million 0.2%	US$ 86 million 1.1%

(Cont. Table A1)

a. Only workers who have contributed for at least 48 months in the last 10 years and have at least 6 months prior to entering the new system.
b. Minimum pension guarantee (MPG) introduced with second round of reforms in 1995, but regulations have not yet been issued.
c. The upper band of the profitability guarantee was removed in November 1996. The law also provides for a minimum return guarantee, but no regulation has been issued to date.
d. "Compensatory pension" is paid upon retirement, not as a bond. The value is based on years of contribution and last 10 years' earnings.
e. This is paid by the employer.
f. Economically active population (EAP) taken from ILO 1996 because it was not available in the *1997 Yearbook*.
g. Workers with fewer than 150 weeks of contributions are not eligible for a recognition bond.
h. The rate shown is for both private and public sector and for 1996 and following years. Contribution rate increased gradually during 1994–96.
i. Only those eligible for retirement at the end of 1996 will continue to receive benefits according to the old PAYG actuarial formula, paid out by the Banco de Previsión Social. A transition PAYG system is set up to ease shift to the *new* two-pillar, PAYG/Capitalized system. See President's Report No. P7190-UR, for details.
j. At the present stage of the reform process in Uruguay, the total contribution rate to the pension system remains at 27.5 percent; however, employee/employer share of contribution has changed, and earned-income ceilings have been put in place, based on May 1995 pesos. For details on the reformed contribution structure, see Table 1.1 in Annex II of PR No. P7190-UR.
k. The salary on which the public pension is calculated, under the new system, will be subject to a ceiling of 5,000 pesos per month (May 1995 pesos). The formula for calculating the public pension is 50 percent of the average salary of the last 10 years.
l. Contributions to the old system cease on August 31, 1997. Transition workers can choose at retirement the higher of the benefits available under the old PAYG scheme or the new defined contribution plan.
m. Disclosure of expected current and future fiscal costs would be made on an annual basis.
n. Social Quota indexed to the CPI and estimated between 1 and 5.5 percent, depending on worker's income and on average equivalent to 2.2 percent of wages.
o. Current pensioners continue to receive benefits from the National Treasury as defined under the old system.
p. Except those workers eligible for retirement under the rules of the old system by April 30, 1997. The AFPs began operating on May 1, 1997.
q. Affiliates who have contributed to the old system will receive compensatory pensions, paid monthly upon retirement, and calculated for those having contributed at least five years according to an actuarial formula (Von Gersdorf 1997, p. 9).
r. Law 1732 does not provide for a government guaranteed minimum pension. However, in addition to the standard defined contribution (DC) scheme of other Latin American countries, in Bolivia the pension reform and capitalization scheme led to the transfer of 50 percent of the privatized companies to the Administradora de Fondos de Pensiones (AFPs) to fund a "universal" pension (Bonosol) for Bolivians who were over 21 years of age at the end of 1995. The situation has changed since the 1997 elections, because the Bonosol program has been canceled and replaced by a much-reduced benefit, the Bolivida, which will be funded with 30 percent of the capitalization fund. The rest of the shares will be distributed to Bolivians, but it is not yet clear where those shares will be held and whether they will be tradable.
s. An additional 13 percent of wages are withheld: 10 percent contribution for health insurance, and 3 percent contribution to the housing fund.
t. Of the 12.5 percent of worker wages withheld by the employer, 2.0 percent is an insurance premium covering physical impairment or death from common causes, 0.5 percent pays for AFP services, and employers contribute an additional premium of 2.0 percent for work-related injury or death.
u. Before the reform, most formal sector workers in Bolivia, both private and public, belonged to practically obligatory employer-arranged plans, complementary to the PAYG plan. Contribution rates under these plans varied from 3.5 percent to 12 percent.
v. Pension law specifies that the maximum limit on investment in foreign securities will be no less than 10 percent and no more than 50 percent, and only in instruments traded on the New York Stock Exchange and the London Stock Exchange. For the first 15 years of the system, the AFPs are required to invest at least US$180 million per year in treasury bonds, to help finance the fiscal costs of transition.
w. Only one fund permitted until July 1998.
x. República AFAP is subject to a 2 percent real return rule.
y. The Central Bank pension account offers a guaranteed yield of 2 percent per year.

Sources: Grandolini and Cerda (1998), p. 21; Pension Superintendencies in the region, and authors' calculations.

TABLE A2

PORTFOLIO LIMITS IN SEVEN LATIN AMERICAN COUNTRIES, MAY 1998

Portfolio Limits	Argentina	Chile	Bolivia[b]	Peru	Colombia	Mexico	Uruguay
Govt securities	50	50	$ 180 mn min	30	50	100	75-85[d]
Federal govt securities							
Provincial & municipal securities	15[a]						
Central Bank securities				30			
Corporate bonds	40	45	0	35	20	35	25
Corporate bonds, long term	28						
Corporate bonds, short term	14			10			
Corporate bonds, convertible	28	10					
Corporate bonds, priv. firms	14						
Bank bonds			0	25	50	10	25
Mortgage-backed securities	28	50		30	30		30
Letters of credit		50					
Fixed-term deposits	28	50	test	30			30
Short-term margin loans				10			
Repurchase agreements					15		
Shares, PLCs	35	37	0	20	30	0	25
Shares, workers' shares				20			
Shares, real estate companies							
Shares, preferred share certificate							
Shares, privatized firms				10			
Stock index instruments	14				5		
Securitized instruments			0	10	20[e]		
Primary issues, new ventures							
Mutual funds	14	5	0	10	5		0
Real estate funds		10					
Venture capital funds		5					
Securitized credit funds		5					
Direct investment funds	10						
Foreign securities	10	12	0	5	10	0	
Foreign govt securities	10						
Foreign corp. bonds & shares	7						0
Foreign assets, fixed income		12			10		
Foreign assets, var. income		6					
Hedging instruments	2	9		10			

PLCs = Public limited companies.

a. Nacion AFJP must invest between 20 and 50 percent (or $300 million) in these instruments to finance regional projects.
b. Bolivia has not issued regulation for the actual limit.
c. Limit of 15 percent for instruments backed by non-admitted assets, real state, and infrastructure projects.
d. Up from 80 to 100 in 1996. The legislated limits were 70 to 90 in 1997, 60 to 80 in 1998, 50 to 70 in 1999, 40 to 60 in 2000, 30 to 60 in 2001 to 2005. The difference can be invested in securities not issued by the central state.

Source: Pension Fund Regulators.

TABLE A3

LEGISLATED PORTFOLIO LIMITS IN ARGENTINA, CHILE, AND BOLIVIA

Portfolio Limits	Argentina	Chile		Bolivia	
	max	min	max	min	max
Government securities	N/A	35	50	$ 180 mn min	100
Federal government securities	50				
Provincial and municipal securities	30			0	10
Central Bank securities					
Corporate bonds		30	50	30	45
Corporate bonds, long term	40				
Corporate bonds, short term	20				
Corporate bonds, convertible	40	10	15		
Corporate bonds, privatized firms	20				
Bank bonds				50	50
Mortgage-backed securities		30	50	30	50
Letters of credit		35	50		
Fixed-term deposits	20 (1)	30	50	50	50
Short-term margin loans					
Repurchase agreements					
Shares, PLCs	50	30	40	50	90
Shares, workers' shares					
Shares, real estate companies		10	20		
Shares, preferred share certificate					
Shares, privatized firms	20				
Stock index instruments					
Securitized instruments					
Primary issues, new ventures					
Mutual funds	20	5	10	5	15
Real estate funds		10	20		
Venture capital funds		2	5		
Securitized credit funds		5	10		
Direct investment funds	10				
Foreign securities	10	6	12	10	50
Foreign government securities	10				
Foreign corporate bonds and shares	10				
Foreign assets, fixed income		6	12		
Foreign assets, variable income		6	6		
Hedging instruments	10	5	15		

PLCs = Public limited companies.

Source: Pension Fund Regulators.

TABLE A4

EVOLUTION OF PORTFOLIO REGULATION - CHILE, 1981-1998

Portfolio Limits	1981	1982	1985	1990	1992	1995	1996	1997	1998
Government securities	100	100	50	45	45	50	50	50	50
Corporate bonds	60	60	40	40	40	40	45	45	45
Corporate bonds, convertible	0	0	10	10	10	10	10	10	10
Mortgage-backed securities	70	40	40	50	50	50	50	50	50
Letters of credit	70	40	40	50	50	50	50	50	50
Fixed-term deposits	70	40	40	50	50	50	50	50	50
Shares, plc's	0	0	30	30	30	37	37	37	37
Mutual funds	0	0	0	10	10	10	5	5	5
Real state funds	0	0	0	10	10	10	10	10	10
Venture capital funds	0	0	0	0	0	0	5	5	5
Securitized credit funds	0	0	0	0	0	0	5	5	5
Foreign securities	0	0	0	0	3	9	9	12	12
Foreign assets, fixed income	0	0	0	0	0	9	9	12	12
Foreign assets, variable income	0	0	0	0	0	4.5	4.5	6	6
Futures and options	0	0	0	0	0	9	9	9	12

Source: Pension Fund Superintendency.

ANNEX B

DESCRIPTION OF VARIABLES

CHILE

Variable	Short Name	Description	Source
Term Deposit Rate	Deposit Rate	90-365-day real (Unidad Fomento adjusted) deposit rate, financial system average	Central Bank of Chile, Economic Indicators
Bond index	BOND	Real rate of return for fixed-income instruments traded on the Santiago Exchange	Santiago Stock Exchange. Annual Report 1997
Equity Index	IFCG	IFCG total return index (adjusted by the Unidad de Fomento)	IFC Emerging Markets Database
Balanced market benchmark	MB (balanced)	60% IFCG, 40% BOND	Authors' calculations
Risk-matching market benchmark	MB (risk-matching)	Varies by period: 15 years: 22-78; 10 years: 26-74; 5 years: 37-90	Authors' calculations
Conservative market benchmark	MB (conservative)	10% IFCG, 90% BOND	Authors' calculations
Pension fund return	AFP	Real rate of return	Superintendencia de AFPs
Short-term fixed income mutual funds return	MF1	Real rate of return of the quota of mutual funds investing in money market instruments	National Securities Commission
Medium- and long-term fixed income mutual fund return	MF2	Real rate of return of the quota of funds investing in fixed-income instruments	National Securities Commission
Mixed-income mutual funds	MF3	Real rate of return of the quota	National Securities Commission
Average mutual fund return	MF	Arithmetic average of all three mutual fund returns	Authors' calculations

PERU

Variable	Short Name	Description	Source
Term deposit rate	Deposit Rate	180-365-day deposit rate, financial system average	Central Bank of Peru, Economic Indicators
Equity index	IFCG	IFCG total return index (Lima Exchange)	IFC Emerging Markets Database
Market benchmark	MB	100% IFCG	Authors' calculations
Pension fund return	AFP	Real rate of return	Superintendencia de AFPs

ARGENTINA

Variable	Short Name	Description	Source
Term deposit rate	Deposit Rate	Over 60 days deposit rate	Central Bank
Equity index	IFCG	IFCG total return index (Buenos Aires exchange)	IFC Emerging Markets Database
Bond index	BOFRAN	BOFRAN Government Bond Rate of Return Index, adjusted by CPI	Banco Francés, Argentina
Balanced market benchmark	MB (balanced)	60% IFCG, 40% BOFRAN	Authors' calculations
Pension fund return	AFP	Real rate of return	Superintendencia de AFPs

ANNEX C

THE IFCG INDEX

The IFC Global (IFCG) index is intended to represent the performance of the most active stocks in the stock market and to be the broadest possible indicator of market movements. Any share selected must be among the most actively traded shares in terms of value traded during the annual review period; it must have traded frequently during the review period (i.e., one large block trade might skew the value traded statistics); and, it must have reasonable prospects for a continued trading presence in the stock exchange (e.g., it must not be in imminent danger of being suspended or delisted). In order to ensure that the IFCG index captures the real market, the target aggregate market capitalization of the index constituents is 60% to 75% of the total capitalization of all exchange-listed shares. The index also intends to represent the different industries in the stock market. IFC analysts may suggest substituting one company's shares for another on the list if the suggested shares have reasonably similar trading characteristics but represent an industry group which may be underrepresented in the current composition of the IFCG index.

The three tables below give an indication of the degree of representativeness of the IFCG indexes for the three countries that are analyzed in the paper: Argentina, Chile and Peru.

ARGENTINA: IFCG AS % OF LOCAL MARKET

Date	% market cap	% Value Traded	Local Turnover Ratio	IFCG/Local Turnover Ratio	Difference
Jan-97	58.78%	83.86%	0.93%	0.78%	0.15%
Feb-97	58.50%	92.59%	4.99%	4.62%	0.37%
Mar-97	58.28%	96.79%	5.55%	5.37%	0.18%
Apr-97	57.86%	96.42%	4.35%	4.19%	0.16%
May-97	57.85%	96.14%	4.08%	3.92%	0.16%
Jun-97	58.30%	93.07%	3.72%	3.47%	0.26%
Jul-97	59.17%	95.03%	5.06%	4.80%	0.25%
Aug-97	59.76%	85.81%	4.47%	3.84%	0.63%
Sep-97	59.30%	93.04%	3.28%	3.05%	0.23%
Oct-97	56.37%	84.66%	5.28%	4.47%	0.81%
Nov-97	59.73%	94.95%	3.03%	2.87%	0.15%
Dec-97	59.31%	95.66%	2.48%	2.38%	0.11%

CHILE: IFCG AS % OF LOCAL MARKET

Date	% market cap	% Value Traded	Local Turnover Ratio	IFCG/Local Turnover Ratio	Difference
Jan-97	54.15%	75.02%	0.96%	0.72%	0.24%
Feb-97	54.16%	75.67%	0.76%	0.58%	0.19%
Mar-97	53.67%	74.05%	0.79%	0.58%	0.20%
Apr-97	55.03%	75.08%	0.88%	0.66%	0.22%
May-97	55.27%	75.75%	0.79%	0.60%	0.19%
Jun-97	54.98%	70.31%	0.98%	0.69%	0.29%
Jul-97	54.89%	68.62%	0.87%	0.60%	0.27%
Aug-97	53.63%	70.05%	0.63%	0.44%	0.19%
Sep-97	54.22%	74.94%	0.39%	0.29%	0.10%
Oct-97	53.72%	84.18%	0.98%	0.82%	0.15%
Nov-97	61.94%	80.70%	0.70%	0.57%	0.14%
Dec-97	61.76%	74.88%	0.76%	0.57%	0.19%

PERU: IFCG AS % OF LOCAL MARKET

Date	% market cap	% Value Traded	Local Turnover Ratio	IFCG/Local Turnover Ratio	Difference
Jan-97	56.07%	55.15%	2.40%	1.33%	1.08%
Feb-97	54.99%	68.73%	1.90%	1.30%	0.59%
Mar-97	54.47%	75.29%	1.40%	1.05%	0.35%
Apr-97	56.03%	79.56%	1.80%	1.43%	0.37%
May-97	54.32%	79.21%	1.63%	1.29%	0.34%
Jun-97	52.82%	76.05%	1.79%	1.36%	0.43%
Jul-97	51.20%	81.66%	1.90%	1.55%	0.35%
Aug-97	50.48%	58.04%	1.58%	0.92%	0.66%
Sep-97	50.30%	56.52%	1.84%	1.04%	0.80%
Oct-97	48.62%	80.62%	1.67%	1.34%	0.32%
Nov-97	54.79%	100.75%	2.77%	2.79%	−0.02%
Dec-97	54.91%	73.61%	2.10%	1.54%	0.55%

Notes

[1] See World Bank (1994) and James (1997). The larger justification for this specific model was that the public, defined benefit, pay-as-you-go (PAYG) schemes were actuarially bankrupt.

[2] In all Latin American countries that have followed this reform model, the second pillar is expected to provide the majority of pension benefits to participating workers.

[3] The term "draconian" is from Vittas (1996).

[4] The impact of limits on foreign investment is the subject of a forthcoming paper.

[5] A PAYG system is one where contributions to the pension system from current workers finance benefits paid out to current retirees.

[6] Peru (1993), Argentina (1994), Colombia (1994), Uruguay (1995), Bolivia (1997), Mexico (1997), and El Salvador (1998) have implemented pension reforms based on the three-pillar approach. Several other countries are in the process of doing so. The Chilean reform in 1981 provided the motivation for most existing second-pillar designs. In 1997 three countries in Eastern Europe and Central Asia (Hungary, Poland, and Kazakhstan) enacted legislation mandating the creation of private pension funds.

[7] In Colombia, the administrators of existing severance funds were allowed to manage pensions as long as the two businesses were separated.

[8] In Colombia the task falls on an agency that coordinates all aspects of financial supervision including securities, insurance, and banking. In Uruguay the Central Bank is in charge of supervising the private pension industry.

[9] Only 30 out of about 300 listed companies were eligible for investment by pension funds before 1997 (mainly blue-chip companies). The new capital market reform bill, approved in 1997, extended coverage to more than 200 companies with smaller capitalization and other financial instruments (such as project financing, securitized bonds, and venture capital).

[10] See Tirole (1988) for an industrial organization perspective on this old-style form of regulation of privatized industries.

[11] In some countries, such as Mexico, government institutions are in charge of collecting contributions.

[12] The maximum limit on shares is Peru's at 40 percent, and the maximum on foreign assets is Chile's at 12 percent.

[13] In the initial stages of the system, this amount, US$ 180 million per year, has been similar to that in the pension funds. Hence, de facto, nearly all investments have been in government bonds.

[14] The Mexican Pensions Law also includes the broad requirement that the pension funds must invest in securities that predominantly encourage national productive activity, create infrastructure, and generate employment, housing investment, and regional development (Article 43).

[15] Chile is considering changing the application of the rule to a 36-month rolling basis.

[16] All funds have to establish an excess return account and a reserve fund with their own capital (the assets of which are invested in the same way as the pension fund). If the rate of return is above the maximum of the band, the difference is credited to the excess return account. If the return is below the minimum in any period the fund manager first tops off the difference with funds from this account. If there are insufficient funds to bring the returns to the minimum established by the regulation, the reserve fund is used to cover the difference. If this in turn is insufficient, the government guarantees the minimum return and the fund manager has either to provide additional capital or file for bankruptcy.

[17] In Peru there are also plans to move to a rate-of-return rule based on five-year performance.

[18] Because República's rate of return dominates the market average (56 percent of total assets in May 1998), other pension funds are forced to also reach the real return of 2 percent.

[19] Fund returns are weighted by percentage of industry assets owned by the fund.

[20] From July 1, 1995, the composition of the market portfolio is determined as follows: (percentage of total pension industry assets invested in shares x 90 percent of the average rate of return of the three stock exchanges of the country) + (percentage of total industry assets not invested in shares x 95 percent of rate of return of a fixed-income index). As of June 1998, only 5 percent of industry assets were invested in equities, making the market portfolio mainly a fixed-income index.

[21] There is some overlap between the first and the last two forms of market failure risks. Whenever there are systemic and agency risks, systematic market risk for the investor is created.

[22] The inadequacy of a regulatory and supervisory framework needs to be addressed by the government. It seems reasonable to ask what prevents the same problems from appearing in the new framework.

[23] Moral hazard may be reestablished if more than one fund is offered by each pension fund manager, as is being contemplated in certain countries.

[24] Investment limits are the norm for public pension funds across the globe.

[25] We are considering only limits of domestic securities. Home bias in emerging markets has made the limits on foreign assets largely obsolete. In Chile, six years after pension funds were allowed to invest abroad (1992), only 2 percent of the portfolio is invested overseas, mainly through mutual funds. For a summary of the arguments for and against these limits see Candia (1998). Two oft-quoted explanations are: (i) they help control volatile capital flows and hence achieve monetary sovereignty and macroeconomic stability (Fontaine, 1997), and (ii) they help reduce capital flight and deepen domestic financial markets (see Reisen 1997, and Uthoff 1997, for a discussion on this last issue).

[26] Shah (1997) also discusses this issue.

[27] About 90 percent of return is explained by the investment regime. The rest is attributed to investment management (Brinson, Singer, and Beebower 1991).

[28] See Geanakoplos, Mitchell, and Zeldes (1998) for a discussion of this issue.

[29] This implies that $ 100 invested in 1967 in a country with a prudent man regulatory regime would have grown to $ 216 in 1990, as opposed to only $ 193 in a draconian regime.

[30] Performance regulation is usually present only in industries that suffer from imperfect competition or are natural monopolies, like utilities.

[31] Excess returns are channeled to an excess account and not to the fund managers or to the individual accounts. If performance is below the minimum established, and there are insufficient funds in the excess account, the fund manager has to cover the difference with her own capital (from the reserve fund). Hence, the fund manager is penalized for returns below the minimum, but is not rewarded for returns above the maximum.

[32] Despite potential differences in risk aversion, all workers end up with practically identical portfolios. Some observers (for example, Valdés-Prieto in a private communication) have argued that forcing fund managers to offer similar investment portfolios can have significant benefits which should be traded off against the costs mentioned above. For example, profitability rules can limit fund management discretion and inefficiency when there is a danger of "investment capture" by powerful issuers (for example, governments and large public companies).

[33] It is a year in all the Latin American systems except Colombia, where it is three years.

[34] All data items are not available for all countries. Exceptions are noted in the analysis.

[35] Shah (1997) acknowledges some problems with the source data used for Chile. It is possible that fees reported by the Superintendency are overstated for the first five years of the system.

[36] The total return index includes cash dividends. It is also the relevant index for local investors. It is representative of the market (over 50 percent of market capitalization) and incorporates liquidity tests and minimum liquidity hurdles in the selection of the individual securities that make up the index (value traded and frequency of trades). The index is therefore replicable and tradable by local institutional investors such as pension funds.

[37] To our knowledge there are no fixed-income indexes published officially in either Argentina or Peru.

[38] The specific maturity of deposits used for each country is reported in Annex B.

[39] Equity aspects are dealt with in other literature (for example, Murthi, 1998). A complete evaluation of the efficiency effect of the regulatory regime should take into account its benefits as well as its costs.

[40] The Colombian regulator has established its own market index that makes up 50 percent of the market return that pension funds must reach. In Bolivia, the contract between the government and the pension funds stipulates that a benchmark would be established, and that the funds would be able to increase their commissions by 10 percent if the benchmark was reached. As yet, the government has not determined what the benchmark should be. Other countries are at various stages of thinking about development of performance benchmarks.

41 The data used are year-on-year real gross returns on a monthly basis. Correlations were calculated for all combinations of any two funds. The average of these correlations was then calculated.

42 Another evaluation that could be carried out would be to compare countries with no profitability rules, such as Bolivia and Mexico, with the others. This could be done when there is a long enough data sample and portfolio limits in Bolivia and Mexico are relaxed so that the direct effect of profitability rules can be isolated.

43 These results do not depend on the availability of index funds in these countries and the costs of such funds. Since the components of the benchmarks are widely available and the pension funds are institutional investors, they should be able to index their portfolios to these benchmarks in the absence of investment limits.

44 The weights are fixed, hence, the "passive" investment strategy.

45 This, however, represents a more aggressive portfolio than is currently permitted in Chile, Peru, and Argentina.

46 An interesting area of future research is how well domestic equity and bond index funds perform relative to domestic actively managed funds, and the relative fees and costs of such strategies.

47 Since the main objective of this section is to isolate the effect of changes in investment limits, only changes in relative performance over time are relevant, not the relative performance itself.

48 Deposit rates can also be used to calculate related measures of risk-adjusted performance for individual funds, such as the Sharpe ratio (Sharpe, 1966). The term of deposits is less than a year in all cases. See Annex B for details.

49 The jump in the share of the proportion allocated to equities between 1990 and 1991 (from 11 percent to 24 percent) is due largely to an extraordinary stock market real return of nearly 90 percent.

50 The slow move toward equities can be explained by different factors. First, herding behavior among pension funds creates inertia in the asset allocation of the industry. Second, profitability rules, which penalize deviations of individual pension funds from the industry average (especially if it involves more risk-taking), exacerbate this inertia effect. Third, pension funds reduced timing risk by spreading their total portfolio investment in stocks over many years. Fourth, the tightness of the investment regime at the beginning of the system led to a predominant position of pension funds in most fixed-income markets. This limited their ability to sell those securities in large quantities without adversely affecting prices.

51 The current limit on stocks (37 percent) is well above the percentage of pension fund assets invested in stocks (23 percent), but, as a result of other regulations (for example, limits by individual securities), the effective limit is likely to be much lower.

52 For the last 16 years, the weights in the risk-matching benchmark are 0.22 for the IFCG index and 0.78 for the bond index. This implies that by investing 22 percent of her assets in an equity index and 78 percent in a bond index, a worker would have obtained the same return volatility as was actually obtained by the pension funds. For the last 10 years the weights are 0.26 and 0.74, respectively. For the last five years, they are 0.37 and 0.90, respectively.

53 For the last 16 years, the weights in the return-matching benchmark are 0.17 for the IFCG index and 0.83 for the bond index. In other words, by investing 17 percent of her assets in an equity index and 83 percent in a bond index, a worker would have obtained the same return as was actually obtained by the pension funds (but at a different volatility). For the last 10 years the weights are 0.14 and 0.86, respectively. For the last five years, they are 0.58 and 0.43, respectively, similar to those of the balanced portfolio.

54 Short-selling possibilities are not considered in the current framework.

55 As argued above, asset allocation is the main determinant of performance. Little of the improvement in performance in Chilean pension funds may be attributable to increased fund management expertise and greater management efficiency.

56 These results do not depend on minimum deposit requirements. Since pension funds are large institutional investors, these constraints should not be binding.

57 We do not have knowledge of any bond index in Peru that could have been used in the construction of a bond benchmark.

58 The weights for this benchmark were 27 percent for the equity index and 73 percent for the bond index. Over the last year the weights were 59 percent for the equity index and 41 percent for the bond index. The wide fluctuation in weights is due to the bad performance of fixed-income securities in the last year.

59 Otermin and Zablotzky (1996) also acknowledge this source of bias.

60 Replacement rates can be defined in various ways. The definition used in this section is the ratio of annual pension income to the annual salary at retirement.

61 The problem could also be posed in reverse. Assuming the investment regime was optimal, the question is whether an adequate contribution rate was chosen.

62 The replacement rate approach is especially relevant in systems that guarantee a defined-benefit pension or an absolute rate of return, such as the Colombian, Mexican, and Uruguayan systems. In these cases, the contingent liability of the government depends on the extent to which the market produces sufficiently high returns (see Muralidhar and Van der Wouden, 1998a and 1998b).

63 Future research should consider the required return in a stochastic environment. The aim would be to determine the required rate of return needed to guarantee, within a certain margin of error (typically a 90 percent confidence level), that a minimum replacement rate will be achieved. Such analysis is equivalent to the shortfall risk approach proposed by Leibowitz, Bader, and Kogelman (1998).

64 This is the contribution rate for the pension fund in Chile. In addition, workers pay the fund managers about 2.3 percent of their salary to cover administrative costs.

65 Introducing an annuity cost would have little impact on the relative performance of pension funds with respect to the market benchmarks.

66 The time period is slightly different from that in the risk-return analysis because annual data is used. Since the data starts in December 1982, the first annual observation is the return for 1982. In the risk return analysis of the previous section, the sample starts with the annual return in 1983.

67 She receives extra retirement income from the bond that the government issued to her to recognize her acquired rights in the old PAYG system. The total replacement rate for this transition worker will be the sum from the two sources.

68 Only those with life expectancy at retirement of 20 years.

69 There may be good reasons to presume that the past performance will not be sustained. As the pension system matures and long-term savings increase, premiums on the more illiquid assets contract. More recently, global volatility has shaken Chilean capital markets.

70 This is the case in all Latin American countries, except Mexico, where fund managers can choose the commission structure.

71 Introducing a positive rate of real wages makes little difference to the projections and does not change the conclusions of this section.

72 Front-loading of fees means that the fee as a percentage of assets is greatly exaggerated and the net return to assets is greatly depressed in the first few years of participation relative to the life-time average fee and rate of return. In general, therefore, the downward bias on net returns of pension funds relative to those of mutual or index funds gradually diminishes as the investment horizon is increased.

73 Mainly those who were older than about age 45 when the reform took place in 1981.

74 Those who joined the labor force around the time of the reform.

75 U.S. index funds, which invest in such a manner as to track market indexes, charge approximately 0.5 percent over assets. This compares with the 1 percent estimated for the pension funds.

76 Pension funds can invest up to a maximum of only 37 percent of their assets in equity (1998 regulation). This is less than the weight of the equity index in the balanced benchmark (60 percent).

77 That is, we are not evaluating the costs of the other forms of structure regulation, ownership controls, or the limit of one fund per administrator.

78 The longest term for a time deposit in Chile is one year, compared to about five years in developed countries.

79 It can be argued, however, that pension funds have a longer time horizon than mutual funds, since their liabilities have longer maturities. They may therefore be able to take advantage of liquidity premiums by investing in less liquid assets and raise risk-adjusted returns. This advantage may nevertheless be illusory if pension funds invest in a myopic manner. The nature of competition in the pension fund industry and performance rules seem to encourage such behavior. A more tech-

nical justification is that when rates of return are independently distributed across time, any excess profits to be obtained from forecasting long-term returns are eliminated (see, for example, Walker, 1991).

[80] In Chile, the average commission per account in bank deposits was about 10 percent the commission charged by pension funds (1997 figures, reported in Valdés-Prieto, 1997).

[81] Introducing a positive rate of real wages makes little difference to the projections, and does not change the conclusions of this section.

[82] This starting year was chosen because it was the earliest at which reliable data for mutual funds could be obtained.

[83] The scenario here is one where the investor has to decide in which instrument to invest ex ante, and she does not switch between instruments during her investment period. This is a realistic assumption because, as a result of the distortion created by front-load fees, investing in pension funds over short time periods is very costly. It is assumed that the best estimate of future commissions is today's level.

[84] The 40-year projection for deposit rates is not shown because of the subjectivity of any estimate of the premium of a diversified portfolio over the riskless rate for a country like Chile.

[85] An equal weight is given to the money market and fixed-income funds, since they show practically identical risk/return profiles. This ensures that there is a unique solution to the calculation.

[86] In general, regulation of mutual funds in Latin American countries comes much closer to the prudent person model of Anglo-Saxon countries. Investment limits on foreign assets exist in some countries, but there are no constraints on domestic instruments, other than minimum diversification guidelines and other prudential rules to avoid excessive market power and conflicts of interest. The possibility to invest abroad could have led to a better risk-adjusted performance by mutual funds. In Chile, however, mutual funds invest less in foreign securities as a proportion of total assets than pension funds (0.1 percent and 2 percent, respectively, in May 1998).

[87] Because of the limits imposed by mutual funds on individual balances, this comparison will be significantly biased against pension funds. Hence, the comparison should be viewed as a best-case scenario of mutual fund performance relative to that of pension funds.

[88] After 15 years, the average pension fund is already offering a better performance than the risk-matching mutual fund (6.6 percent vs. 6.3 percent per year).

[89] Some caveats about the mutual fund comparison should be mentioned. First, variability of returns across mutual funds is much greater than across pension funds. Second, there may be more downward pressure on mutual fund fees than on pension fund fees. Variable income mutual funds charged an average 6 percent on assets, versus a standard figure of less than 2 percent in the U.S.

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Revista de Análisis Económico, Vol. 14, N° 1, pp. 121-142 (Junio 1999)

FUNCION DE COSTOS EN LA INDUSTRIA DE LAS ADMINISTRADORAS DE FONDOS DE JUBILACIONES Y PENSIONES EN LA ARGENTINA: UN ANALISIS DE LAS MODIFICACIONES REGULATORIAS*

DANIEL G. BRABERMAN
Instituto de Economía, UADE, Buenos Aires, Argentina

OMAR O. CHISARI
Instituto de Economía, UADE, Buenos Aires, Argentina

LUCIA QUESADA
Instituto de Economía, UADE, Buenos Aires, Argentina

MARTIN A. ROSSI
Centro de Estudios Económicos de Regulación-Instituto de Economía, UADE, Argentina

Abstract

In this paper we address two important issues for the young pension fund industry in Argentina: (i) How can individual funds be ranked according to their efficiency? and (ii) How have recent regulations –mainly, limiting the use of promotion for transferring members and allocating residual members not according to market shares but evenly among the funds- influenced costs? Panel data are used to estimate a cost frontier and relative efficiency is defined accordingly as the distance between firms' actual costs and the frontier. We find that regulation has increased total costs but has not modified relative efficiency to a significant extent.

* Los autores agradecemos las observaciones y comentarios de Salvador Valdés-Prieto y de Martín González Rozada en etapas previas de este trabajo. El resultado final, que ellos no observaron, es de nuestra exclusiva responsabilidad.