Innovations in Retirement Financing

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Chapter 13

Risk Management Through International Diversification: The Case of Latin American Pension Funds

P. S. Srinivas and Juan Yermo

> There are some investors who have a rooted prejudice against all foreign investment. This attitude is highly patriotic, no doubt, but like every other fancy, it has to be paid for. (*The Investment Registry,* London, 1904)

Much of this volume focuses on retirement issues in developed nations, particularly the United States. In contrast, the present chapter offers a different international dimension by focusing on retirement issues in Latin American old-age systems. This topic is of keen interest because many Latin American countries have instituted privatized mandatory funded defined contribution systems in the last two decades, and in the process they are seeking better ways to manage investment risk. Finance theory argues for international diversification of pension assets as a useful risk management tool, an argument particularly relevant in the context of emerging markets with a limited set of domestic investment opportunities. Nevertheless, with the exception of Chile, few pension funds in Latin America invest in foreign assets. Our goal in this chapter is to offer empricial evidence of the potential for improvement in risk-adjusted returns for Latin American pension funds, achievable through international investment. We show that restricting international investments imposes costs on pension stakeholders in terms of lost returns and higher levels of risk per unit of realized return.

Our discussion begins with a brief overview of the international pension reform context. Next we describe the main arguments for and against international diversification, followed by an overview of the private pension systems in Latin America and the regulatory environment under which they operate. Subsequent to a description of the data and methodology used for the analysis, we evaluate the gains from international diversification from

the perspectives of investors in both developed and developing countries. Last we focus on pension fund performance under alternate investment strategies. We employ a standard mean-variance framework, market data from 1976–99, and risk adjusted returns as the measure of benefits. These indicate that pension funds in three Latin American countries with the longest history of private pension funds—Argentina, Chile, and Peru—would have benefited from diversifying into international markets. We conclude that, in these countries, pension funds could have achieved higher risk adjusted returns than they actually did by investing in international assets. Relaxing international investment restrictions would provide avenues for better risk management. In countries that do allow such investments, pension funds should look more actively into international diversification.

The International Pension Reform Context

It is well known that old-age systems in virtually every country are under stress, as they face the dual pressures of rapidly aging populations living longer in retirement, and declining birth rates reducing the pool of active workers. In a majority of countries, public pensions (or the income component of social security systems) were traditionally based on a mandatory defined benefit (DB) model where current workers pay social security taxes that finance current retirees' pension payments (pay-as-you-go; PAYG). Few public pension systems built up reserves of assets, and today most are underfunded to one degree or another.

As a natural consequence of population aging, the PAYGO DB model today confronts policymakers in many countries with highly unpalatable choices: raising tax rates, cutting benefits, or offering an entirely new framework for retirement income provision. Various countries have adopted different strategies to avert their old age crises, ranging from denial, to marginal changes, to large-scale revamping. Many Latin American and Eastern European nations, especially those where the old schemes were most under stress, have tended to adopt the third approach. This entails transforming their social security systems, generally moving from the traditional DB model to a privately managed, individual account based, defined contribution (DC) model.[1]

Latin America has been the leader in reforming old, dysfunctional social security systems, and the wide range of new DC models adopted in the region serve to spur debate in many developed economies, including those considering "privatizing" as in the United States.[2] The Latin American pension reforms have not been without their critics: for instance, Diamond (1998) eloquently argues that DB systems are the first-best design for social security systems, in light of their ability to transfer risk intergenerationally. He and others contend that a DC system is often a response to the poor implementation records of DB systems, so that their limitations should be

recognized. In a separate paper, Orszag and Stiglitz (1999) highlight several problems with the Latin American reform models, and more recently Holzmann (2000a) shows that public DB systems can provide significant risk management benefits when there is low correlation between wage growth and financial asset returns. In this chapter we take the new pension models as a given and address certain aspects of a key implementation issue, namely how to manage assets in these reformed systems.

With the change in design of the pension system from a PAYG (unfunded) to a funded one, Latin American pension funds have begun accumulating substantial amounts of assets. At the end of 1999, mandatory private pension systems in Latin America had about $70 billion in assets under management (8 percent of combined GDP). Brazil, which has a voluntary and largely employer-based pension system, had over $80 billion in assets (10 percent of GDP). Salomon Smith Barney, the investment bank, projects that Latin pension fund assets will grow to about $850 billion by 2015. Despite these optimistic forecasts, Latin American private pension funds face many challenges operating within the context of relatively less developed financial markets and weaker institutional structures (compared to those in the developed economies). Specifically, as assets under management have grown and prior experience with asset management is limited, one major area of concern has been how these funds should be invested and how risks in the process should be managed. In particular, we focus on the debate that has accompanied the issue of Latin pension funds investing (at least a part of) their assets abroad, in the developed markets.

Given that emerging markets have traditionally been looked on as investment opportunities for investors in developed countries, rather than as investors in their own right, there is little empirical work that has taken the perspective of the emerging market investor looking outwards. In theory, the issues are identical, irrespective of the domicile of the investor. In practice, as we show below, emerging market investors considering diversifying into developed markets for risk management or return enhancement see the world somewhat differently. Developed country financial markets often offer better return per unit of risk characteristics, lower transactions costs, more favorable return distributions, and beneficial correlation characteristics. For this reason, constraining emerging market pension portfolios by restricting investments to less developed financial markets will therefore be likely to expose pension plan stakeholders to higher risks. Better risk management would argue for greater international diversification.

Invest at Home or Abroad: The International Diversification Debate

In a fully integrated and efficient financial market, modern finance theory has established that the world market portfolio is the optimal risky asset to

hold.[3] Hence, at first glance, a debate over the appropriateness of international asset diversification might seem strange. Theory would argue that an investor exposed only to domestic investments should perceive that international diversification reduces risk per unit of return, achieved by investing in asset classes that are not perfectly correlated with his existing portfolio.

In line with this theory, initial empirical research indicated that there was a low correlation between U.S. and other developed market assets, as well as between U.S. and emerging market assets.[4] This research impelled U.S. pension funds to diversify into other developed country markets and, later, into emerging markets. More recently, however, new research is casting doubt on the value of international diversification, at least for U.S. investors. In bond markets, U.S. investors apparently face highly integrated international fixed-income securities markets; this integration reduces the benefits from U.S. diversification into foreign bonds. In equity markets, capital market integration has also led to an increase in the correlation between U.S. and other developed equity markets (Adrangi and Shank 1998). Furthermore, over the last three-quarters of a century, the U.S. equity market had the highest mean return of all equity markets in the world, and this return appears to be substantially higher than that of most other countries even after adjusting for volatility (Goetzmann and Jorion 1999). Other researchers have shown that U.S. investors can achieve the benefits of international diversification by investing in portfolios of domestic securities, so that gains beyond those attainable through homemade diversification have become statistically and economically insignificant (Errunza, Hogen, and Hung 1999). Correlation and covariance patterns between equity returns of the major industrialized countries are also unstable over time, and it appears that correlations tend to rise in periods of high volatility, thereby reducing the benefits of diversification (Longin and Solnik 1995). Focusing on U.S. investors diversifying into emerging markets, Blommenstein (1998) argues that the dollar returns in emerging markets over the past 20 years have not been significantly higher than those on the U.S. stock markets, but they have been much more volatile. As a result, gains are low to U.S. investors in terms of risk-adjusted returns from emerging market investments.

Turning to emerging markets, Bekaert et al. (1998) find that returns in several emerging markets exhibit skewness and kurtosis characteristics that deviate substantially from those that would be observed if the underlying return distribution were normal, and hence conclude that benefits of international diversification presented through mean-variance analyses may be biased. That analysis also provides evidence that the higher moments of emerging market return distributions change through time, making the ex ante investment decision and its ex post evaluation more difficult. Finally, some observers propose that, as with changing patterns of correlations between industrialized countries, developed and emerging market correlations also change over time, thereby reducing the appeal of investing in

emerging markets. Correlations appear highest during downturns in developed markets, but this is just when investors most need low correlations. This arises because emerging market economies often follow in the wake of developed markets, especially that of the U.S. Indeed, U.S.-emerging market correlations are much more unstable than correlations between the U.S. and other developed markets. Financial models based on historical market data may also not fully take into account the event volatility associated with macroeconomic and political uncertainty, and the less transparent regulatory and legislative frameworks of developing countries.[5] Partly in reaction to a growing number of such findings, there is a suggestion that U.S. pension funds have recently begun rethinking their international investment strategies.[6]

For other OECD countries, however, portfolio diversification into emerging country assets still appears to provide significant gains (Fischer and Reisen, 1994). Moreover, some observers have found evidence that international diversification can be most beneficial when one takes into account the whole portfolio of retirement assets, including nontraded assets such as human capital and assets in public defined benefit pension plans. In particular, Baxter and King (2000) demonstrate important risk management benefits from holding international assets, even when the gains of international diversification by themselves are low, because human capital returns are more highly correlated with domestic financial returns than with international financial returns. Hence the optimal allocation to international securities may well be higher when one considers the full set of traded and nontraded assets, than when one only considers traded financial assets.

From an emerging market perspective, objections to international portfolio investment tend to be grounded less in financial risk management theory than in macroeconomic and political economy considerations. At least in part, these arguments rely on the multiple objectives offered for social security privatization. That is, old-age pension reform in emerging economies is undertaken for many reasons, and optimization of contributor risk and return is only one (and often not the most important) of several competing objectives. In developing economies it is often argued that pension funds should be restricted from investing abroad to ensure the development of domestic capital markets, and to make sure that domestic capital resources are channeled toward domestic investments.[7] Also, research has argued that domestic market liquidity is a major link between financial development and growth (Levine and Zervos, 1998). This stance is contested by Reisen and Williamson (1997), among others, who show that there is little evidence that domestic market liquidity improves as a result of investment restrictions on foreign securities.

Another rationale for restricting pension investments to domestic markets is that many governments need to finance debt, particularly the so-called "transition debt" associated with social security reform (Corsetti and Schmidt-Hebbel 1995). In this context, private pension funds are often

required to invest in government securities so as to avoid driving up interest rates that might worsen government finances and crowd out private investment. Of course this argument does not imply that private pension funds should be required to invest *all* of their assets in government bonds, and hence this argument is silent on the allocation of assets beyond that portion that is required to be invested in government bonds.

Other reasons offered to justify limiting international investments by pension funds include the existence and necessity of capital controls in emerging markets and the importance of maintaining exchange rate stability (Fontaine 1997). Capital controls are often imposed in emerging markets to prevent capital flight and thereby to protect the domestic tax base. Often countries have justified controls on capital inflows with arguments that such flows may destabilize or accentuate the instability of financial systems. Chile had controls on capital inflows for almost two decades before relaxing them subsequent to the 1997/98 crises in East Asia and Brazil. More recently, Malaysia imposed such controls during the 1997/98 East Asian crisis, although these are gradually being relaxed. It is also argued that volatile capital flows may put pressure on exchange rate stability, increasing fluctuations in both nominal and real exchange rates and consequently domestic price levels and export competitiveness. Since emerging markets are believed to be less able to withstand the impact of such shocks, preventing domestic institutional investors such as pension funds from adding to these pressures has been a priority. In turn this has implied imposing strict limits on their international investments.

Against this backdrop—mixed evidence on benefits of international diversification for U.S. investors and objections to international diversification by emerging market investors—are there good financial reasons why Latin American private pension funds should invest abroad? Is there any evidence that diversification from an emerging market portfolio into one including developed market assets is advantageous? Would investment risks facing pensions be better managed if the pension funds were allowed to invest more abroad? We address these issues next.

Privatized Latin American Pension Systems

As noted above, eight Latin American countries have implemented fundamental reforms of their social security systems to date, moving from publicly managed DB systems to privately managed DC plans; additional countries are currently moving in the same direction. These new pension funds are accumulating assets at a rapid rate and are expected to continue their growth in the medium term (see Table 1). Unlike mature systems in developed countries, where most of the asset growth occurs due to investment returns, the major source of asset growth in these much younger pension systems of the Latin countries is, and will continue to be, fresh contributions.

Table 1. Assets Managed by Private Pension Funds in Latin America

	Assets Under Management (US$ million)		*Assets Under Management/GDP (%)*	
	1998	*1999*	*1998*	*1999*
Argentina	11,526	16,787	3.9	5.9
Bolivia	333	592	4.0	7.0
Chile	31,146	34,501	43.9	53.3
Colombia	2,119	2,887	2.4	7.3
El Salvador	47	213	0.4	1.7
Mexico	5,730	11,430	1.4	2.3
Peru	1,713	2,406	2.7	4.1
Uruguay	374	591	1.9	2.8
Total/Average	52,988	69,407	7.6	10.6

Source: Authors' calculations using data from various pension fund, national bank, and investment house sources.
Note: Local currency equivalents are converted to US$ using year-end exchange rates. The overall average assets-to-GDP ratio is the arithmetic mean of the individual country figures.

While future asset growth in these systems is clearly on an upward trend, there is more uncertainty regarding the performance of this new pension fund industry. Past performance by Latin pension funds, averaged across all pension funds in a country, has been claimed to be good by many policymakers and practitioners because of high (relative to developed countries) real returns (see Table 2). But relative to market benchmarks, arguably a more relevant comparison, the performance of Latin private pension funds has been mixed, with relative pension fund performance being affected by choice of both benchmarks and time periods (Srinivas and Yermo, 1999).

In the three countries with the longest running private pension systems — Argentina, Chile, and Peru — private pension fund returns gross of management fees have been both lower and more volatile in recent years (see Figure 1 and Table 3). Chilean pension funds' nominal gross returns were about 24.5 percent (about 11.2 percent in real terms) during January 1982–December 1999. Further, dividing this sample period into two equal parts (January 1982–December 1990 and January 1991–December 1999) reveals that average annual returns were higher in the first period (31.3 percent) and lower in the second, more recent, period (17.6 percent). Recent returns were also more volatile, with a standard deviation of 7.33 percent as compared to the volatility in the earlier period of 4.95 percent. The null hypothesis of equality of mean returns can be rejected at the 1 percent confidence level. Similar results hold for Argentina and Peru, although the time frame during which these private systems have operated here is shorter than in Chile.

This pattern of pension fund performance can be explained, at least in

TABLE 2. Latin American Pension Fund Returns from Inception to Year-End 1999 (%)

Country	*Year of Inception*	*Nominal Return Since Inception*	*Real Return Since Inception*
Argentina	1994	12.97	12.46
Bolivia	1997	15.11	9.24
Colombia	1994	28.34	9.08
Chile	1981	27.40	11.20
El Salvador	1998	12.94	14.09
Mexico	1997	30.24	9.65
Peru	1993	16.80	7.28
Uruguay	1996	21.54	7.94

Source: Authors' calculations using data from various pension fund, national bank, and investment house sources.
Note: Colombian pension fund returns measured since 1996 only; El Salvador returns correspond to calendar year 1999. All historical returns correspond to the geometric mean over the sample period. Average industry nominal returns calculated by weighting each pension fund return by its assets under management at the end of the period. Real returns are obtained by deflating nominal returns by the national consumer price index or by related price indices (e.g., the "unidad de fomento" in Chile, the "unidad reajustable" in Uruguay). Returns are gross of fees, i.e., administrative costs of managing pension assets are not deducted from returns.

part, by the fact that in the early stages of the introduction of these new systems governments sought to ensure that these funds showed positive returns, in order to establish system credibility. Toward this end, pension fund regulations were tight and investments were largely in government bonds that paid extremely high interest rates with low price volatility. Over time, as pension systems became more established, investment regimes were gradually liberalized, allowing pension funds to invest in a broader range of assets. This exposed them to more sources of volatility. Concurrently, as these economies became more stable, interest rates on government bonds fell, which in turn affected pension fund returns as a result of their large allocation to these bonds (see Table 4). Most recently, many Latin American domestic financial markets have been quite volatile due to the East Asian and Brazilian crises; these too have been a proximate cause of the decline in pension asset performance. These trends in performance provide a good motivation for these pension funds to examine alternate avenues—such as international diversification—to enhance performance.[8] Indeed, in Chile, pension funds have increased their exposure to foreign securities (mainly U.S.) in recent years (see Table 5). By December 1999, Chilean pension funds held 13.4 percent of their aggregate portfolio in foreign assets, up from zero at the system's inception.[9]

These new Latin American DC pension systems expose pension assets to a number of risks, so governments in these countries have often strictly regulated the pension fund management industry's structure, performance,

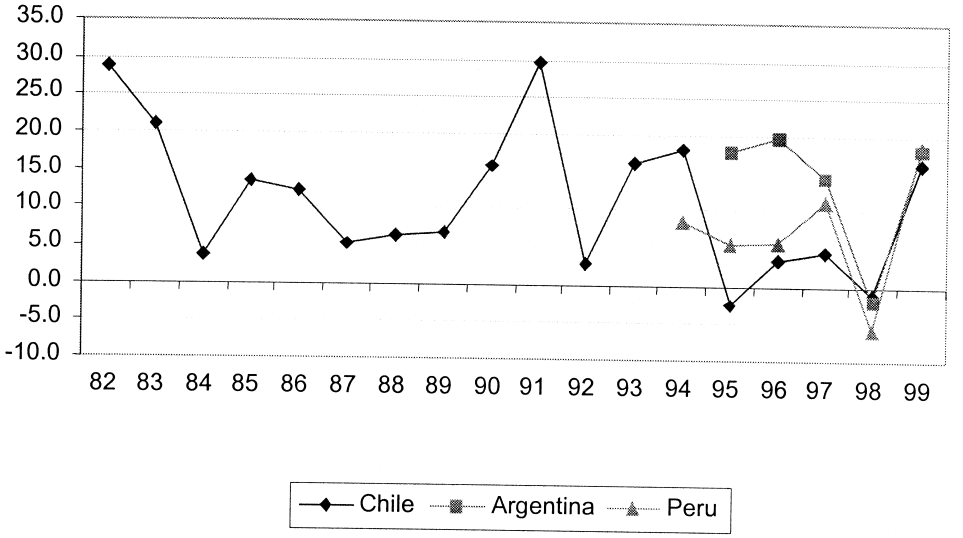


Figure 1. Realized annual pension fund return in Chile, Argentina, and Peru, percent per year from inception to year-end 1999. Source: Authors' calculations using data provided by Asociación Internacional de Organismos de Supervisión de Fondos e Pensiones (AIOS, the International Association of Pension Supervisors). Average industry nominal annual returns calculated by weighting each pension fund's annual return by its assets under management at the end of the year. Real returns are gross of fees; administrative costs of managing pension assets are not deducted from returns.

and asset allocation practices. Typically, industry structure is regulated through the establishment of fund management industries consisting of competing pension funds distinct from other financial institutions and new entrants into the financial system. This financial structure has been offered as the solution to the often poor record of performance and management in the preexisting financial services sector. Reflecting the fact that pension systems in Latin America are mandatory, countries have imposed strict performance criteria on the pension funds. The general structure of these requirements is that all pension funds are required to provide returns within a band around the ex post industry-average return. Penalties apply for underperformance, while "excess" returns are sequestered as a reserve against potential future underperformance. Finally, in a majority of countries, there are also restrictions on the type of investments that can be made and limits on allocations to asset classes.

Pension fund investment regulations in most countries have a prudential objective, namely, to ensure that they do not take excessive risks by overexposing their portfolios to specific securities and issuers. Latin American countries have established prudential regulations similar to those in devel-

TABLE 3. Latin American Pension Fund Mean Annual Returns and Standard Deviation

	Argentina	*Chile*	*Peru*
Time period of complete sample	Aug. '94–Dec. '99	Jan. '82–Dec. '99	Aug. '93–Dec. '99
Mean annual return	12.69	24.49	16.90
Standard deviation of returns	8.54	6.55	5.49
Time period of first sub-sample	Aug. '94–Mar. '97	Jan. '82–Dec. '90	Aug. '93–Oct. '96
(M1) Mean annual return	17.37	31.37	21.46
Standard deviation of returns	4.81	4.95	4.02
Time period of second sub-sample	Apr. '97–Dec. '99	Jan. '91–Dec. '99	Nov. '96–Dec. '99
(M2) Mean annual return	8.15	17.62	12.21
Standard deviation of returns	10.94	7.33	6.45
t-statistic for null hypothesis of M1=M2	1.28 not significant	4.66 significant at 1%	2.17 significant at 5%

Source: Authors' calculations based on data supplied by Asociación Internacional de Organismos de Supervisión de Fondos de Pensiones (AIOS, the International Association of Pension Fund Supervisors).
Note: Data for Chile begin in January 1982, which was the first full year of operation. Panel A presents the performance of the pension funds since inception up to December 1999. For each country, the time since inception of the private pension funds up to year-end 1999 is divided into two equal halves to assess change in performance over time. Panel B presents the mean and standard deviation of pension fund returns in the initial period since inception and Panel C, the same data for the more recent period. Panel D presents the results of a t-test for equality of means of the two time periods, assuming different variances. The null hypothesis of equality of means can be rejected for Chile and Peru, but not for Argentina.

oped countries. These regulations cover single issuer and single security exposure limits and also require that fixed income investments be of a minimum risk rating. For example, in Chile, prudential regulation requires pension funds to limit their investments in a single issue of fixed income securities to seven percent of their portfolio and their investment in the equity of a single issuer to five percent of their portfolio. To avoid conflicts of interest, the limits are set lower for issuers that have financial interests in the pension fund management companies. The minimum acceptable risk category for fixed income securities is BBB or equivalent. There are similar prudential rules in other countries.

In addition to these prudential rules, all Latin American countries impose quantitative restrictions on portfolio allocation by asset type (see Table 6). In Argentina, for example, pension funds are not allowed to invest more than 50 percent of their assets in government securities, while Mexico does not permit any investment in equities. This contrasts with the situation in some developed countries such as Austria, Australia, Ireland, the Netherlands, New Zealand, the United Kingdom, and the United States which largely rely on "prudent-person" regulations.

TABLE 4. Latin American Pension Fund Portfolios (%, Year-End 1999)

	Government Securities	*Financial Institutions*	*Corporate Bonds*	*Equities*	*Investment Funds*	*Foreign Securities*	*Others*	*Total*
Argentina	52.3	15.5	2.1	20.5	6.3	0.4	2.9	100
Bolivia	67.2	32.4	0.4	0.0	0.0	0.0	0.0	100
Chile	34.6	33.2	3.8	12.4	2.6	13.4	0.0	100
Colombia	43.0	40.2	13.6	3.0	0.0	0.0	0.2	100
Costa Rica	90.3	8.8	0.0	0.0	0.9	0.0	0.0	100
El Salvador	64.6	31.7	0.0	3.7	0.0	0.0	0.0	100
Mexico	97.4	0.1	2.5	0.0	0.0	0.0	0.0	100
Peru	7.1	39.3	15.4	37.1	0.6	0.0	0.5	100
Uruguay	60.1	36.0	1.9	0.0	0.0	0.0	2.0	100

Source: Authors' calculations based on data supplied by the Asociación Internacional de Organismos de Supervisión de Fondos de Pensiones (AIOS, the International Association of Pension Fund Supervisors), Superintendencia Bancaria de Colombia (the Superintendent of Banks of Colombia), and Banco Central de Colombia (the Central Bank of Colombia).

Note: Government securities include all sovereign obligations including central bank and treasury paper. Corporate bonds are obligations of the non-financial private sector and includes certificates of deposit issued by such entities. Financial institutions include bonds and certificates of deposit issued by financial institutions, cash deposits of pension funds with the banking sector, and mortgage securities. Investment funds include investments by pension funds in mutual funds and other pooled investment vehicles that, in turn, manage those assets. Foreign securities include all foreign assets denominated in foreign currency. Investments in assets denominated in foreign currency but issued by domestic issuers are included in their respective categories and are not considered foreign assets. Others include loans by pension funds to sponsoring enterprises and contributors.

TABLE 5. Foreign Investment by Latin American Pension Funds

	Chile		*Argentina*	
Year	*Amount (US$M)*	*Percent of Portfolio*	*Amount (US$M)*	*Percent of Portfolio*
1991	0	0	—	—
1992	0	0.0	—	—
1993	95.7	0.6	—	—
1994	200.7	0.9	0.4	0.1
1995	50.3	0.2	18.2	0.7
1996	146.9	0.5	8.5	0.2
1997	368.7	1.1	32.9	0.4
1998	1,753.6	5.6	28.9	0.3
1999	4,623.1	13.4	67.2	0.4

Source: Authors' calculations using data from pension fund regulators.

Focusing on regulations governing foreign investments, only three Latin countries—Argentina, Chile, and Peru—permitted investment abroad by pension funds at the end of 1999, and even here at levels much lower than either those prevalent in developed countries or levels that would follow from the relative weight of these countries in a global portfolio.[10] In Chile, foreign investment was first allowed in 1992, at three percent of the portfolio. This limit was subsequently raised to nine percent in 1995, 12 percent in 1997, and 20 percent in 1999. Each time, the full allowance could be invested in foreign fixed income securities, but only half could be invested in foreign equities. Meanwhile, Argentina has restricted this level to 10 percent since the system's inception. Again, while the full allowance could be invested in foreign bonds, only a maximum of seven percent could be invested in foreign equity. In Peru, pension funds have recently been allowed to invest up to one percent of their portfolio abroad. In terms of actual investments, only Argentine and Chilean pension funds have invested in foreign assets (see Table 5). While Chilean pension funds began investing in foreign assets in 1993, their role in the overall portfolio was minimal until 1998 and became more substantial in 1999, with over 13 percent of assets being invested abroad. One reason for this large recent increase in Chilean pension funds' interest in international assets is the poor performance of domestic markets during the East Asian and Brazilian crises. Argentine pension funds still invest a very small fraction of assets overseas.

Other countries contemplate investment abroad in their pension legislation but, as was true in Peru until recently, the relevant central bank or other regulatory authority did not permit such investments. This is true in Colombia and Bolivia, where for instance in Colombia, the limit is set at 10 percent, while in Bolivia the law permits investment of between 10 and 30 percent of the portfolio in foreign securities. In fact, in neither of these countries have

TABLE 6. Maximum Portfolio Limits for Selected Latin American Pension Funds (Year-End 1999)

	Argentina	*Chile*	*Peru*	*Colombia*	*Mexico*	*Uruguay*	*El Salvador*
Government Securities	50	50	40	50	100	Min 50	100
Corporate Bonds	40	45	40	20	35	25	30
Financial Institutions/Deposits	28	50	40	50	10	30	40
Equities	35	37	35	30	0	25	5
Investment Mutual Funds	14	10	15	5	0	0	0
Foreign Securities	10	20	1	0	0	0	0
Hedging Instruments	2	9	5	5	0	0	0

Source: Authors' calculations based on data supplied by pension fund regulators.
Note: Columns do not need to sum to 100 percent as not all limits are simultaneously binding. Limits imposed by regulators and may differ from limits set by law. Government securities include all sovereign obligations including central bank and treasury paper. Corporate bonds are obligations of the nonfinancial private sector and includes certificates of deposit issued by such entities. Financial institutions includes bonds and certificates of deposit issued by financial institutions, cash deposits of pension funds with the banking sector, and mortgage securities. Equities are self-explanatory. Investment funds include investments by pension funds in mutual funds and other pooled investment vehicles that, in turn, manage those assets. Foreign securities include all foreign assets denominated in foreign currency. Investments in assets denominated in foreign currency but issued by domestic issuers are included in their respective categories and are not considered foreign assets. Hedging instruments are derivatives such as futures and forward contracts.

foreign assets actually been permitted in the pension funds. The other Latin countries with mandatory pension fund systems, Mexico, Uruguay, and El Salvador, do not contemplate foreign investment in their pension legislation.

While foreign investment has been controversial in some developed countries, for some of the same reasons as those currently being advanced in emerging markets, these limits have been liberalized over time. For example, in OECD countries that do have statutory limits on foreign investments, the ceiling is usually above 20 percent (see Table 7).

Modeling the Gains from Diversification

To explore further the potential gains from international portfolio diversification by Latin American pension funds, we first study the issue of diversification from domestic to international markets in general. Next we examine pension funds in the three countries that have the longest histories of operating national mandatory private pension funds in the region, namely Argentina, Chile, and Peru. We use stock market indices as a measure of overall stock market performance and construct different portfolios and

Table 7. Limits on International Investments by Pension Funds in OECD Countries

Prudent person	
Austria, Australia, Ireland, the Netherlands, New Zealand, UK, U.S.	(no limits)
Iceland	no foreign investments by public-sector funds
Japan	no limits for Employees Pension Funds
Spain	no limits in other OECD countries
Asset limits	
Belgium	no investments in non-EU countries
Canada	30% limit
Czech Republic	no investments outside OECD countries
Denmark	20% limit.
Finland	20% in other EU states; maximum 5% in non-EU countries; there is also a minimum currency-matching requirement of 80%.
France	no foreign assets (insured funds)
Germany	maximum 20% in foreign assets overall; maximum 6% in non-EU equities, 6% in non-EU bonds; there is also a minimum currency-matching requirement of 80%.
Greece	maximum 20% in domestically based mutual funds, which in turn can invest abroad
Hungary	mandatory pension funds: 0% in 1999, increasing to 30% by Jan 1, 2002; voluntary pension funds: 20%; the ratio of investment in non-OECD countries shall not exceed 30% of all foreign investment.
Italy	50% limit on debt and equity securities of OECD countries traded in regulated markets; 5% limit on debt and equity securities of non-OECD countries traded in regulated markets; debt and equity securities of non-OECD countries traded in non-regulated market are prohibited.
Korea	10% limit
Luxembourg	10% in non-OECD countries
Mexico	no foreign investment
Norway	no limits
Portugal	20% limit
Poland	5% limit on foreign assets
Sweden	5–10% limit, depending on type of fund and assets concerned
Switzerland	30% global limit: 30% in foreign bonds, 25% in foreign equities, 5% in property

Source: Srinivas, Whitehouse, and Yermo (1999), Laboul (1998), OECD (1998).
Note: Investment by pension funds is not regulated in Turkey. Restrictions placed on international investments by pension funds in countries that are members of the Organization for Economic Cooperation and Development (OECD). The prevalent regulatory regimes in the countries are divided into two types. First, "Prudent person" regulation is similar to that in the United States, where there are few explicit limits on asset allocation. The second type of regulatory regime is one in which countries impose explicit asset allocation limits, usually in percentage terms, on pension fund investments.

assess their performance in a mean-variance framework. For individual countries, we use country indices from the Emerging Markets Database (2000 version) of the Standard & Poor's Corporation (S&P). These indices provide a good measure of the investment opportunities available to domestic investors in equity markets. For developed countries we use two measures: the Standard & Poor's 500 (S&P 500) index as a measure of U.S. equity market returns, and the Morgan Stanley Capital International Europe, Australia, and Far East (MSCI EAFE) index as a measure of developed-market equity returns (excluding the U.S.).[11] We also use the International Finance Corporation Latin America Investible (IFCI) returns index as a measure of investment opportunities available to U.S. investors when considering investments in the region. All data are given in terms of monthly total returns, except for the MSCI EAFE where only monthly price returns are available for the relevant time frame. We use data for each country since the inception of the respective series. For Argentina, the IFC index of monthly equity market returns is available from January 1979; for Brazil, Chile, and Mexico the corresponding starting date is January 1976 and for Peru it is January 1993. All data series end in December 1999. Corresponding to these dates, we use monthly data for the S&P 500 and the MSCI EAFE indices to construct portfolios.

Pension fund returns in Argentina, Chile, and Peru are obtained from annual reports of the pension funds and regulators in various countries, from their websites, and through personal communications. Monthly total return data are used for all countries, gross of pension fund administrative expenses.[12] Argentine pension fund return data are available from August 1994, Chilean data from January 1982, and Peruvian data from August 1993. Corresponding to these dates, we use monthly data for the S&P 500 and the MSCI EAFE indices to construct portfolios. All returns and standard deviations are calculated in the local currency of each country, since this is the relevant measure for a domestic investor. Throughout the analysis, we assume that investors are only interested in returns in their respective currencies and do not use instruments to hedge currency risk. Therefore, we abstract from currency hedging issues.[13] Since both the S&P 500 and MSCI EAFE returns are available in U.S. dollars, we convert these returns to local currency for each country using month-end exchange rates. From monthly returns, we obtain annual arithmetic returns by averaging across monthly returns and multiplying by twelve.

Emerging market financial data pose unique problems, and it is useful to keep these in mind while interpreting our results. While we have tried to use data for each country ever since these became available, some series are still too short to provide complete comfort in making inferences. The use of monthly data only partly mitigates this problem. Emerging stock markets are also very volatile and face frequent structural shocks, often as a result of shocks to the macroeconomy. While short data samples are unlikely to cap-

ture longer term trends, longer samples can put too much weight on old trends that may have been radically altered by structural shocks.

International Equity Investment: The Perspective of a U.S. Investor

To lay out our methodological approach, it is useful to first examine the case of a U.S. investor examining alternative diversification avenues for his equity portfolio. This analysis sheds light on the ongoing debate over the benefits of international diversification by U.S. investors that can then be compared with emerging market investors. To this end we construct alternate portfolios for a U.S. investor and examine the effect of diversification into emerging markets and other developed markets. The measure of benefits of diversification that we use is return per unit of risk or the *Sharpe ratio.* This measure is constructed as the arithmetic average of monthly returns divided by the standard deviation of monthly returns over the time period of interest. We examine portfolios that have incremental amounts of international assets: for example, we start with a U.S. investor investing his assets fully in the S&P 500 index with zero percent foreign assets, and then adjust from there. A first alternate portfolio has 90 percent allocation to the S&P 500 and 10 percent to the MSCI EAFE; the next has 20 percent invested in the MSCI EAFE, and so forth until the last portfolio constructed has 100 percent of its assets invested in the MSCI EAFE. For diversification into emerging markets, we consider a U.S. investor investing in Latin markets and measure returns and risk using the IFCI Latin America index.[14]

Looking first at diversification into other developed markets, we examine the argument as to whether benefits of diversification have declined as argued in recent literature. Table 8 shows that there is a clear trend of increasing returns per unit of risk to U.S. investors investing in other developed economies during 1976–89 (Panel A). International investments provided better risk-adjusted returns at all levels of foreign investment, as indicated by the monotonic increase in the Sharpe ratio. In practice, U.S. investors invested a relatively small fraction of their portfolio in international assets, but the trend of increasing returns per unit of risk is in line with the arguments presented in early literature that international diversification is beneficial.

The IFCI Latin America index was not available during this period, so no conclusion can be reached for diversification into emerging markets. However, Panel B indicates why the more recent evidence suggests that the benefits of international diversification are dropping for U.S. investors. During 1990–99, the flat or declining Sharpe ratios for all levels of diversification into both emerging markets and other developed countries implies that U.S. markets provided the highest levels of risk-adjusted returns during this period. Actual returns may have been higher in other markets, but they

TABLE 8. Impact of International Diversification on Risk Adjusted Returns

	United States		*Argentina*		*Brazil*		*Chile*		*Mexico*		*Peru*	
Percentage of Foreign Assets	*IFCI*	*EAFE*	*S&P 500*	*EAFE*	*S&P 500*	*EAFE*	*S&P 500*	*EAFE*	*S&P 500*	*EAFE*	*S&P 500*	*EAFE*
A.												
0	N/A	0.20	0.46	0.46	0.55	0.55	0.43	0.43	0.42	0.42	N/A	N/A
10	N/A	0.22	0.49	0.49	0.59	0.59	0.45	0.46	0.45	0.45	N/A	N/A
20	N/A	0.24	0.52	0.52	0.64	0.64	0.49	0.49	0.48	0.49	N/A	N/A
30	N/A	0.26	0.55	0.55	0.69	0.69	0.52	0.53	0.51	0.52	N/A	N/A
40	N/A	0.27	0.58	0.58	0.74	0.75	0.56	0.58	0.54	0.55	N/A	N/A
50	N/A	0.29	0.61	0.61	0.80	0.81	0.59	0.63	0.55	0.57	N/A	N/A
60	N/A	0.31	0.63	0.64	0.85	0.87	0.62	0.68	0.54	0.57	N/A	N/A
70	N/A	0.32	0.64	0.65	0.90	0.92	0.63	0.72	0.52	0.55	N/A	N/A
80	N/A	0.33	0.64	0.65	0.92	0.96	0.61	0.73	0.49	0.52	N/A	N/A
90	N/A	0.33	0.63	0.64	0.92	0.97	0.56	0.70	0.45	0.48	N/A	N/A
100	N/A	0.33	0.60	0.61	0.90	0.96	0.49	0.63	0.40	0.44	N/A	N/A

B.												
0	0.33	0.33	0.18	0.18	0.62	0.62	0.31	0.31	0.32	0.32	0.24	0.24
10	0.33	0.31	0.19	0.18	0.65	0.64	0.33	0.32	0.34	0.33	0.27	0.26
20	0.32	0.30	0.19	0.18	0.68	0.67	0.35	0.33	0.38	0.35	0.30	0.29
30	0.31	0.28	0.19	0.18	0.71	0.69	0.38	0.34	0.41	0.37	0.34	0.31
40	0.29	0.26	0.19	0.18	0.74	0.72	0.40	0.34	0.44	0.38	0.39	0.34
50	0.27	0.23	0.19	0.18	0.77	0.74	0.43	0.34	0.47	0.38	0.44	0.37
60	0.25	0.21	0.19	0.17	0.79	0.76	0.45	0.33	0.48	0.38	0.50	0.40
70	0.24	0.18	0.19	0.17	0.81	0.78	0.47	0.31	0.48	0.36	0.57	0.44
80	0.22	0.15	0.19	0.16	0.83	0.78	0.46	0.28	0.46	0.33	0.62	0.46
90	0.21	0.13	0.19	0.16	0.83	0.78	0.45	0.24	0.43	0.30	0.64	0.48
100	0.20	0.11	0.19	0.15	0.82	0.77	0.42	0.20	0.39	0.26	0.62	0.48

Source: Authors' calculations based on data provided by Bloomberg and Standard & Poor's Emerging Market Database (2000 version), as well as personal communication with Morgan Stanley Capital International.
Note: Returns per unit of risk for investors in six countries for different percentages of foreign equities holdings. Panel A covers 1976–89 and Panel B, 1990–99. The first row in each panel is the return per unit of risk that an investor obtained holding a purely domestic equity portfolio (S&P 500 for United States investors and the respective country index of the International Finance Corporation (IFC) for other countries). Subsequent rows represent portfolios formed in increments of 10% of two foreign assets—the IFC Investable (IFCI) Latin America Index and the Europe, Far East and Australia (EAFE) index of Morgan Stanley Capital International for United States investors and the S&P 500 and EAFE for investors in other countries. Arithmetic average monthly returns and standard deviations are calculated in the local currency of each country, the ratio of which gives the return per unit of risk.

were accompanied by higher-than-proportionate levels of risk for which investors were not adequately compensated.

In a mean-variance framework, the first panel of Figure 2 shows the performance of various portfolios during 1990–99 from the perspective of a U.S. investor.[15] Beginning with a portfolio entirely invested in the S&P 500, the curve going from left to right tracks the risk and return of a combined portfolio of the S&P 500 and the IFCI Latin America index. Each subsequent point in the curve represents an increase of 10 percentage points in the share of the IFCI index in the portfolio. As the weight of the IFCI index is increased, both the average return and the volatility of the portfolio rise. The last data point, on the extreme right, is the risk and return of a portfolio invested fully in Latin American equities; it is easy to see that the risk increases proportionately much more than the return. From top to bottom, the curve tracks the performance of a portfolio of the S&P 500 and the MSCI EAFE. This portfolio has quite different characteristics from the one just discussed. As the weight of the MSCI EAFE rises in the portfolio (i.e. going down the curve), both average return and volatility fall. The minimum volatility portfolio is obtained at about 40 percent of investment in developed markets outside the U.S. However, as shown in Table 8 above, return per unit of risk is highest for the 100 percent S&P 500 portfolio, in line with the performance of the U.S. equity markets over this period.

Similar analysis has been used by researchers to justify why diversification into foreign securities offers limited benefits, from a U.S. investor's perspective. Investment in emerging markets during the 1990s would have led to only slightly higher returns than could be obtained at home, and at a very high cost in terms of portfolio volatility. Meanwhile, investment in the more developed markets of the world could have reduced volatility, but similar risk reductions could have also been achieved via investment in the United States domestic bond markets without necessarily having to invest abroad.[16]

International Equity Investment: The Latin American Perspective

We now turn the case of Latin American investors, so as to evaluate the performance of equity portfolios of Latin investors as the share of foreign assets held in their portfolio is increased. We focus on investors in five countries: Argentina, Brazil, Chile, Mexico, and Peru. These countries are selected for two reasons. First, these are the only countries with reasonably long time series of equity market data. Second, all have private pension funds; in the next section, we shall explore the performance of the funds in the first three countries.

We consider diversification by investors in these countries into U.S. markets (measured by the S&P 500 index) and into developed markets outside the U.S. (measured by the MSCI EAFE index). These are selected because

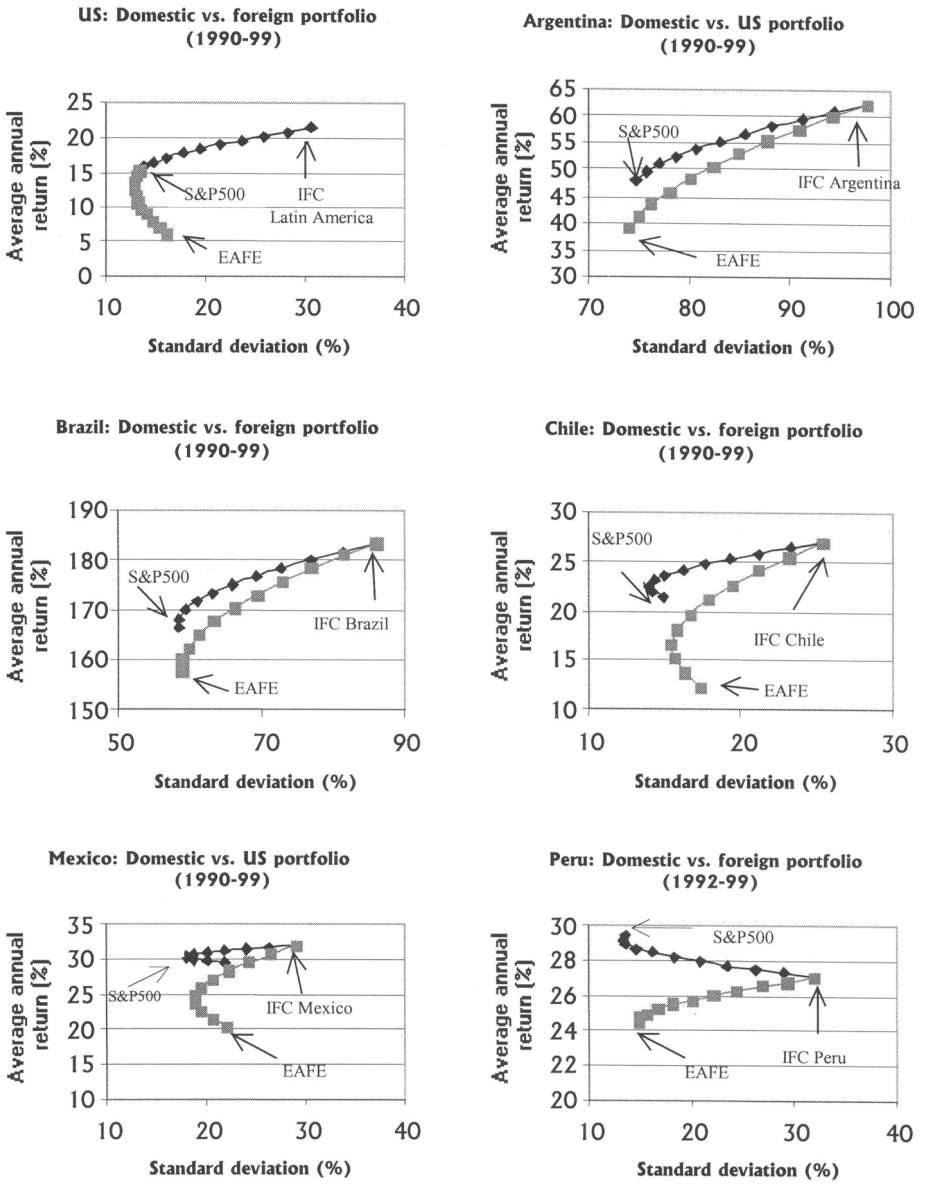


Figure 2. Impact of international diversification on risk and return: equity average return and risk. Source: Authors' calculations using data provided by Standard & Poor's Emerging Market Database (2000) version, Bloomberg, Morgan Stanley Capital International, and pension fund regulators. Note: Investors in each country begin by holding a portfolio consisting entirely of domestic assets and diversify into two foreign portfolios as indicated. All returns and standard deviations are in the domestic currency of the investor and calculated monthly and reported annually.

investments in developed countries are likely to be of primary interest to investors in emerging markets, especially when they are in the early stages of international diversification. In addition, the U.S. has the largest single equity market in the world, and hence it is a natural first choice for many emerging market investors. Data are used for the longest time period for which they are available: 1976–99 for Brazil, Chile, and Mexico, 1976–99 for Argentina, and 1993–99 for Peru. The analysis is undertaken in both a risk-adjusted returns (Sharpe ratios) format and a mean-variance framework, as in the case of the U.S. investor, above.

Table 8 displays results for the risk-adjusted returns that could have been obtained by investors in these countries. Similar to the U.S. case, two time periods are considered: pre-1990, and 1990–99. Portfolio returns and standard deviations are measured in the domestic currency of the respective country. Panel A of Table 8 indicates that during the pre-1990 period, investors in all countries (except Peru, where pre-1990 data were not available) would have benefited in terms of higher risk-adjusted returns by diversifying either into the S&P 500 or the MSCI EAFE index. The Sharpe ratio for portfolios containing international assets goes up for all countries. Argentine and Brazilian investors would have obtained much higher returns per unit of risk taken by investing their entire portfolios abroad. Brazilian investors obtained a return of 0.55 percent per year per unit of risk taken (standard deviation) by investing entirely in the portfolio of Brazilian equities represented by the IFC Brazilian index. By investing half of their portfolio in the S&P 500 and the other half in Brazilian assets, they would have obtained 0.8 percent per annum per unit of risk taken. For Chilean and Mexican investors, the Sharpe ratio increases up to some level of investment in foreign assets and then declines, indicating that while they would also have benefited from international diversification, they should have held some part of their portfolios in domestic equities. The evidence is broadly similar for the 1990–99 period (Panel B of Table 8), although the evidence is weak for Argentine investors. During the 1990s, Peruvian investors would have obtained higher returns per unit of risk by investing their entire portfolios abroad.

The last five panels of Figure 2 show the effect that international diversification would have had for investors in the five countries during 1990–99, using a mean-variance framework.[17] The construction methodology of the curves in the panels is the same as that described above. It is clear that for all countries except Peru, the highest returns were available only in the domestic equity markets, but these high returns came at the cost of high return volatility. The latter could have been reduced by investing internationally. Examining the fifth panel of Figure 2, for example, we find that investors holding their entire portfolio in Mexican equities during the period would have obtained a return of about 32 percent per year with a standard deviation of returns of about 29 percent. But by investing about 30 percent of

their assets in the S&P 500 and holding the balance in domestic equities, returns in local currency would have been about 31 percent, with much lower standard deviation of returns of about 21 percent. In terms of returns per unit of risk, therefore, investors would have benefited from international diversification. Even more striking is the case of Peru, where over the period 1993–99, domestic investors would have obtained a "free lunch" by investing in the S&P 500 index with higher average return and lower standard deviation.

An important issue to be kept in mind here is that investors in emerging markets face risk of devaluation of their home currency. In this context long term foreign currency denominated assets can provide a natural hedge against the risk of devaluation. While the breakdown of overall foreign asset returns into those due to currency and those due to the performance of the underlying assets is beyond the scope of this chapter, there is no doubt that an analysis along these lines would yield greater insights into different sources of portfolio risk and enable investors to develop appropriate management tools for these risks.

The International Investment Behavior of Latin American Pension Funds

The financial evidence makes a case for international diversification of equity portfolios by Latin American investors; next we ask how pension fund returns in three Latin American countries would have changed had they invested abroad. Similar to our previous analyses, we examine diversification of pension funds into the U.S. equity market with returns measured by the S&P 500 index and other non-U.S. developed markets with returns measured by the MSCI EAFE index.

We start with the realized mean and standard deviation of returns of industry-wide pension fund portfolios in the three countries—Chile, Argentina, and Peru—since inception to year-end 1999. Srinivas and Yermo (1999) show that for each of the three countries of interest, individual pension fund portfolios and returns are not significantly different from the industry-wide average and therefore the latter portfolio is representative of individual pension fund portfolios. Monthly mean returns of industry-wide pension fund portfolios for each country are obtained by weighting the returns of each pension fund with the assets under its management. For Chile, where the longest data series is available (1982–99), we break up the series into pre-1990 and 1990–99 in order to examine differences in performance across these time periods.

We then ask how these pension funds would have been affected under alternate assumptions regarding investments in international equities. We construct alternate hypothetical portfolios for pension funds by combining their existing portfolios with different proportions of foreign investments,

keeping the domestic asset allocation constant in proportional terms. This construction assumes that pension funds had an "optimal" asset allocation to domestic assets and therefore would make changes only at the margin if international assets were made available to them. Therefore, the results should be interpreted as those generated by a "marginal" change analysis. This construction allows us to focus on the issue of impact of international diversification as a risk management tool by pension funds, and to abstract from conjectures regarding what domestic asset allocation pension funds would have selected, if they also considered investing in international assets. In practice, of course, allocations to both domestic and international assets would be jointly determined using some form of an asset allocation model.

The patterns of returns per unit of risk under alternative assumptions regarding foreign investment appear in Table 9. One result is that during Chile's pension system's early days (pre-1990), higher risk-adjusted returns could not have been obtained by pension funds by investing abroad. The Chilean plans obtained extremely high risk-adjusted returns in comparison to all other markets (Table 8). This tends to support the view that the Chilean government worked to ensure that pension funds would obtain high returns at a low level of risk. In order to achieve this, the government provided the pension funds with access to government bonds that produced high rates of return. Stringent asset-allocation restrictions ensured that government bonds were often the largest asset class in which pension funds invested. This behavior on policymakers' parts is sometimes justified on the grounds that it is necessary to build the credibility of privatized social security systems. Over time, as the Chilean private pension system established itself, returns on domestic government bonds fell, and the pension funds were allowed to take on more risks and invest in a broader range of assets. During this process, opportunities for risk management by investing abroad increased. As a result, Chilean pensions would have obtained higher returns per unit of risk by investing a portion of their assets abroad during 1990–99, as indicated by the increase in ratios for investment up to almost about 40 percent of the portfolio in the S&P 500 and 10 percent for the EAFE index. The impact of the S&P 500 is much higher largely due to the stellar performance of the US equity market in the 1990s.

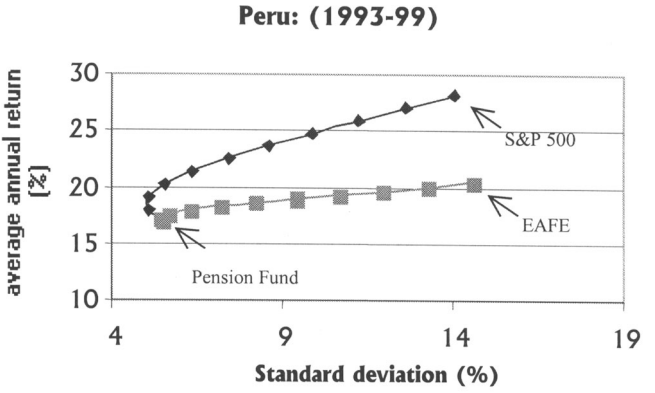
Similar results hold for Argentina and Peru. We reiterate that this analysis represents the impact of marginal changes rather than one where an asset allocation model is used to arrive at an optimal portfolio. Hence we do not suggest that any particular level of investment in foreign assets would be justified using this analysis. We do, nevertheless, find strong indication that pension fund risks could be better managed if the entire universe of investment opportunities were considered, including foreign assets.

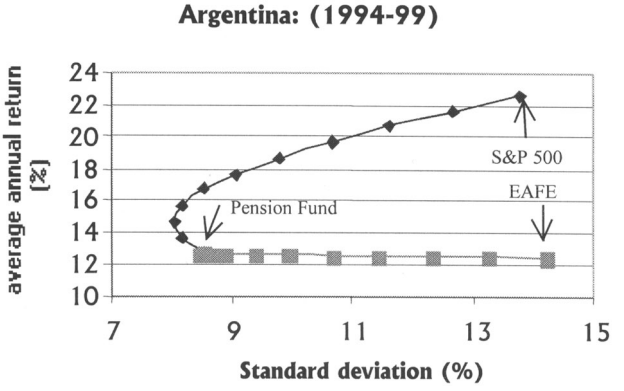
Figure 3 shows the impact of increasing levels of international equity holdings on pension fund portfolios during the 1990s in a mean-variance framework, using construction methodology similar to that described above. Here

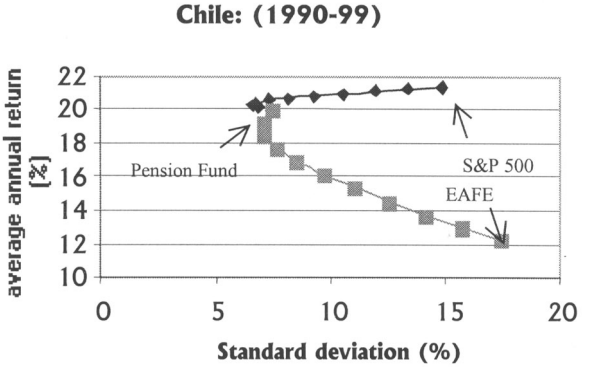
TABLE 9. Impact of International Diversification on Risk-Adjusted Returns of Pension Funds

Percentage of foreign assets in portfolio	*Chile*				*Argentina*		*Peru*	
	S&P 500 1982–89	*EAFE 1982–89*	*S&P 500 1990–99*	*EAFE 1990–99*	*S&P 500 1994–99*	*EAFE 1994–99*	*S&P 500 1993–99*	*EAFE 1993–99*
0	1.84	1.84	0.77	0.77	0.43	0.43	0.89	0.89
10	1.68	1.81	0.85	0.79	0.48	0.43	1.03	0.92
20	1.38	1.59	0.89	0.75	0.53	0.42	1.09	0.90
30	1.12	1.34	0.87	0.67	0.55	0.41	1.05	0.82
40	0.94	1.15	0.81	0.57	0.57	0.39	0.97	0.74
50	0.81	1.00	0.73	0.48	0.56	0.36	0.88	0.65
60	0.71	0.89	0.64	0.40	0.55	0.34	0.79	0.58
70	0.64	0.81	0.57	0.33	0.53	0.32	0.72	0.52
80	0.58	0.74	0.51	0.28	0.51	0.29	0.67	0.48
90	0.53	0.69	0.46	0.24	0.49	0.27	0.62	0.44
100	0.50	0.65	0.42	0.20	0.47	0.25	0.58	0.40

Source: Authors' calculations based on data provided by Bloomberg and Standard & Poor's Emerging Market Database (2000 version), as well as personal communication with Morgan Stanley Capital International.
Note: Returns per unit of risk for pension fund portfolios in three Latin American countries with the oldest private pension fund industries, for different percentages of foreign equity holdings. As Chile has the longest data series, two sub-sets of data are examined—1982–1989 and 1990–99. Monthly returns across all pension funds in each country, obtained by weighting the return of each pension fund with the assets under management are used. The first row in each panel is the return per unit of risk that the pension funds in the country actually obtained. Subsequent rows represent portfolios formed in increments of 10% of two foreign assets—the Standard and Poor's 500 index (S&P 500) and the Europe, Far East and Australia (EAFE) index of Morgan Stanley Capital International. While investing in these foreign assets, pension funds are assumed to be investing the rest of their assets according to the same asset allocation that they actually had. Arithmetic average monthly returns and standard deviations of each portfolio is calculated in the local currency of each country, the ratio of which gives the return per unit of risk.


Peru: (1993-99)
average annual return [%]
30
25
20
15
10
4
9
14
19
Standard deviation (%)
S&P 500
EAFE
Pension Fund


Argentina: (1994-99)
average annual return [%]
24
22
20
18
16
14
12
10
7
9
11
13
15
Standard deviation (%)
S&P 500
EAFE
Pension Fund


Chile: (1990-99)
average annual return [%]
22
20
18
16
14
12
10
0
5
10
15
20
Standard deviation (%)
Pension Fund
S&P 500
EAFE

it is clear that pension funds in all countries took relatively low levels of risk. It is particularly revealing to compare the location of the risk and return point of the pension fund portfolios with the corresponding performance of the domestic equity market (Figure 2). Pension fund portfolios in all countries achieved substantially lower levels of risk than the domestic equity markets and proportionately higher levels of return. But Figure 3 also shows that Latin American pension funds would have benefited by investing internationally. Not surprisingly, the analysis shows that pension funds in all three countries could have benefited by investing in the S&P 500 during the 1990s. Peruvian pension funds would have benefited by investing in the other developed markets also as measured by the MSCI EAFE, while non-U.S. markets were not as attractive to Argentine and Chilean pension funds.

These results, together with earlier evidence, indicate that Latin pension funds would gain from investing abroad in terms of higher returns per unit of risk. Consequently, international investment would be a sound risk management strategy. Although these analyses focus on pension systems in Argentina, Chile, and Peru because of data limitations, it is likely that other countries such as Bolivia, El Salvador, Mexico, and Uruguay would also have large gains from diversification into developed markets. By not undertaking such investments, these pension funds have implicitly imposed costs on their stakeholders in terms of lost returns and higher risks.

Given these benefits, Latin pension funds would be expected to exploit these benefits. But in Chile and Argentina, the two countries permitting such investments during the second half of the 1990s, pension funds largely shunned foreign markets until recently. Restrictions on foreign investment regulations in both countries were not binding up to the end of 1999, as the actual investments were far below the permitted levels. Why was this the case?

One possible explanation for low levels of foreign investments could simply be a case of "home bias" for Latin American pension funds, a bias that might gradually erode over time. Pension funds in some OECD countries have been shown to have much lower levels of foreign investments than would be optimal in a mean-variance framework, and home bias has been

Figure 3. Impact of international investments on pension fund returns. Source: Authors' calculations using data provided by Standard & Poor's Emerging Market Database (2000) version), Bloomberg, Morgan Stanley Capital International, and pension fund regulators. Note: The figure shows the impact of international equity investment on portfolio returns of pension funds in three Latin American countries. Funds in each country begin by holding the same portfolio they actually did, indicated by the point marked "Pension Fund." Funds are then allowed to hold increasing percentages of two foreign portfolios, indicated by the S&P and EAFE curves. All returns and standard deviations are in domestic currency and calculated monthly and reported annually.

documented to be a major reason as to why pension funds prefer to stay at home among developed countries (Davis, 1991; OECD 1998). Chilean pension funds do seem to be overcoming this home bias in recent years, as they boost their international asset exposure. It is more difficult to explain the lack of interest in international investments shown by Argentine pension funds, given the large gains that could have been obtained during the late 1990s.

Home bias might be exacerbated in these countries by regulations that constrain the ability of individual investors to choose pension funds that offer them the most suitable combination of risk and return (Srinivas and Yermo 1999). In the three Latin countries examined here, each pension fund manager is required to offer only one fund.[18] Furthermore, returns to the funds are subject to strict profitability rules.[19] As a result, pension asset portfolios tend to be quite similar across pension funds and contributors are constrained from selecting diversified portfolios. In particular, relative rate of return rules may create inertia in investment management strategies and make international diversification more costly for any given fund. Even if some funds in the industry were to obtain significantly better returns by investing abroad, they are still required to deposit part of the gains (the return above the maximum of a band around the industry average) into a "reserve fund" that can be drawn down in case of future poor performance. This implies that neither pension funds nor contributors benefit fully in the short run from higher returns. And pension fund managers are immediately penalized in the event of poor performance: they are required to make up shortfalls either from the "reserve fund" or from its capital, if performance is below the minimum of the band. Latin pension funds therefore have strong incentives to "follow the leader" and ensure that their investments generate the industry average return. If one of the large pension funds does not invest abroad for any reason, it is very likely that the industry equilibrium is one where the whole industry does not do so either.

Conclusion and Discussion

International diversification of investment portfolios has been recommended for pension funds in developed country markets, and it has also been shown here to benefit Latin American investors. Contributors to pension funds could have obtained higher risk adjusted returns had pension funds invested abroad. When these benefits are not taken advantage of, costs are imposed on pension fund stakeholders, be they workers, retirees, or taxpayers. International diversification is especially important for countries with a limited supply of liquid domestic financial instruments, and for those with unstable macroeconomic conditions. The presence of the latter without the former may significantly reduce the attractiveness of domestic pension fund returns.

The lesson of this research for policymakers and pension fund managers is that costs are imposed on contributors, in terms of higher risks per unit of return, when foreign investments by national defined contribution pension plans are restricted. Furthermore, those countries that currently do permit international investment need to take a closer look at all features of their regulatory framework to identify constraints imposed on the ability of pension fund managers to invest abroad and to explore ways to relax these constraints. Prudential management of pension assets via diversification of pension fund portfolios must take into account contributors' interests in bearing an optimal mix of risk and return.

Notes

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1. New funded pension systems were launched in several Latin American countries over the last two decades, including Chile (1981), Peru (1993), Argentina (1994), Colombia (1994), Uruguay (1995), Bolivia (1997), Mexico (1998), and El Salvador (1998). Some transition economies in Europe and Central Asia have also reformed their pension systems along similar lines, including Hungary (1997), Kazakhstan (1997), Poland (1999), Croatia (1999), and Latvia (2000).

2. Feldstein (1974) shows that privatization of social security would reduce distortions that payroll taxes impose on household saving and labor supply decisions. More recently, Feldstein (1998) has argued for investment of at least a portion of social security taxes through individual accounts in the capital markets. Kotlikoff (1996), among several others, supports Feldstein's conclusions. However, Geanakoplos et al. (1998 and 1999) show that the claim made by advocates of U.S. social security privatization that rates of return under a defined contribution individual account system would be much higher than under the current U.S. social security system is inaccurate.

3. See Markowitz (1959), Sharpe (1964), Lessard (1973, 1974), Adler and Dumas (1975), Dumas (1993), Solnik (1991), and Claessens (1994) for discussions of various aspects of portfolio theory and applications to international diversification.

4. Agmon (1972), Grubel (1968), Grauer and Hakansson (1987), and Levy and Sarnat (1970), among others, find that international diversification is beneficial for developed countries in terms of reducing portfolio risk and/or enhancing portfolio return. This literature tends to rely mainly on a low measured correlation between returns on international equity markets. Solnik (1974) shows that the variance of returns of a portfolio of randomly selected U.S. stocks is higher than that of a portfolio of U.S. and international stocks.

5. An example is the inability of financial models to anticipate the impact of events such as the Mexican devaluation in 1994/95 or that of the East Asian crisis in 1997/98.

6. Personal communication with some large U.S. pension funds.

7. Discussions in the legislatures of El Salvador, Chile, Mexico, and Uruguay along these lines ensured that the privatized pension funds would not invest abroad. Chile has since relaxed the rules, but international investments are still not allowed in the other countries.

8. Investment in domestic stocks is another venue for diversification. However, this may be difficult in several countries in the region due to the relatively small size of equity markets and the large size of pension funds as compared to the market capitalization. Stock and bond returns have also been shown to be highly correlated in most emerging markets, reducing the gains from diversification.

9. A similar behavior has been observed among pension funds in Singapore (Holzmann, 2000b).

10. In September 1999, Latin America as a whole formed just 28.29 percent of the International Finance Corporation (IFC)'s Global Emerging Market Index. Individual country weights for the large countries were Argentina (2.71 percent), Brazil (8.17 percent), Chile (4.70 percent), and Mexico (10.85 percent). In a global portfolio including the developed countries, the weights of these countries would, of course, be substantially lower. This implies that in order to hold a truly "world portfolio," much more than the allowed level of investments would have to be made abroad by investors in these countries.

11. Data on the S&P 500 and MSCI EAFE were provided to the authors by Bloomberg and MSCI, for which we are grateful.

12. To subtract administrative costs, we would need to develop a full actuarial and economic model combining demographic and market return assumptions, an exercise beyond the scope of the present paper. For more on administrative cost estimates see Mitchell (1999).

13. It is clear that both the mean and variance of currency return play an important role in international diversification. To the extent that hedging instruments are available for currency risk management, it may be the case that investors would benefit from hedging their currency exposure. In many emerging markets, including those being examined here, long term hedging instruments either do not exist, or they have come into existence very recently. Hence our focus on unhedged returns is reasonable.

14. Allowing the U.S. investor to diversify into a portfolio of all emerging market stocks, as opposed to just Latin America, does not materially affect our results.

15. Similar figures for earlier time periods are available from the authors.

16. Analysis of this issue is not reported here but is available from the authors.

17. Figures for the earlier period are available from the authors.

18. Chile introduced new legislation at the end of 1999 that allows the establishment of a new fund, invested exclusively in fixed income securities. In countries like Mexico, Bolivia, and El Salvador, where pension assets are invested exclusively in government bonds, an equivalent reform would be to introduce an internationally diversified fund.

19. Similar regulations exist in other Latin American countries; only Mexico and Bolivia do not impose rate of return regulations.

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