

**LATIN-AMERICAN INVESTMENT INSTRUMENTS AVAILABLE  
FOR PENSION FUNDS AND SUPPLY RESPONSE IN  
DEVELOPING INSTRUMENTS TO MEET PENSION FUNDS  
DEMAND\*\***

**Marcelo Otermin\***

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\* Chief Investment Officer of AFJP Prorenta S.A and professor of Corporate Finance at *Universidad de San Andrés*. The opinions presented in this paper are solely of the author and do not necessarily coincide with those of AFJP Prorenta S.A.

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## ABSTRACT

Pension funds have been crucial in creating and developing long-term instruments in Latin American countries, such as corporate bonds, asset-backed securities, stocks, and mutual funds. Experience gained in Argentina, Bolivia, Brazil, Colombia, Chile, Mexico, Peru, and Uruguay shows that performance has been highly diverse and, therefore, this paper examines several factors that may have exerted influence on each case. This analysis refers to evidence of existing limits to asset classes or instruments, valuation rules other than mark-to-market, importance of fiscal performance through the well known crowding out effect, shortage of local instruments as the reason for flexibilizing limits and regulations to foreign asset investment, and the supply of several pension funds with different risk profiles so that contributors may choose any fund based on their preference depending on age and risk aversion.

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# Latin-American Investment Instruments available for Pension Funds and Supply Response in Developing Instruments to Meet Pension Funds Demand

## I. Introduction

There are several research papers dealing with the relationship between pension funds and capital markets, as well as changes occurring in capital markets due to the accumulation of long term capital. Walker and Lefort (2002) describe the current status of literature on this topic, the main changes being the following:

- building a long-term corporate market (maturity/duration increase of debt issues);
- streamlining regulations and enhancing transparency (e.g., corporate governance); and
- reducing the cost of capital

The underlying idea of this paper is to examine which factors may have an impact on the composition of pension fund portfolios which, at the same time, should affect the creation of instruments designed to meet pension fund demand.

No doubt, the type of structured plan should be an important factor. One can choose between two systems, i.e. Defined Benefit or Defined Contribution. In case of a Defined Benefit Plan, the asset manager takes the risk because liabilities are fixed. This should encourage to invest in long term fixed income and, therefore, to make use of the Asset Liability Management solution. The other alternative, a Defined Contribution Plan, implies that the beneficiary takes the risk, and the goal of maximizing long-term return should be a driver to invest in stocks, at least according to experience gained in developed countries.<sup>1</sup> Latin-American countries have chosen Defined Contribution Plans.

Literature distinguishes between two investment regulation alternatives<sup>2</sup>: (a) strict Investment Rules or Quantitative Restrictions; and (b) Prudent Person Rule. On the other hand, Fernando Solis-Soberon (1999) has added a third alternative: (c) Prudent Investor Rule<sup>3</sup>. Solis-Soberon (1999) states that the first alternative is based on imposing restrictions with the purpose of excluding certain risks from investment possibilities. The second alternative considers that some asset classes are very risky and, therefore, they should be restricted or excluded; whereas the third alternative focuses on how to optimize the risk-reward frontier following the Portfolio Theory that was thoroughly studied by Markowitz (1952). The notion of quantitative restrictions is the mainstream in Latin America and, therefore, regulation is a predominant factor in analyzing instruments that can be developed for investments by pension funds.

Following the above classification, Vittas (1998) analyzes the rationale behind each regulation and emphasizes that, in case of a Defined Benefit Plan, the Prudent Person/Prudent Investor Rule is more logical because the asset manager takes the risk.

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<sup>1</sup> See Jeremy Siegel (1998.)

<sup>2</sup> Vittas (1998.)

<sup>3</sup> For Solis Soberon the definition of the first two alternatives is not consistent with the foregoing rationale and they can be compared to Quantitative Restrictions; whereas the definition of Prudent Investor Rule can be compared to Prudent Man Rule.

However, in Defined Contribution Plans, Quantitative Restrictions are justified because the fund member takes the risk.

Regulations include three types of restrictions: (a) on eligible securities, which are usually required to be listed in organized markets, have minimum risk rating and liquidity level; (b) on issuers, since there is usually a ceiling on the proportion of the securities issued by a company that a given fund can hold or the proportion of assets in a fund's portfolio issued by the same institution; and (c) on asset classes.

In general, Vittas states that accepted restrictions are type (a) and type (b), and discussion focuses on asset classes. He proposes to flexibilize limits on equity investments to the extent that pension funds enlarge their size and the capital market is streamlined and rendered more efficient. Rocha, Hinz and Gutierrez (1999) also agree on this issue and hold similar views in that restrictions could initially be justified in emerging countries, but should be more flexible through time, in line with the development of institutions and instruments, an improvement in market depth and liquidity, and an enhancement of the legal framework. All this should be done always having in mind a long-term goal, i.e. to adopt so-called Prudent Person Rule.

Another issue relates to foreign asset investment. This has been subject to severe restrictions in Latin America but in developed countries, where restrictions are non-existent, we can notice the "home bias" phenomenon.

Bearing in mind the discussions under study, the core idea will be that the regulatory framework is crucial for eligible assets; there being a possibility to generate "arbitrages" or situations which force corner solutions. Fiscal performance also affects the composition of pension fund portfolios through the well-known "crowding out" effect, thereby increasing securities holding by the public sector to the detriment of the private sector.

Countries under study are Argentina, Bolivia<sup>4</sup>, Chile, Colombia, Peru, Mexico, and Uruguay -all of them under a mandatory Defined Contribution System; and Brazil<sup>5</sup>, a case of voluntary Defined Benefit System.

Factors examined in this paper are as follows:

- A. Regulation of asset classes / instruments:** Several Latin-American countries have chosen quantitative restrictions as a rule, such regulations being crucial for eligible securities and, therefore, the ensuing supply to be created. If the aggregate amount of limits exceeds 100%, it will imply more flexibility in the selection of instruments<sup>6</sup> and, therefore, it should have a positive impact on the development of new alternatives.
  
- B. Valuation rules other than "mark to market":** In presence of valuation rules that are different from "mark to market" procedures, we should notice that the weight of the participation of any asset class or eligible instrument increases or decreases consistently with the degree of overvaluation/undervaluation that may

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<sup>4</sup> Individual Capitalization Funds.

<sup>5</sup> Closed-End Pension Funds.

<sup>6</sup> See Robert Palacios (2003).

be created until reaching the maximum/minimum level permitted by regulation. The rationale is also valid if the rule mitigates the specific asset volatility by accounting for it at a lower level than market volatility. .

An alternative approach examined by Ricardo Shefer (2001) for Argentina sustains that due to the existence of relative to average performance regulations, pension funds do not substantially invest in low-liquidity instruments whose valuation criteria segregate them from the evolution of systemic risk.

- C. Fiscal performance:** The presence of public indebtedness should exert influence on the composition of pension fund bond portfolios. The underlying idea is that sound public finance, with low level of indebtedness and/or fiscal deficit, should generate low level of public assets in the fund portfolio and high weighting of the private sector, the opposite being valid.
- D. Number of managed funds:** The number of pension funds is usually associated with the possibility of offering different risk alternatives and the member choosing on the basis of his/her profile. A great number of funds implies the need for a wider range of assets in order to build well-diversified portfolios with different risk levels. This should result in a greater number of instruments and/or increased growth in alternatives.
- E. Investments in foreign assets:** Most countries have imposed restrictions on foreign asset investments as a tool to retain savings accumulated in pension funds and allocate them to domestic financing of the economy; particularly, deficit arising from transition in the public sector, and development of the local capital market to favor growth in the economy. However, from the viewpoint of fund members, this implies concentration of their savings risk within the country, and major contingent losses resulting from crises that may probably affect these; all of which proved to be very deep in the past.

From the standpoint of fund managers, literature has analyzed the "home bias" phenomenon whereby fund managers tend to invest a larger proportion in domestic assets than they would be expected to do if an unrestricted portfolio model be applicable. However, Raúl Susmel (1998) found that, as the returns of Latin-American markets have fatter tails than developed markets, especially the lower distribution tail, by applying the "safety first" principle, we can have an optimal portfolio with a 15% stake in Latin American markets. Consequently, it seems logical to increase foreign asset investment limits for pension funds.

On the basis of the foregoing analysis, we should find evidence supporting that an increase in foreign asset investment answers to an improvement in fiscal performance, shortage of instruments on the local market, and subsequent flexibility of regulations.

## II. Investments evolution and development of new instruments

- A. **Argentina:** Table 1 shows the evolution of portfolio composition. Investments were dominated by government bonds in the whole period, but the second and third asset classes were time deposits, equities, and foreign assets. We can distinguish three periods: (i) until 1998, before the Russian crisis and Brazilian devaluation; (ii) 1998-2001; and (iii) since 2002 devaluation.

In the first period, corporate bond investments were significant, reaching 8.7% in 1995. Time deposits increased by 24.4% in 1997, as a result of valuation regulations on variable interest rate time deposits, as we shall see later. The most important innovations were the development of agricultural funds, real estate financing, and securitized instruments.

Agricultural funds were small scale instruments developed for private investors and adjusted to institutional investor requirements. Their initial duration was one year. These funds comprised land leases of 10,000/25,000 hectares diversifying areas and crops and selecting the best land sites. Investment encompassed sowing the lands, subsequent harvesting, product sale and distribution of resulting funds to investors. For a better tax optimization, these funds ended up having a 3 to 5 year duration with greater stability in terms of land leasing and input utilization. The investment volume was always small due to a lack of fund performance, likely attributable to scarce professional management for larger scale investments.

Securitized instruments evolved mainly as consumer and pledge loans for the purchase of vehicles and agricultural equipment by small producers. Given that these instruments were nonexistent prior to pension funds, great conversations went on with investment banks to adjust these instruments to investor needs. However, in many cases it was a matter of portfolio sales by some banks with liquidity needs and therefore lacked the necessary continuity to generate a track record that would enable a gradual scale increase.

As far as mortgage instruments are concerned, these worked well for financing housing construction and office buildings. Through an initial land mortgage, and after construction work was in progress, the constructor received financing at various stages of the work.

Equity investment was significant during this period accounting for 21.5% of total funds, but there was no major activity in terms of initial public offerings. Primary issues totaled US\$1.8 billion between 1995 and 1997, but were concentrated in 11 issuers, only five of which complied with risk rating requirements in order to be purchased by pension funds. Pension funds bought, on average, an approximate 20% of what was issued by those five.

In 1997 CEDEARs were created which—as we will see later—allowed the start of foreign equity investments and promoted the creation of foreign equity funds.

Following the Asian crisis, country risk premium as measured by EMBI+ was always above 500 basis points with peaks reaching 1700 basis points during the

Russian crisis. Such capital costs resulted too high for companies and thus some exited the market. There was a significant increase in government bond investment both by the federal government as well as local governments. Investment in corporate bonds systematically dropped and there was an increase in structured bond participation, the majority of which had government bonds as underlying assets.

Despite the poor investment atmosphere, two important projects were started, the first forestry fund and an office building development, both amounting to US\$70 million.

The beginning of the third period following devaluation shows a substantial increase in foreign asset investment reaching almost 10% given that, as a result of both government and private sector default, it was impossible to continue investing in government bonds, the financial system was very weakened<sup>7</sup>, and most companies were facing financial difficulties.

Currently, the most dynamic sector is that linked to exports, thus corporate bond<sup>8</sup> investment slightly increased. In addition, there is a process underway to finance farmer inputs through securitized instruments. Also apparent is an increase in consumer loan securitization owing to the fact that important retail chains are using this instrument to get direct financing from pension funds, contrary to what took place during the first years the system was in place. Amounts are still not significant yet show the trend.

Regulation on limits has not restricted the development of new instruments. The sum of maximums —excluding the government sector— started off at 181% and later increased to 260%. At first, the Superintendency was able to reduce legal limits by 30% and it did just so. In 2000, it cancelled such reductions and reorganized asset classes.

- B. **Bolivia:** In terms of limits regulation, legislation poses a certain degree of ambiguity since it specifies limit ranges for most instruments stating that “These limits shall be fixed through the SPVS Administrative Resolution approved by the Prudent Financial Rules Committee (Spanish acronym CONFIP) for securities issued by local issuers, and by the Board of Directors of the Central Bank of Bolivia for securities issued by foreign issuers, within the following range...”.

As such limits were never established, fund managers construe the rule to mean that minimum limits prevail. Considering such interpretation, the sum of limits, excluding government, reaches 145%, a figure which is slightly lower than that of countries with more flexible regulations but that in and of itself does not affect free portfolio composition.

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<sup>7</sup> Following the asymmetrical pesification which implied the payment of deposits at an exchange rate of AR\$ 1.40 per dollar and collection of loans at an exchange rate of AR\$ 1.00 per dollar — partly offset by the government— investments in time deposits dropped to minimal levels since the beginning of the system.

<sup>8</sup> What must be considered is that debt rescheduling continues as a result of default, all of which reduces the value of corporate debt investments.

Initially, the total amount of funds was invested in government bonds and later, —for a two-year period— what was not compulsorily invested in government bonds was earmarked to time deposits. It was only in 2000 that the corporate bond market evolved. The most important economy sectors —and mainly companies with strategic economic positions— were the first to resort to the market in search of resources. Owing to the amounts required issues had to be geared toward institutional investors. Given that there are two fund managers and each is allowed to purchase up to 40% of an issue, companies base their issue on pension fund requirements thus ensuring their success. The corporate bond market has increased up to its current 16% which enabled the absorption of liquidity invested in time deposits.

In 2002, small-sized companies were able to access the market by issuing securitized instruments as an alternative in order to meet pension fund minimum risk rating requirements. Issues are still for small amounts but it is likely that the market will continue to evolve.

Although equity investments are allowed, this alternative has not been used much due to lack of liquidity. What has been perceived towards the end of 2003 is the inclusion of an investment of 8.6% of the fund. This was the result of a sale made from the Collective Compensation Fund (Spanish acronym FCC).

The FCC is a fund whose assets comprise stock from companies privatized between 1995 and 1997. These companies belong to the hydrocarbon, energy, telecommunications, airline, and railroad sectors. Such fund is responsible for the benefits of the old government system which it pays out from dividends collected from investments made. At the end of 2003, dividends were insufficient for benefit payment and the government therefore decided to make payments from the proceeds of part of the stock sale to pension funds, notwithstanding rejection by fund managers. There is a draft bill establishing that the FCC shall repurchase stock within a 5-year term.

- C. **Brazil:** This country has one of the most flexible investment regulations. The sum of non-government instrument limits totals 274%. In 2003, new alternatives were included thus expanding the possibilities of investing in mutual funds, especially in those funds investing in credit instrument rights.

When state-owned companies began their privatization process, the government created pension funds whose sponsors were precisely those companies. State-owned companies' pension funds have enjoyed over 60% of the closed fund market share. Despite not being able to purchase more than 20% of a company's equity, various funds are majority shareholders of privatized companies and, as a result, equity investments have remained high, from close to 40% in 1994 to almost 30% in 2003, including investments in variable income funds.

As illustrated in Table 1.C, the main instrument developed, although not new, have been investment funds. Investment rose from 12% in 1994 to almost 55% of total funds in recent times. The fact is that pension funds must pay taxes on financial transactions (provisional contribution for financial moves – Portuguese

acronym CPMF) whose rate is 0.38%, whereas investment funds are exempt from such payment. It is clear that pension funds find it more profitable to funnel their fixed and variable income investments paying investment fund management fees rather than paying the CPMF for each transaction.

Real estate investment was significant at the onset and comprised direct investment in hotel or shopping center projects. As a result of their lack of transparency such investments were highly questioned, coupled with low returns. Therefore, funds similar to US REITs evolved constituting a more transparent instrument to channel pension fund investment.

Futures, options and structured transactions are allowed and are solely used as portfolio hedging. Legislation in force does not allow its use for speculative transactions.

Congress is examining the Public Private Partnerships (PPP) alternative whereby the State analyzes project feasibility, looks for financing sources and structures them according to private investor needs —where pension funds are comprised.

- D. **Colombia:** Investments have featured a constant increase in the public sector, from a minimum of approximately 21% up to almost a current 50%, which covers the maximum authorized limit. Within this setting, the only other investments that have increased have been those in foreign assets which, as a whole (fixed plus variable income) have exceeded 7%. This enabled the development of swap and forward hedging transactions for the purpose of covering positions in foreign currency.

In 1996, prior to government bond investment growth, investments in bonds issued by the financial sector totaled 36% of funds. This was the result of a high consumption cycle and real sector expansion projects funded greatly with bank loans, all of which drove the financial sector to search for resources by issuing bonds where pension funds massively invested in. Until 1998 the limit on instruments issued by the financial sector was 50%, but in 1999 a gradual reduction was decided on up to 30% owing to the fragile nature displayed by the financial sector. By the end of 1998 investments in the financial sector amounted to 56.5% and in 2001 dropped to less than half (25.7%). This limit reduction could have affected the weakened financial sector which later experienced a systemic crisis.

An important part of investments in instruments issued by the financial sector was made in securitizations reaching 13.6% of funds in 1996. These investments originated following the new housing market boom which took place in the early '90s. To finance the demand for construction and home purchase resources, mortgage banks issued securitized instruments and pension funds were the greatest buyers of such instruments. The financial crisis strongly impacted mortgage debtors which made investors lose trust resulting in a drop in pension fund participation to a low 2.5% in 2001<sup>9</sup>.

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<sup>9</sup> In 2001 Securitizations were reclassified as Mortgage Bonds, Financial and Non Financial Securitizations.

- E. **Chile:** It has the oldest defined contribution system which was started in 1981. With over 20 years experience it offers a great variety of innovations vis-à-vis other countries, considering that investments were initially very restricted with a significant concentration in time deposits, government bonds and mortgage bonds.

Instrument creation and development for pension fund purposes went hand in hand with the gradual investment regulation flexibility<sup>10</sup>, contrary to other countries which started the system off with a broader scope of alternatives.

It was probably institutional protection mechanisms against inflation such as the “Foment Unit” (Spanish acronym UF) which enabled the creation of mortgage bonds providing low risk yet requiring long term currency.

The experience of other Latin American countries devoid of a “UF” unit shows the difficulty in developing such instruments given that local currency does not offer the investor appropriate protection. On the other hand, instruments denominated in dollars cannot serve that role either since exchange rate fluctuations are often significant and hence generate difficulties for both parties.

Corporate bonds were the second type of instruments to be developed. At the beginning of the ‘80s, following the debt crisis, the market was very small. Yet, towards the end of the ‘80s, investments were close to 10%.

In 1985, equity investment was approved and since then, pension funds increased their participation reaching investment levels in excess of 30% of funds at the beginning of the ‘90s.

In 1990, mutual funds were allowed which enabled real estate and equity fund investments. As of the mid ‘90s these investments hold a 3% share.

Another important regulation breakthrough was allowing for investments in foreign assets. In 1992, fixed income was authorized comprising up to 3% of investments and limits were consecutively increased to reach an approximate 24% of funds in 2003.

- F. **Mexico:** As it happened in Chile, authorized investment alternatives were initially very restrictive. Besides the possibility of investing up to 100% in government instruments, it was permitted to invest up to 35% in corporate bonds, and up to 10% in banks.

Additional restrictions such as the one setting forth that at least 51% of the fund must be invested in instruments linked to or protected from inflation, or that at least 65% must be invested in instruments whose term is shorter than 183 days or that the floating interest rate must be reviewed earlier than 183 days, forced government to issue these instruments to enable funds to comply with investment regulations. Therefore, investments in government instruments were close to 97% during the first years.

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<sup>10</sup> See Table 2

These regulations later promoted corporate bond issues with inflationary protection for 20 and 30 years, and bonds with 3 and 5 year maturity at variable rates and floor according to inflation values.

The CONSAR [Spanish Acronym] has recently flexibilized investment regulations, removing limits on instruments and replacing them for those based on risk rating. The latter enabled a significant increase in private sector investments which exceeded 15% in 2003.

Table 3 illustrates SIEFOREs' participation in primary corporate bond issues during the last 3 years, rising to almost 50% in 2001.

- G. **Peru:** This is virtually the opposite case of what happened in most countries that implemented defined contribution systems. In 1996, there were no government bonds available and fund managers had to find other investment sources. The main investment in excess of 30% were equities, in spite of having a concentrated and rather illiquid market. To illustrate this, simply consider daily trading volume which is currently close to US\$4 million, after having experienced peaks of US\$15 million.

Other two groups evolved as a result of pension funds: that of corporate bonds<sup>11</sup>, —an almost nonexistent market— and leasing and subordinated bonds among those issued by financial institutions.

Leasing bonds were much used by banks to finance leasing transactions. These transactions enable companies to access significant tax benefits. On the other hand, banks use subordinated bonds to record them as capital in light of central bank requirements.

When Brady Bond investment was authorized in 1998 there started a cycle of government investment increase amounting to almost 20% in 2003. In addition, also as of 2000, investments in foreign assets began fulfilling the 9% quota, recently expanded to 10.5%.

- H. **Uruguay:** This has been the most restrictive case in terms of limits regulations. Initially, only up to 20% was allowed to be invested in instruments not issued by the Uruguayan government, but including securities issued by the Uruguayan Central Bank and Uruguayan Mortgage Bank. This limit gradually expanded and increased up to 70%, although there is another 40% limit in place excluding government instruments and time deposits.

Within this framework, investments were controlled by government-issued instruments. Initially, the corporate bond market evolved with investments reaching almost 6% of funds, but companies were heavily indebted in dollars and following the 2001 devaluation incurred default. The market is currently closed for corporate issues and investments have dropped substantially to a low 1%.

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<sup>11</sup> See Walker and Lefort (2002), page 36.

The only new instruments are Certificates Representing Investments (Spanish acronym CRI) which are securitized instruments promoted by the Ministry of Cattle Breeding, Agriculture and Fishing. These instruments were initially used to finance milk production in 2002 and later rice production. Investments currently exceed 4% of funds.

### III. Factors that could have affected the development of new instruments

#### A. Valuation Rules

Countries that currently have or have had valuation rules that generate asset prices which are different from market prices are as follows: Argentina, Bolivia, Brazil, Colombia and Uruguay.

**Argentina:** In 1994, since the beginning of system implementation, national government securities valuation was allowed to be held constant up to 25% of the fund. According to this rule, the valuation generated was similar to security purchase price plus internal rate of return (IRR), called investment valuation. This enabled holding securities in the account until maturity or to sell them four years after purchase date if market price was higher than book value.

The clear-cut incentive was to choose government securities of a greater yield—and therefore greater volatility—and recording them as a time deposit. Chart 1 illustrates investments always around 25% of the fund and even with an increase of up to 30% when rules expanded the limit to the latter percentage in August 1998. This concluded towards the end of 2001 as a result of the exchange of government debt for national government guaranteed loans.

A similar method was allowed for Rural Mortgage Bonds issued by *Banco de la Nación Argentina* for up to 4% of the fund. Yet, it was never able to cover the maximum allowable percentage since it comprised a single security with reduced market liquidity and a reduced issued amount.

Another piece of legislation that generated a strong portfolio change referred to variable rate time deposits valuation. Typically, these deposits allowed recovery of principal at maturity and charging variable interest rate based on an implicit strategy of financial asset options on market indexes. Valuation comprised adding principal to be received at maturity plus the implicit options strategy intrinsic value, thus generating a clear deposit overvaluation. As a result, in November 1996, when banks started offering this investment alternative, an investment cycle began later ending in March 1998 with 25% deposits at variable interest rate with regard to the fund (See Chart II). Valuation regulations changed as of that date whereby the principal was estimated at present value and the options strategy valued pursuant to Black & Scholes. Therefore, book value approached market value and there was no further incentive. New investments dropped to insignificant amounts and the stock of variable interest rate deposits gradually extinguished as deposits matured. In two years' time, these came to represent 1.2% of the total fund.

It is worth mentioning that the same valuation criterion was true for structured instruments, but these did not gain the same importance as time deposits given that issues were typically geared toward pension funds and therefore required an agreement of various funds as to the implicit strategy, in addition to the period of time elapsed until they were registered and listed on markets. All of this resulted in a loss of appeal vis-à-vis deposits for which there was greater flexibility.

**Bolivia:** During the conflicts in mid 2002, legislation was established—in force from July to November of that same year—whereby valuation rules applied to fixed income instruments were deferred. This rule comprises the use of market rates as discount rates. Discount rates were frozen but as market rates increased instruments became overvalued. Yet, since in Bolivia pension fund investments are fully invested on fixed income instruments, and since the valuation change was transient, this had no major impact on portfolio composition changes. The only significant change noticeable between June and December 2002 was the increase in time deposits from 12% to 14.6%, due to investments in Treasury Bonds. The latter took place as a result of new cash flow investments and it was not due to securities selling.

**Brazil:** It is possible to post fixed income instruments to an investment account up until maturity. The generated price is the outcome of purchase price plus internal rate of return (IRR). This alternative is also allowed for debentures and commercial paper, as well as mutual funds designed for a single investor.

Since investment statistics on pension funds fail to distinguish between funds included in this category and marked-to-market funds, it is impossible to assess the relevant impact on investment decisions.

**Colombia:** Regulations provide that fixed income instruments may be posted to an investment account up until maturity. The generated price is the outcome of purchase price plus internal rate of return (IRR). Although valuation in Colombia is similar to valuation in Argentina, there is a major difference in that reclassification may be performed at market prices on the basis of a decision by the regulatory authority or as a result of adverse change in the issuer's status, regulatory amendments precluding investments maintenance, mergers and acquisitions.

Although high yields may be obtained with zero accounting volatility, if the asset remains overvalued there may be a mark-to-market risk and therefore a need for reporting the accounting loss. This partly removes incentives and precludes a corner solution. Additionally, the fact that government debt instruments are not subject to risk rating requirements makes them more attractive for this type of accounting system.

Indeed, Chart III shows that between 2001 and 2004, more than 90% of the items posted as investment were government debt instruments. One can also see that the total amount recorded as investment in terms of the managed fund ranged between 12% and 28%, i.e. an average of nearly 22%.

These figures are seemingly small if we consider the absence of limits and the experience gained in Argentina. In fact, by the way of calculating minimum return<sup>12</sup>, when a portfolio representing fixed income is weighted at market prices, the higher percentage the investment account, the lowest fund volatility and the greatest risk of remaining below minimum profitability in bull markets.

**Uruguay:** Ever since the inception of the pension fund system in 1997, regulations have provided that only government securities maturing in 2033 may be posted to an investment account. As it happens in Argentina, bonds may be sold after four (4) years. The generated price is the outcome of purchase price plus accrued IRR. However, the price may be adjusted to the extent that book value remains outside a close range of 10% against market price. In practice, this implies a deferral in executing valuation of such bond, which tends to smooth away typical deviations in times of high volatility.

Again, incentives partly decline to the extent that book value follows market value in the long term. Indeed, the original limit was not to exceed 40% of the fund, which was later reduced to 20% in October 2001. Prior to such reduction, utilization averaged 23%; there being a subsequent drop of approximately 13% of the fund (see Chart IV.)

In 2002, after the debt crisis, AFAPs executed a swap transaction with BCU whereby they delivered corporate bonds issued by defaulting banks and received an inflation-indexed bond<sup>13</sup>. This bond was posted to an investment account, with the “advantage” that, as the bond was not listed on the market, it was not subject to price adjustment.

## B. Fiscal Performance

Table IV shows the limits established by each country for public sector debt investment. In general, maximum limits are –and have been- high, with a minimum 40% in Peru, and 100% in Bolivia, Brazil, and Mexico. The basis for this fact is the transition deficit that is created whenever funds from the prior system (pay as you go) are channelled to the new system (defined contribution). In this way, pension funds partly finance such deficit until fiscal accounts strike a balance as a result of the decline in their liabilities.

Some cases are worthy of additional comment.

- **Argentina** originally fixed the limit at 50% but, in November 2001, as a result of the exchange of government debt for national government guaranteed loans, it increased such limit by 100% on condition that any

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12 Minimum Return (MR) is a simple average between 90% of the average return on the pension system (ARP) and the average between 90% of the return on a reference variable income portfolio (RVI), weighted by the percentage of a pension fund portfolio invested in equities (%E), and 95% of the return on a reference fixed income portfolio (RFI), weighted by the difference between 100% and the amount invested in equities.

$MR = 0.5 * 0.9 * ARP + 0.5 * (0.9 * RVI * \%E + 0.95 * RFI * (1 - \%E))$

<sup>13</sup> For further information see Adolfo Sarmiento (1993.)

amount in excess of 50% related to such guaranteed loans. As from August 2003, pursuant to Executive Decree 530/03 which established that underlying bonds securing guaranteed loans be returned to those individuals who did not accept peso-conversion thereof<sup>14</sup>, the Pension Fund Superintendency (Spanish acronym SAFJP) decided that accounting records should include holdings of underlying bonds securing guaranteed loans, even if such bonds had not been returned<sup>15</sup>. This means that the limit remains at 50%, being impossible to reach 100% because guaranteed loans are not allowed to be computed.

- **Bolivia** has an implied minimum limit since pension funds have a mandatory amount of government debt monthly purchases which are useful to finance the needs of the prior system, thereby increasing public sector debt investment by a minimum 63% approximately.
- **Chile** started up with a limit of 100%, which was reduced to 50% in 1985, remaining at 45% only for a 5-year period (1990-1994.)
- **Peru** has the most restricted pension fund system. The maximum limit for government debt, including securities issued by the Peruvian Federal Government and the Peruvian Federal Reserve Bank System, has a sublimit for Brady bonds which was established at 5% and then increased by 10% as from 2001. As Brady bonds are the main portion of listed government debt securities, the foregoing worked as an additional restriction for government debt investment.
- **Uruguay** has minimum and maximum limits, which started at 85%-65%, with a gradual reduction between 60% and 40%. Additionally, the Uruguayan Central Bank (Spanish acronym BCU) establishes maximum limits for investments in Uruguayan pesos, beginning at 20% and currently increasing by 40%. As government debt is largely dollar-denominated, this is an indirect way of channelling investments towards public sector debt.

Table V shows information on total and/or foreign public debt in stock, in terms of GDP for several countries, as well as investments in the public sector according to each country rating, all these data being year-end figures. In every case, there is a direct relationship which can be more clearly seen in Charts V and VI. This means that, if fiscal performance is not satisfactory, the public sector will drive out the private sector through the well-known crowding out effect, thereby increasing government investments in pension fund portfolios. We should not expect similar ratios in public sector investment levels for similar

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<sup>14</sup> In March 2002, pursuant to Executive Decree 471/02, the Government established that guaranteed loans issued by the National Government and denominated in US dollars be converted into pesos at an exchange rate equal to AR\$1.40 per US dollar. It also decided that guaranteed loans be adjusted for the CPI, and that the interest rate be reduced between 3% and 5%, depending on the loan term. In April 2002, pursuant to Executive Decree 644/02, it was resolved that in order to be eligible for collecting principal and interest on guaranteed loans, it was mandatory to accept the regulatory changes provided for in Executive Decree 471/02.

<sup>15</sup> Pension funds rejected that underlying bonds be returned because the Government was not empowered to do so under the Trust Indenture.

indebtedness levels, because limits and regulations are different for each country.

It is true that, in this case, the debt level is one of the indicators measuring fiscal performance, but debt in stock is an inventory like investments. We must also consider that debt in stock may change not only because a deficit is created, but also due to the fact that exchange rates fluctuate whenever debt is denominated in other currency, a very common situation in these countries. It may also change as a result of debt conversion transactions, as it happened in Argentina in 2001 and Uruguay in 2002, which alter nominal debt in stock.

On the investment front, we should bear in mind that investments are marked to market, except for the notion of investment account in Argentina, Brazil, Colombia, and Uruguay. Therefore, comparison is not really homogeneous and it may cause ensuing disruption.

Our research findings are useful to make some remarks on the countries below.

- **Argentina:** In 1997 there was a sharp decrease in public sector investments, under the influence of a dramatic increase in variable interest rate deposits that year, which then dropped sharply in 1998, as mentioned before. In 2003 there was a substantial reduction (8.6% of the fund) since the limit indeed fell by 50% for government securities, as specified before, and also the Superintendency had “frozen” guaranteed loan valuation since August 2003; whereas the remaining assets recorded sharp increases.
- **Brazil:** In 2003 pension funds invested a very low percentage (12.7%) directly, the largest portion of their investment being made through fixed income funds, totalling 44.6% that year. It should be noted that, except for investments in government securities and fixed income funds, other fixed income investments have been declining over the last years. Although it is impossible to determine the composition of fixed income investment funds in which pension funds invest, these funds largely invest in the public sector and therefore we added a column to Table II showing the aggregate amount of government securities plus fixed income instruments. Anyway, if we suppose fixed income fund investment were focused on the private sector, we could equally notice a direct ratio between indebtedness and investments in government securities.
- **Colombia:** Due to the fact that the investment limit is set on 50%, as from 2000 the ratio faded away because investments reached 47.4% that year.
- **Chile:** This is the country with the weakest ratio, but it is worth mentioning that there has been a sharp indebtedness reduction ever since the late 1980s, which accounts for a reverse ratio vis-à-vis most countries, i.e. that the lower the indebtedness level, the lower the government debt investment.
- **Mexico:** As it happens in Chile, there is a reduction in borrowing levels, together with less investment in government securities, even though it is true that almost all pension fund investments was made in public sector debt.

- **Uruguay:** There is a constant growth in public sector investments, where it is allowed to invest up to a 100%. In fact, as regards securities issued by the Uruguayan government it is allowed to invest up to 60% , but excluding the Central Bank of Uruguay (Spanish acronym BCU) whose limit is 30% in conjunction with the Mortgage Bank of Uruguay (Spanish acronym BHU). Additionally, temporary cash may be invested in the Central Bank (BCU) outside the 30% range. Given that for temporary cash held in financial institutions the limit is 1% of the fund, all temporary cash are deemed to be invested in the Central Bank (BCU). It should be noted that temporary cash reached a peak of 19% in 2002.

### **C. Public debt share in pension fund portfolios. Panel data evidence.**

In this section we use panel data on countries in order to provide a formal test for the assumption explored in the foregoing section. The goal is to analyze the ratio between total proportion of funds invested in securities issued by the government, including federal government, local governments, and the central bank, and amount of public sector debt and deficit, both measured in terms of GDP percentage.

In order to perform this analysis, we have taken panel data supplied by the following countries: Argentina, Brazil, Colombia, Chile, Mexico, Peru, and Uruguay.

For the econometric runs described below, we also used panel data. In order to estimate regressions by means of panel data we took into account unobserved heterogeneous components that could appear among observations (for example, each country's typical elements that may have an impact on estimates and should be taken into consideration because, otherwise, we will observe the consequences of omitted variables.) We estimated the error component regression model, the fixed-effect estimator, and the random-effect estimator. We should clarify that we estimated the error component model because the potential error term in the panel data case should have a specific structure reflecting shocks that may change depending on countries but remain unchanged through time, and/or temporary shocks which shall not change from one country to another.

Two models were run according to the explanatory variables included in such models.

#### **Estimate results**

The results of the first estimate are shown in Table 6. The estimated function uses both explanatory variables without lags.

In the regression of fixed effects both deficit/GDP and debt/GDP have a positive sign, as expected, but deficit has a coefficient which is not significant. The test

for fixed effects rejects the null hypothesis,  $H_0$  absence of fixed effects, which indicates that there are distinguishing traits among countries.

The regression of random effects shows that public sector weight on pension fund portfolios increases in line with the rise in public sector debt and deficit. Yet, for the latter, the coefficient is not significantly far from zero, consistently with the estimate considering fixed effects.

The Breusch and Pagan test for random effects (based on the residual sum of Classical Least Squares) rejects the null hypothesis ( $H_0 = \text{Var}(u) = 0$ ), from which we can derive that there are random effects.

The test for joint significance of the coefficients of explanatory variables rejects the null hypothesis whereby all coefficients are equal to zero.

Given that, although the signs of the explanatory variables are those expected, but the deficit effect is not significantly far from zero, the public sector deficit variable is changed in terms of GDP with one period lag.

The new results appearing on Table 7 show that now explanatory variables are significant and positive coefficient are those expected, thereby indicating that both debt/GDP and deficit/GDP levels have a positive impact on the portion invested in government securities by pension funds.

The Hausman test does not reject the null hypothesis of the exogenous nature of explanatory variables with respect to the random effect. Therefore both fixed-effect regression and random-effect regression show consistent estimators.

These results are very satisfactory considering the heterogeneous nature of information, such as limit differences, cases in which permitted amounts were fully invested, or application of valuation rules other than mark to market.

#### **D. Foreign asset investments**

Brazil y Uruguay are not allowed to invest in foreign assets. Neither was Mexico permitted to invest abroad in the period under study. However, in May 2004 the CONSAR approved the offering of a second pension fund for members under 56 years of age, which is authorized to invest up to 20% of its resources. Permitted alternatives include structured bonds and instruments linked to specific variable income indexes authorized by regulation. It is not allowed to purchase shares of stock directly.

Below there is a description of specific situations in countries where foreign asset investment is permitted.

**Argentina:** The foreign asset investment limit is 10% of the fund and it was set by law. However there are some regulations which preclude this type of investments. One of them refers to markets where pension funds are authorized to trade, and excludes over-the-counter markets where fixed income instruments are traded. Therefore, a fund wishing to purchase sovereign and/or corporate

bonds shall be obliged to trade on a stock exchange, which makes the transaction an impossible mission.

Another regulation refers to minimum risk rating requirements for eligible securities to be purchased. This regulation includes equities and mutual funds with rating requirements, whereas it is a generally accepted practice not to rate such assets.

In September 1997 the Pension Fund Superintendency (SAFJP) authorized to purchase CEDEARs<sup>16</sup> listed on the Buenos Aires Stock Exchange. The established rating requirement was related to the issuer's subordinate debt. However, the same requirement was not applicable to purchase stocks of the same companies on foreign markets. The purchase of CEDEARs allowed to increase investments abroad, but having rather illiquid assets and high conversion costs.

The emergence of CEDEARs favored the organization of Argentine-regulated mutual funds which invest in foreign assets benchmarked against international indexes. Argentine regulations provide that at least 75% of mutual fund investments should be made in Mercosur assets, and CEDEARs are deemed to be included in such 75%. Thus mutual funds can, with the remaining 25%, build portfolios that are wholly invested in foreign assets.

Although foreign asset investments have increased up to virtually covering the authorized limit, more than half of such investments is concentrated in only two (2) shares of stock received in exchange for equities issued by local companies.

**Bolivia:** The regulatory framework provides that it is possible to invest in debt securities, equities, and mutual funds. It also provides that the Superintendency is in charge of setting up a record of intermediaries and agents with whom pension funds are permitted to deal with. Regulations are incomplete, particularly regarding competitive bidding for recruiting a global custodian. Therefore, in practice, foreign asset investments are not allowed.

**Colombia:** Initially, the limit was 10%. However, due to technical requirements for risk rating and mutual fund investments, in practice it was impossible to make those investments. In 2001, regulations changed and the limit was set to increase gradually from 3% to 10%. It was only permitted to invest in exchange-listed sovereign bonds or securities issued by international financial institutions, as well as bonds issued by banks and/or mutual funds. Index funds were allowed some time later. Thereafter, pension funds started a more aggressive strategy to invest in foreign assets, especially bonds issued by banks.

In January 2002 the new 10% investment limit became operative, and in 2004 possibilities expanded for corporate bond investments. Current investment exceeds 7% of the funds.

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<sup>16</sup> Argentine Depositary Receipts. They are similar to American ADRs.

**Chile:** Eleven years after the inception of the pension system, it was allowed to invest in fixed income government securities with minimum risk rating 'A', up to 3% of managed funds. As we can see in Table 2, the limit was subsequently increased by 6% and 9% in 1995 and 1997, respectively, and it was also permitted to invest in corporate bonds, equities, and mutual funds.

The limit was increased by 16% in 1999 and, expanding the supply to five funds, the limit was consecutively taken to 20%, 25%, and 30% in 2002, 2003, and 2004 respectively. Now it is allowed to invest in a wide range of instruments such as bonds, equities, mutual funds, interest rate swaps, foreign currency, etc. Total investments have been increasing sharply, and today they nearly reach 24% of the funds. Thus, Chile is the Latin American country with the greatest share in this type of investments.

It should be noted that more than 40% of fixed income instruments subject foreign investment have been channelled through mutual funds; whereas variable income instruments account for a 90% share, which has given strong momentum to the development of a broad spectrum of mutual funds, with major international asset managers participating actively.

**Peru:** Initially the limit was set on 5%, which expanded to 7.5% in 2000, and 9% in 2003. Eligible instruments were sovereign debt securities, equities, and mutual funds. The most favored investments were equities, and since 2000 the limit has always been covered<sup>17</sup>.

**General analysis:** The assumption put forward at the beginning of this paper is that the increase in foreign asset investment is consistent with an improvement in fiscal performance, shortage of instruments on the local market, and subsequent flexibility of regulations.

Out of the eight countries under study, only four (Colombia, Chile, Mexico y Peru) made their regulations more flexible in order to facilitate foreign asset investment. Out of those four countries, only Chile and Mexico recorded a reduction in their indebtedness according to the figures included in Table 5. Summing up, the first part of the initial hypothesis fitted only partially.

As a proxy for shortage of instruments on the local market we can use some cost of capital indicator. When cost of capital is low, we consider that there is a lack of credit demand to absorb the available supply, this being an indicator of the absence of available instruments for pension funds.

As pension funds are long-term investors, we initially considered country risk premium measured against the indexes calculated by JP Morgan, Emerging Market Bond Index (EMBI). The main inconvenience is the fact that this indicator is not available for every country and, due to the way in which it is calculated, comparisons between countries and time series for the same country are not homogeneous because index duration changes dramatically from one

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<sup>17</sup> Before June 2000 foreign equities were accounted for as shares of stock. Therefore it is impossible to follow their evolution.

country to another and through time<sup>18</sup>. In addition, it fails to represent the cost of capital because, for purposes of such calculation, we usually add the yield on US Treasury Bonds.

Despite the foregoing, in Table 8 we can see that there have been high risk premiums in Argentina as well as Brazil. Specifically, in Argentina rules were not made flexible, while in Brazil foreign investments are not permitted. If we analyze the case for Colombia and Peru, where limits were made flexible, we will notice that this has occurred even though the EMBI has recorded a slight reduction, which does not seem to be significant, as we can see in Chart VII, and the ratio has been negative as expected. Finally, Mexico, who has recently approved foreign asset investments, shows a clear-cut EMBI drop below 300bp.

Instead of considering the EMBI, we can apply the real interest rate which, despite being a short-term measure, proves to be more homogeneous than the former and, additionally, data are available to all countries. Indeed, a high country risk premium does not necessarily imply that there is a demand for long-term instruments. Inversely, if such premium is very high business firms may be unable to find profitable projects and therefore be forced to exit the market.

When we use the real interest rate we assume that, faced with an absence of long-term opportunities, pension funds will increase their liquidity position as the share of time deposits increases and, faced with the loss of profit implied by this circumstance, they will demand that regulators flexibilize restrictions on foreign asset investment.

Table 9 shows that Bolivia, as well as Brazil and Uruguay, where foreign asset investment is not allowed, have two-digit real interest rates or one-high-digit rate as Bolivia. Argentina, which has not flexibilized its regulatory limits, has also recorded high rates largely through time. Inversely, Colombia, Chile, and Peru have recorded sharp reductions in the real interest rate, which has declined to a low one digit, and these countries have expanded the possibilities of investing in foreign assets. Following the rationale of the paragraph above, in Colombia and Peru there was heavy investment in time deposits prior to flexibilizing limits; whereas in Chile the market share of time deposits is increasing together with investments in foreign assets. Perhaps this indicates that the local market glut has been higher than expected since government bond investment has declined sharply at the same time.

The worst scenario has been Mexico, which has recorded negative real interest rates largely over the last years. Mexico is showing that there are some other missing reasons that, even though conditions were allegedly “perfect” according to the assumption under study, they overdeferred the process of flexibilizing regulations. Such reasons certainly relate to the low 35% limit that was originally set on the private sector, and therefore limits were first made flexible for the private sector and then for foreign asset investment.

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<sup>18</sup> For more details see Juan J. Cruces, Marcos Buscaglia, and Joaquín Alonso (2002)

Finally, Chart VIII clearly shows a negative ratio between real interest rate and foreign asset investment limits, thereby providing evidence that shortage of local market investment instruments make authorities flexibilize the possibilities of investing overseas.

#### **E. Foreign asset investments. Panel data evidence**

In this section we use panel data from countries in order to provide a formal test for the assumption explored in the foregoing section. The goal is to analyze the ratio between foreign investment limit and real interest rate as an indicator of shortage of instruments on the local market.

In order to perform this analysis, we have taken panel data supplied by the following countries: Argentina, Bolivia, Brazil, Colombia, Chile, Peru, and Uruguay. Mexico has been excluded because it is clear that there are other factors which have deferred limit flexibility.

Results appear on Table 12–Panel I. The fixed-effect regression model estimate shows a negative ratio between real interest rate and foreign asset investment, the coefficient being significantly different from zero. Likewise, the test for fixed effects is rejected, which indicates that there are distinguishing traits among countries.

Results deriving from the random-effect regression model show that, as in the above case, there is a negative ratio between variables, the coefficient being significantly different from zero. The Breusch and Pagan test rejects the null hypothesis whereby there are no random effects.

Finally, the Hausman test rejects the null hypothesis whereby the difference in the coefficients of the two previous regressions is not systematic. Consequently, there is a correlation between explanatory variable and random effect, and therefore we must disregard the random-effect regression model estimate because it shows inconsistent estimators.

With a view to assessing whether countries flexibilizing limits have more heterogeneous traits, Table 13–Panel II shows the estimate for Chile, Colombia, and Peru.

The fixed-effect regression model estimate shows a negative ratio between real interest rate and foreign asset investment limit, the coefficient being significantly different from zero. Likewise, the test for fixed effects showing their non-existence is rejected, which indicates that there are distinguishing traits among countries.

Results deriving from the random-effect regression model show that, as in the above case, there is a negative ratio between variables, the coefficient being significantly different from zero. The Breusch and Pagan test rejects the null hypothesis whereby there are no random effects.

Finally, the Hausman test does not reject the null hypothesis whereby the difference in the coefficients of the two previous regressions is not systematic. Consequently, there is no correlation between explanatory variable and random effect, and we could indistinctly use the results of the two models.

We can conclude that, consistently with the results shown in both panels, the real interest rate has been a key factor to make limits flexible for investing in foreign assets. Naturally, this has not been the only factor, since part of such impact may correspond to fiscal performance and time deposits accumulated in absence of other investment alternatives.

## **F. Number of managed funds**

Chile has been the only country which offered innovative solutions to pension fund members by giving them an opportunity to choose among more than one pension fund over the period under study. The first reform in 1999 established the formation of a second fund that could be chosen by individuals over 55 years of age and pensioners. However, the most important amendment took place in 2002, when five new pension funds were formed and licensed to operate.

The rationale behind expanding the alternatives to select funds is based on the idea that, on the one hand, pursuant to conventional theory, taking higher risk in the long term allows for higher return and, on the other hand, the possibility of taking higher risk depends on age. This means that younger individuals have more time to recover from potential negative fluctuations, whereas elderly people or pensioners have less time and therefore negative returns have a direct impact on their consumer capabilities<sup>19</sup>.

Therefore, pension fund supply may differentiate according to its risk level. To such end, maximum and minimum limits were set on variable income investments, as shown in Table 10, where Fund A represents the highest risk, being able to invest up to 80% in variable income, and Fund E represents the lowest risk, being forced to invest solely in fixed income instruments.

Another key component appearing in Chart XI shows distribution of contributors by age, where we can see that individuals under 35 account for nearly 48% of the total number. This Chart also shows one-year period automatic distribution of contributors who failed to choose a fund until October 2002. Contributors were automatically distributed by age as follows: (i) individuals under 35 were included in Fund B; (ii) individuals between 36 and 55 were included in Fund C; and (iii) individuals over 55 were included in Fund D.

Table 11 shows fund composition/distribution as of December 2002 and December 2003. Fund A and Fund B increased their participation from 12.5% to 24% as a result of contributors freely choosing a fund, or being automatically distributed in case they had failed to select a fund. The growing participation of

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<sup>19</sup> A detailed analysis of the current status of academic discussion may be found in Herzcovich McIntosh (2004).

higher-risk funds had a direct impact on the increase in the investment portfolio, equities as well as foreign assets, which went from 11.6% to 14.5%, and 13.3% to 23.9%, respectively, between 2001 and 2003. In fact, Chart IX and Chart X show Fund A and Fund B increasing participation both in equities and foreign asset investments.

Therefore we can conclude that in Chile the supply of pension funds with different risk levels has had a major impact on funds investing in variable income instruments and, particularly, in foreign asset mutual funds, which have been in line with the simultaneous increase in the limit set on foreign asset investment.

#### **IV. Conclusions**

Experience gained in the eight Latin-American countries under study shows that pension funds have been crucial to create new instruments that did not exist previously in the market and also to develop other instruments that were not actively traded. Generally speaking, the supply reacted by offering long-term instruments, which are naturally demanded by pension funds.

Instruments either created or developed as a result of the presence of pension funds include, inter alia, corporate bonds, asset backed securities, stocks, mutual funds, CEDEARs, direct investment funds in productive sectors such as agriculture, forestry and real estate.

However, it should be noted that creating and developing such instruments has not been a homogeneous process because countries are different and, specifically, the importance of such process was different in each country. From this we can infer that there have been several factors which affected the market, either favoring or delaying innovation and development.

In cases where instruments are not marked to market, evidence shows that valuation rules have been a key factor in the occurrence of facts such as the development of variable interest deposits in Argentina, in which pension funds invested up to 25%, during the first years the regulation was effective. Posting fixed income instruments and government securities to an investment account also artificially favored more investment in public sector debt, thereby making other instruments less attractive. In Argentina the share of government bonds under investment account in pension funds ranged between 22% and 34%, Colombia between 11% and 27%, and Uruguay between 11% and 29%; apart from Brazil, where statistics do not allow to differentiate instruments on the basis of accounting methods.

There is diverse evidence on limit application by asset classes or instruments. In Mexico and Uruguay investment limits have been very restrictive, thereby hindering financial innovations. In Mexico there was a significant development of the corporate bond market after restrictions were made flexible. Chile is the most evident case of development of equity markets and foreign asset investments largely through mutual funds, after approving successive investments and increasing investment limits. Colombia and Peru also played their part in developing mutual

funds designed for investment in foreign assets after increasing investment limits. Colombia experienced a robust development in securities issued by the financial sector, reaching 56.5% in 1998 -a percentage which, as a result of the financial crisis, plunged dramatically in the following years. Argentina and Brazil have performed in a different fashion and there have been no major limit restrictions. In Argentina the most successful instruments were variable interest deposits, as mentioned above, as well as CEDEARs and mutual funds which invest in foreign assets as a way of avoiding regulations on authorized markets and risk rating requirements which are difficult to comply with. In Brazil, there was substantial development in mutual funds, currently accounting for 55% of fund investments, as a result of fiscal incentive since they are not subject to tax on financial transactions (Portuguese acronym CPMF.)

Fiscal performance has also been another key fact to determine the choice between public and private sector. There is conclusive evidence showing that higher fiscal deficit and greater public sector debt, both measured in GDP terms, have had a direct impact on investment in government securities. This factor has been more significant in Argentina, Bolivia, Brazil, Colombia, and Uruguay, where the share of government instruments amounted to 76%, 73%, 57%, 49%, and 90%, respectively, thereby discouraging private sector investment. Inversely, Chile and Mexico improved fiscal performance and enabled the private sector to increase its capabilities. In fact, Chile recorded a public sector investment decline of 25%; whereas Mexico, stemming from figures of nearly 97%, reduced government investments to 84% in four years, thereby starting an interesting development in corporate debt instruments.

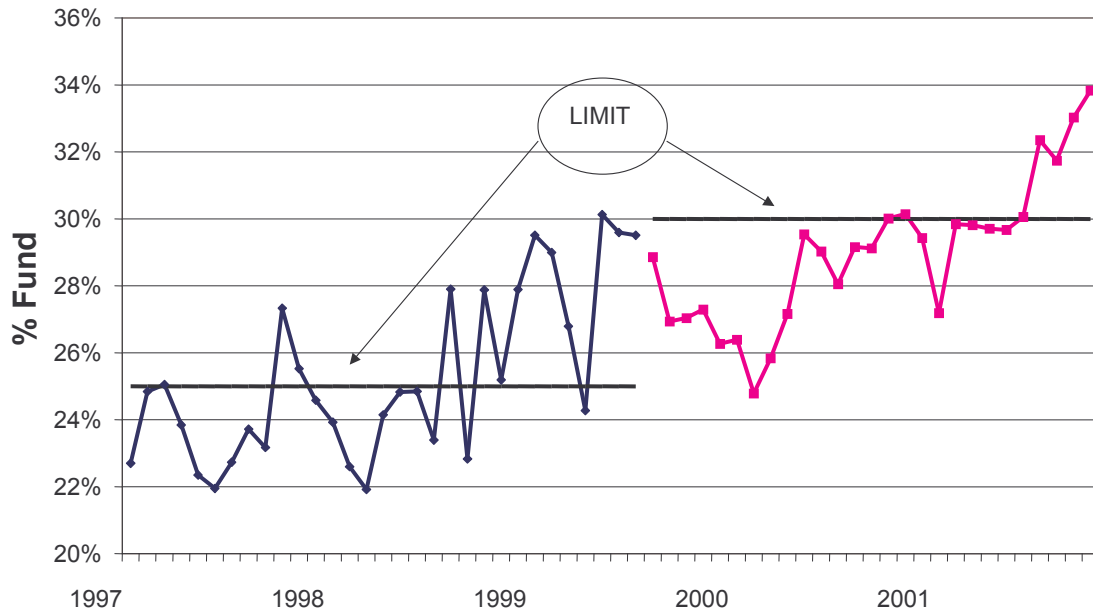
As regards foreign asset investments, fiscal performance has partly been a stumbling block. There is more evidence showing that the lack of local market alternatives, indirectly measured by the drop in (or the low) local real interest rate, has had greater impact on making limits flexible and permitting alternatives to invest in foreign assets, as illustrated by cases such as Chile, Colombia, Peru and, recently, Mexico.

Finally, the recent experience of Chile, where pension fund members were allowed to choose among funds investing at different risk levels, adjusting their preference depending on age and risk aversion, has had a major impact on variable income investments and also demonstrated that pension fund managers may have been too conservative when they assessed contributor preference.

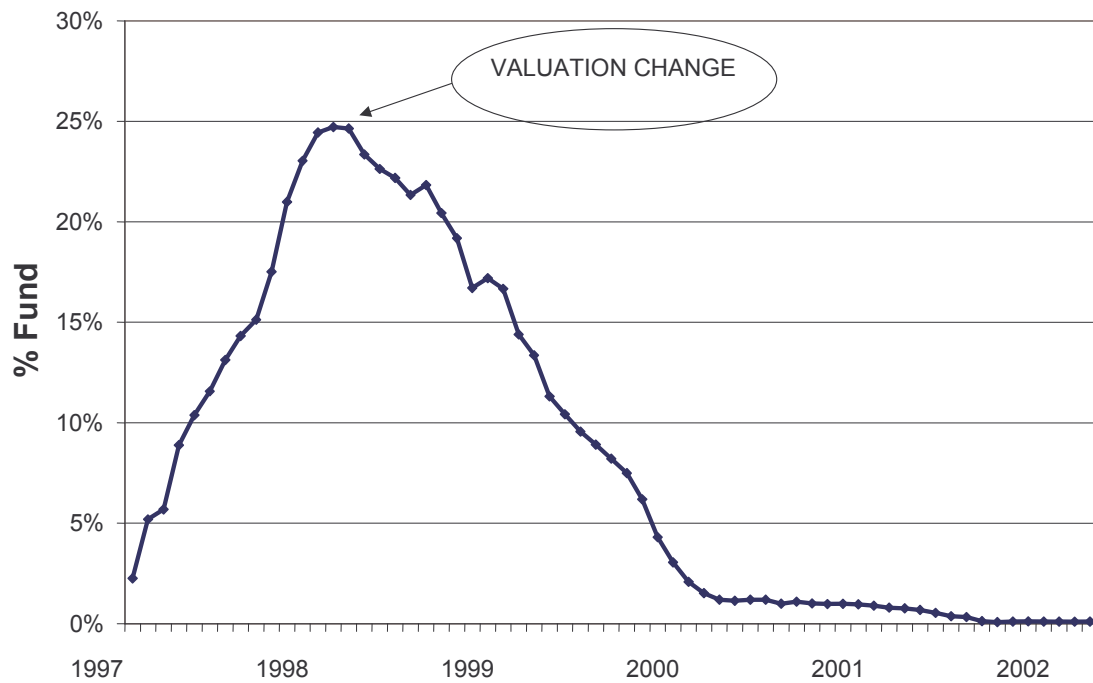
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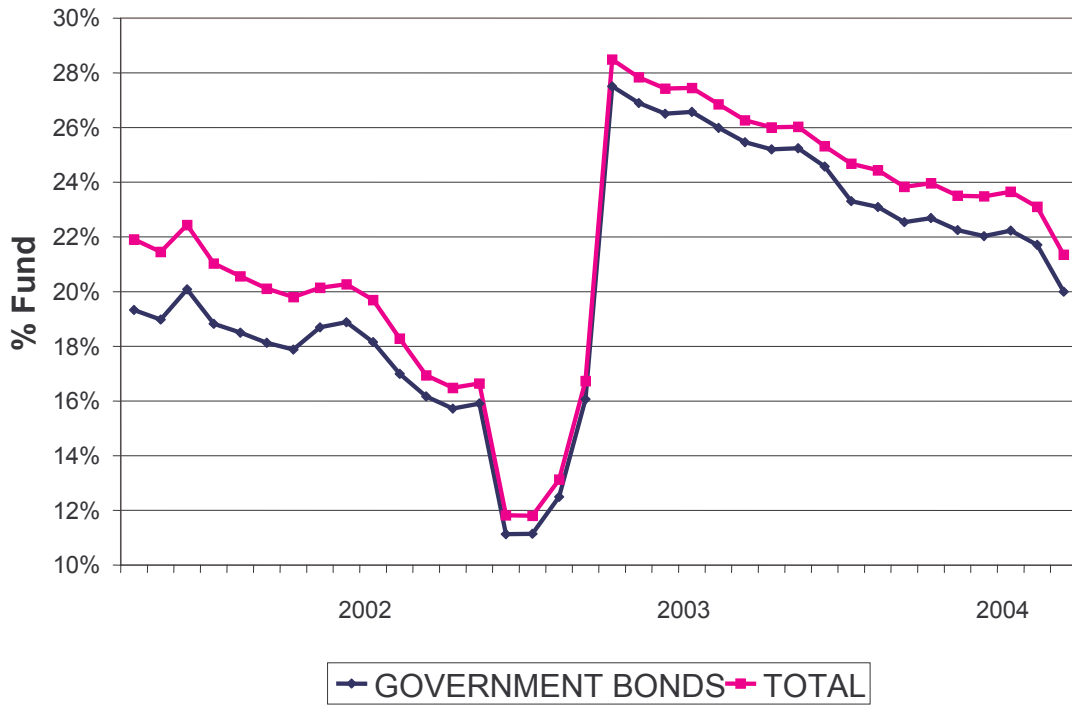
**CHART I**  
**Argentina: Government Bond Investment**



**CHART II**  
**Argentina: Variable Rate Time Deposits**



**CHART III**  
**Colombia: Investment Account**



**CHART IV**  
**Uruguay: Government Bond Investment**

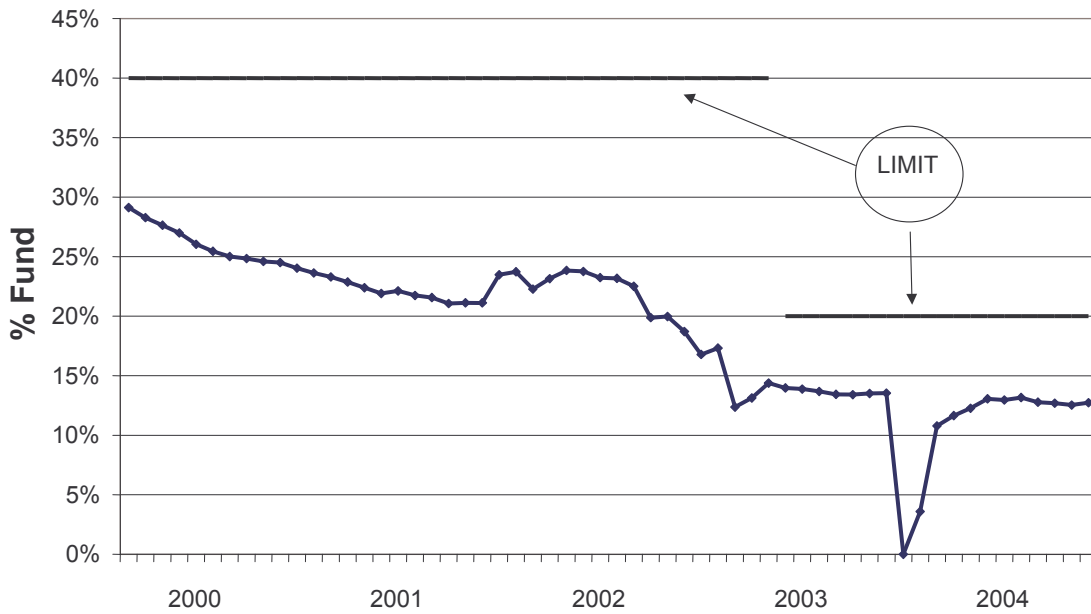


CHART V

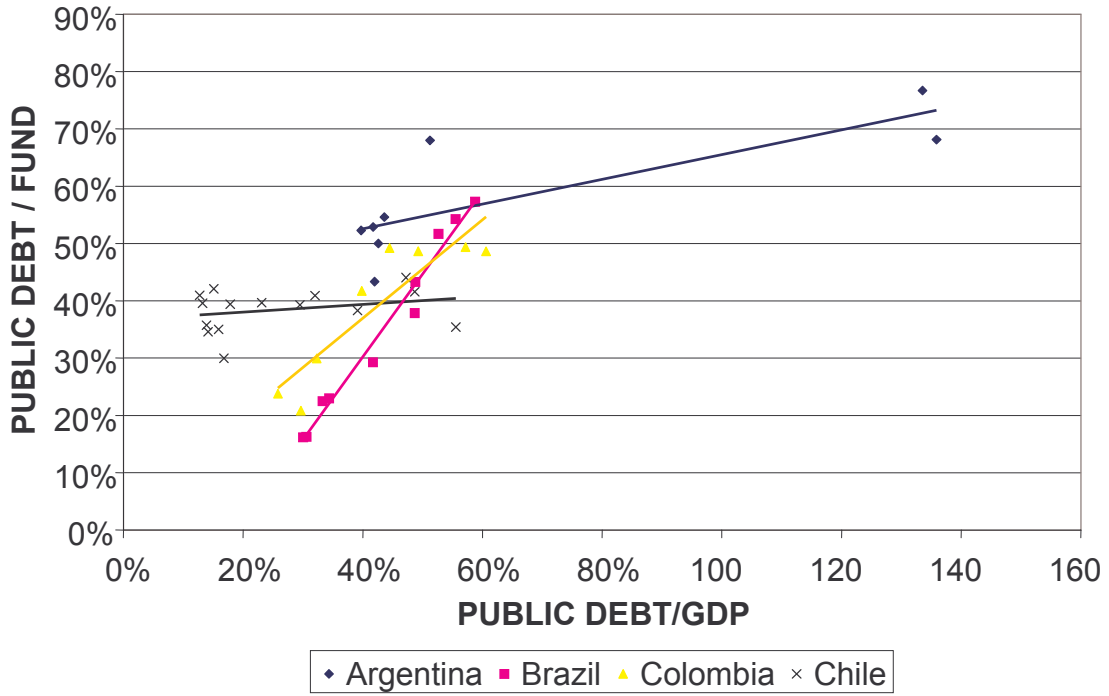


CHART VI

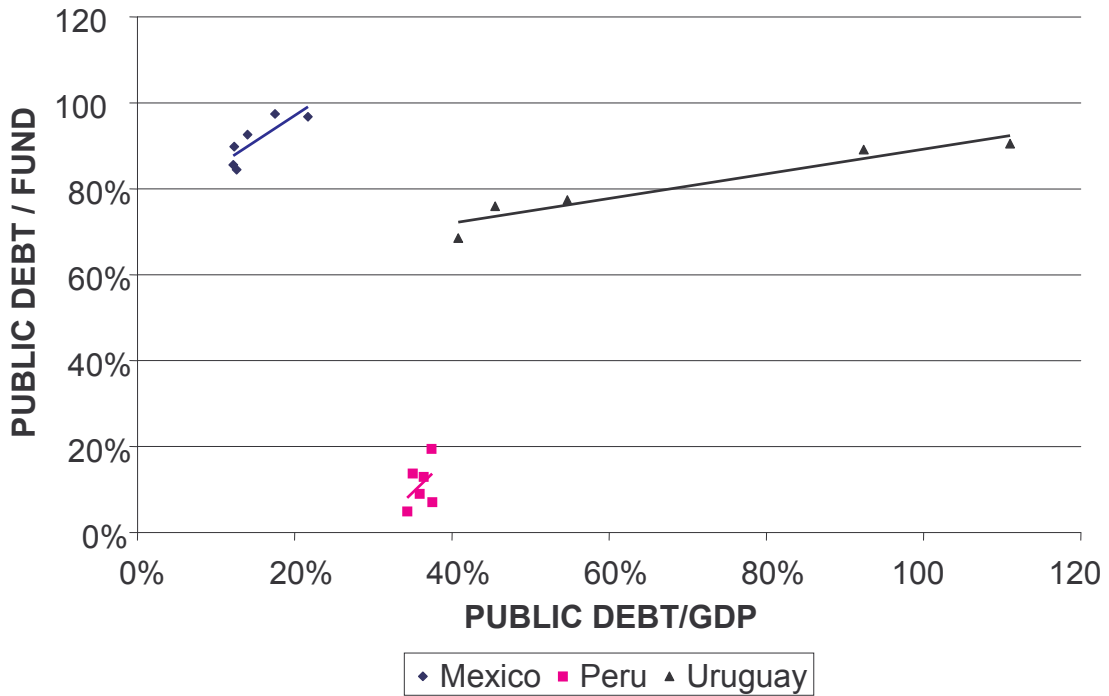


CHART VII

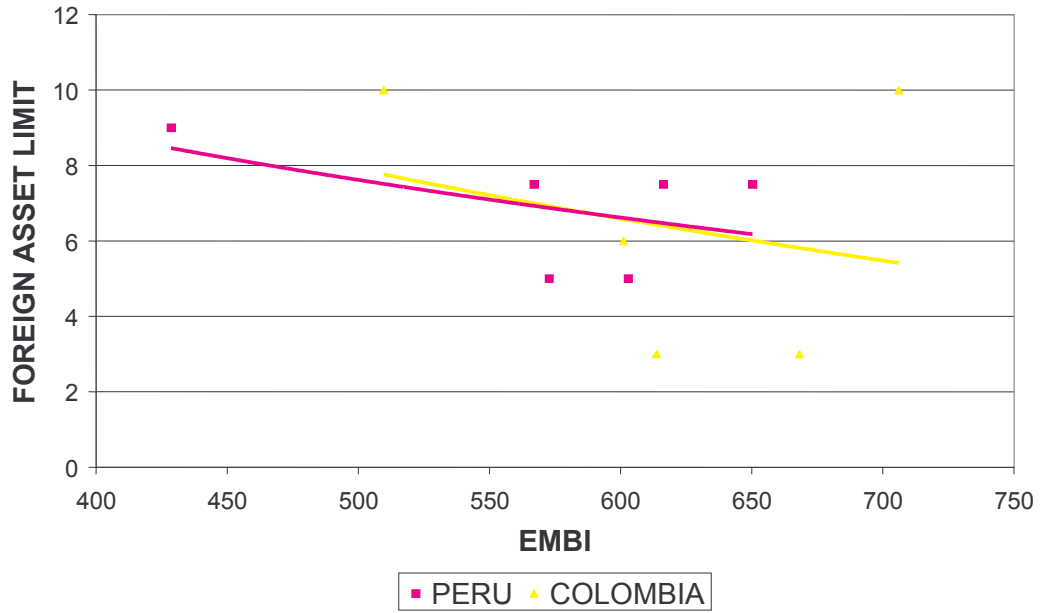
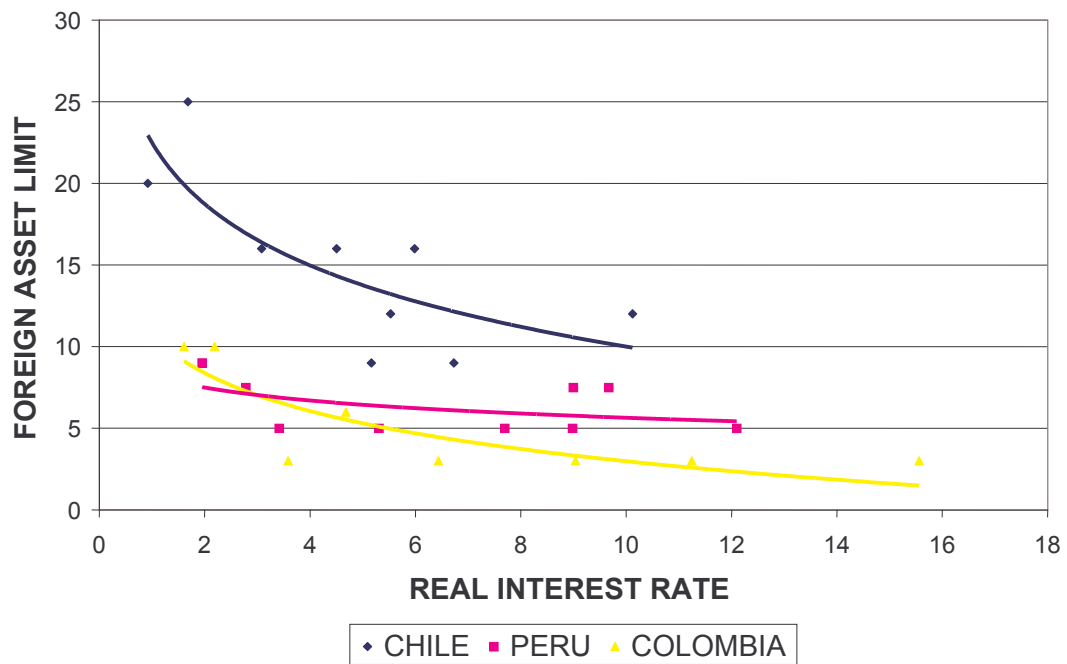
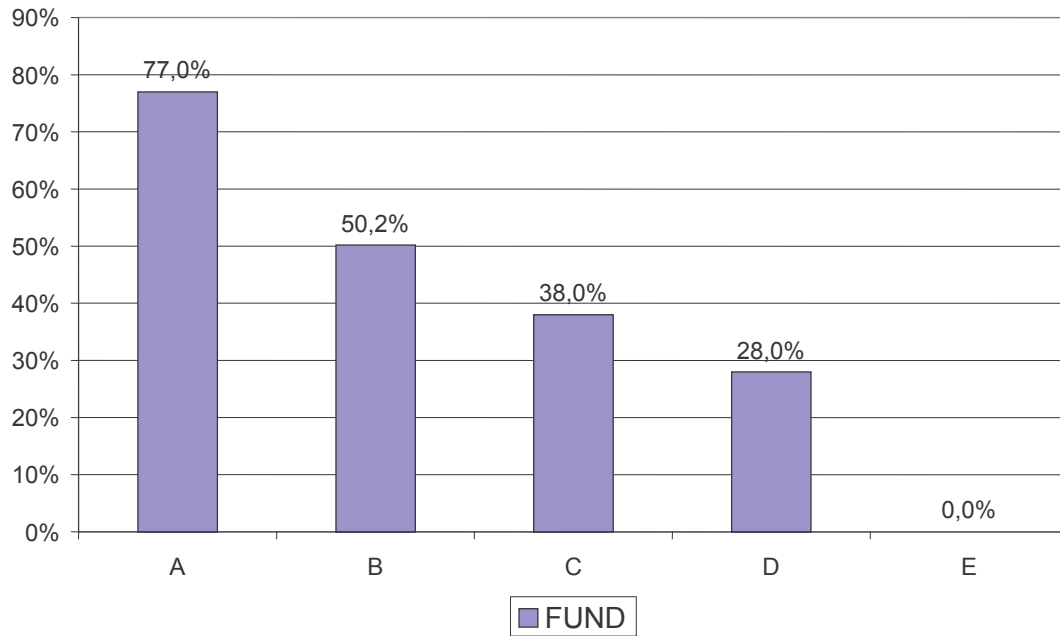


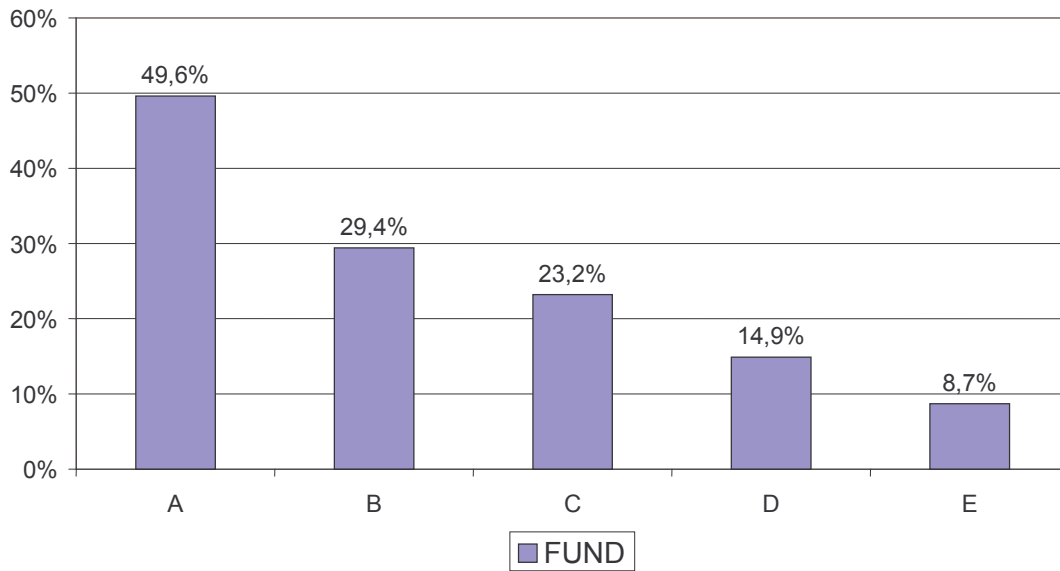
CHART VIII



**CHART IX**  
**CHILE: VARIABLE INCOME**  
December 2003



**CHART X**  
**CHILE: FOREIGN ASSET INVESTMENT**  
December 2003



**CHART XI**  
**CHILE: NUMBER OF CONTRIBUTORS BY AGE**

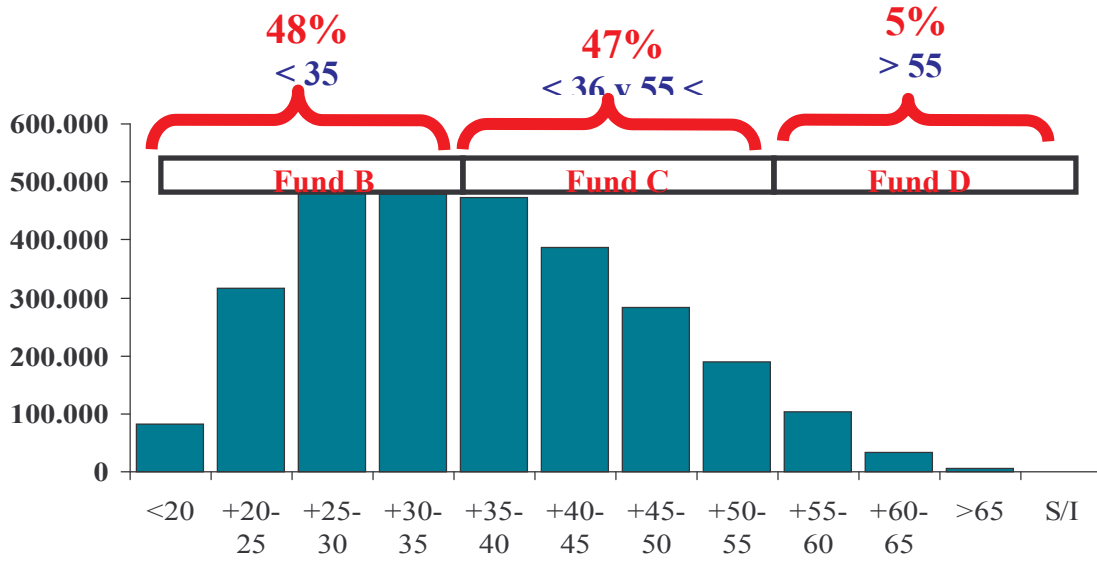


TABLE 1  
Pension Fund Portfolio Composition  
(Percentages and Million US Dollars)

A.Argentina	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Federal Government Bonds</b>	41,90	47,33	48,13	40,90	47,98	48,50	49,31	65,23	75,44	65,97
<b>Local Governments Bonds</b>	7,93	5,35	4,57	2,46	2,01	3,80	5,31	2,74	1,25	2,18
<b>Corporate Bonds</b>	5,84	8,71	7,78	2,86	2,50	2,13	2,80	1,69	1,06	1,54
<b>Long Term</b>	3,13	3,39	5,25	1,71	1,68	1,42	2,50	1,35	0,30	0,90
<b>Short Term</b>	2,72	5,32	2,25	0,96	0,72	0,63	0,31	0,34	0,76	0,64
<b>Convertibles</b>	0,00	0,00	0,28	0,19	0,10	0,08	0,00	0,00	0,00	0,00
<b>Time Deposits</b>	27,55	24,76	14,19	24,44	18,83	15,47	15,63	10,89	2,56	3,22
<b>Equity</b>	1,53	5,85	18,74	21,46	18,36	20,54	12,26	10,24	6,55	11,82
<b>Mutual Funds</b>	5,01	1,74	0,76	1,25	3,74	3,60	1,87	1,97	1,10	2,37
<b>Structured Bonds (1)</b>	0,00	0,00	1,58	3,22	2,84	2,68	6,34	0,83	0,20	0,17
<b>Securitized Bonds</b>	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,53	0,54	0,22
<b>Mortgage Bonds</b>	0,00	0,00	0,48	0,47	0,35	0,08	0,06	0,02	0,00	0,00
<b>Direct Investments Funds</b>	0,00	0,01	0,05	0,10	0,19	0,19	0,19	0,23	0,15	0,15
<b>Foreign Assets</b>	0,08	0,73	0,16	0,37	0,25	0,37	4,47	1,84	8,92	9,71
<b>Derivatives</b>	0,00	0,00	0,00	0,00	0,01	0,24	0,06	0,01	0,01	0,01
<b>Regional Economies (2)</b>	3,82	3,85	1,73	1,49	1,42	1,41	1,42	1,54	0,97	1,12
<b>Liquidity</b>	6,33	1,68	1,83	0,98	1,52	0,97	0,28	2,23	1,26	1,54
<b>Total Pension Fund (EoP)</b>										
<b>US\$ Millions</b>	519	2.497	5.326	8.827	11.526	16.787	20.381	20.786	11.409	15.893

Source: SAFJP

(1) Until end of 2001 include securitizations. In november 2001 structured bonds with government bonds as underlying were accounted as Government Bonds.

(2) State pension fund has to invest at least 30% in such instruments that includes Local Government Bonds and time deposits in Banco de la Nación Argentina.

Individual Capitalization Funds Portfolio  
Composition  
(Percentages and Million US Dollars)

B.Bolivia	1997	1998	1999	2000	2001	2002	2003
<b>Bolivian Government and Central Bank</b>	100,00	67,55	67,62	69,50	73,21	69,07	64,13
<b>Corporate Bonds</b>	0,00	0,00	0,00	3,67	13,40	12,92	16,05
<b>Securitized Bonds</b>	0,00	0,00	0,00	0,00	0,00	0,55	0,69
<b>Time Deposits - Local</b>	0,00	30,09	29,56	23,16	10,46	14,59	7,32
<b>Equity Capitalized Firms</b>	0,00	0,00	0,00	0,00	0,00	0,00	8,58
<b>Time Deposits - Foreign</b>	0,00	0,00	0,00	0,00	0,00	1,32	1,70
<b>Liquidity</b>	0,00	2,36	2,82	3,66	2,94	1,54	1,53
<b>Total Pension Fund (EoP)</b>							
<b>US\$ Millions</b>	73	333	535	842	936	1.144	1.493

Source: SPVS

Closed Pension Funds Portfolio Composition  
(Percentages and Billion US Dollars)

C.Brazil	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Equity</b>	39,10	29,50	30,90	28,50	19,20	26,30	23,60	18,50	15,80	18,95
<b>Real Estate</b>	14,39	14,90	12,90	10,40	10,70	8,80	8,00	6,80	6,70	5,37
<b>Time Deposits</b>	11,47	14,60	9,60	7,60	9,70	4,60	3,20	3,10	2,30	1,24
<b>Investments Funds</b>	12,43	11,90	19,40	30,00	33,00	43,80	48,10	50,90	52,90	54,53
<b>Fixed Income</b>	12,43	11,90	16,80	19,30	22,80	31,60	36,70	40,40	41,00	44,57
<b>Equity</b>	0,00	0,00	2,60	10,70	10,20	12,20	11,40	10,50	11,90	9,96
<b>Loans to Participants</b>	1,91	1,90	2,20	1,90	1,90	1,60	1,80	1,80	1,90	1,85
<b>Real Estate Financing</b>	4,61	5,80	5,10	4,50	4,40	3,40	2,90	2,50	2,00	1,56
<b>Debentures</b>	1,85	5,20	4,80	3,90	3,60	2,50	2,00	2,10	2,20	1,71
<b>Government Bonds</b>	3,81	4,40	5,70	3,70	6,50	6,30	6,60	11,30	13,30	12,68
<b>Others</b>	2,58	2,50	2,40	2,20	2,60	2,60	3,60	2,90	2,90	2,08
<b>Operations w/Sponsors</b>	7,83	9,30	7,00	7,30	8,40	0,10	0,20	0,10	0,00	0,04
<b>Total Pension Fund (EoP)</b>										
<b>US\$ Billions</b>	55,0	59,1	69,0	77,8	75,1	64,4	66,5	66,6	47,7	74,8

Source: ABRAPP

Pension Fund Portfolio Composition  
(Percentages and Million US Dollars)

D.Colombia	1996	1997	1998	1999	2000	2001	2002	2003
<b>Government Bonds</b>	23,78	20,81	29,96	41,73	49,22	48,67	49,38	48,64
<b>Financial Institutions</b>	64,11	54,82	56,50	39,77	31,43	25,70	23,01	22,25
<b>Time Deposits</b>	13,97	16,89	26,63	19,34	18,50	12,46	10,72	10,51
<b>Mortgage Bonds</b>	0,00	0,00	0,00	0,00	0,00	1,05	1,21	1,06
<b>Securitized Bonds</b>	13,62	11,15	8,29	8,17	4,76	0,21	0,47	0,15
<b>Bonds</b>	36,11	25,54	20,54	12,05	7,67	10,51	9,55	10,27
<b>Others</b>	0,41	1,25	1,04	0,20	0,49	1,48	1,06	0,25
<b>Non Financial Institutions</b>	11,80	17,02	10,30	15,48	17,03	14,89	16,60	15,42
<b>Bonds</b>	11,80	17,02	10,30	15,48	17,03	13,64	15,16	13,80
<b>Securitized Bonds</b>	0,00	0,00	0,00	0,00	0,00	1,25	1,44	1,62
<b>Insurance</b>	0,00	0,00	0,00	0,00	0,00	0,32	0,19	0,19
<b>Foreign Fixed Income</b>	0,00	0,00	0,00	0,00	0,00	3,32	3,54	5,17
<b>Equity</b>	0,32	7,35	3,24	3,03	2,32	5,76	6,43	6,54
<b>Financial Institutions</b>	0,00	0,00	0,00	0,00	0,00	1,94	2,49	1,43
<b>Non Financial Institutions</b>	0,00	0,00	0,00	0,00	0,00	3,00	2,93	3,20
<b>Insurance</b>	0,00	0,00	0,00	0,00	0,00	0,02	0,01	0,01
<b>Foreign</b>	0,00	0,00	0,00	0,00	0,00	0,79	1,00	1,91
<b>Liquidity</b>	0,00	0,00	0,00	0,00	0,00	1,05	1,20	1,00
<b>Derivatives</b>	0,00	0,00	0,00	0,00	0,00	0,29	-0,35	0,78
<b>Total Pension Fund (EoP)</b>								
<b>US\$ Millions</b>	809	1.371	2.113	2.885	3.585	4.961	5.472	7.322

Source: Superintendencia Bancaria de Colombia

Note: This classification could contain errors due to the heterogeneity of the information, mainly before 2001

Pension Fund Portfolio Composition  
(Percentages and Million US Dollars)

Chile	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<b>Central Government</b>	28,07	26,00	44,46	42,06	42,44	46,64	41,36	35,41	41,58	44,07	38,30	40,89
<b>Time Deposits</b>	61,91	26,61	2,71	12,16	20,36	22,88	27,41	28,49	20,81	16,26	11,75	9,39
<b>Mortgage Bonds</b>	9,43	46,77	50,65	42,89	35,20	25,50	21,35	20,61	17,70	16,08	13,37	14,23
<b>Financial Institutions</b>												
<b>Bonds</b>	0,00	0,00	0,00	0,60	0,41	0,27	0,68	0,96	0,70	1,05	1,54	1,59
<b>Corporate Bonds</b>	0,59	0,61	2,17	1,81	1,10	0,84	2,60	6,41	9,09	11,14	11,09	9,58
<b>Equity</b>	0,00	0,00	0,00	0,00	0,01	3,75	6,22	8,08	10,10	11,29	23,81	24,01
<b>Mutual Funds</b>	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,17
<b>Foreign Assets</b>	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
<b>Derivatives</b>	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
<b>Liquidity</b>	0,00	0,01	0,02	0,48	0,48	0,12	0,38	0,04	0,03	0,12	0,10	0,14
<b>Total Pension Fund (EoP)</b>												
<b>US\$ Millions</b>	300	606	1.136	1.244	1.533	2.107	2.708	3.603	4.501	6.683	10.078	12.409

Chile	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Central Government</b>	39,30	39,69	39,41	42,10	39,59	40,96	34,59	35,73	35,02	29,99	24,70
<b>Time Deposits</b>	6,14	4,79	5,32	4,20	10,67	13,64	16,11	18,72	17,54	21,25	14,98
<b>Mortgage Bonds</b>	13,11	13,66	15,79	17,87	16,96	16,60	15,10	14,36	12,91	11,14	8,85
<b>Financial Institutions</b>											
<b>Bonds</b>	1,34	1,54	1,31	1,58	1,73	1,45	2,02	2,02	2,05	1,84	1,34
<b>Corporate Bonds</b>	7,26	6,30	5,25	4,67	3,28	3,77	3,79	4,04	6,16	7,14	7,66
<b>Equity</b>	31,86	32,17	30,06	26,00	23,40	14,91	12,41	11,62	10,60	9,89	14,54
<b>Mutual Funds</b>	0,34	0,94	2,56	3,03	3,05	2,88	2,58	2,43	2,38	2,24	2,73
<b>Foreign Assets</b>	0,57	0,90	0,20	0,54	1,25	5,73	13,42	10,88	13,35	16,41	23,89
<b>Derivatives</b>	0,00	0,00	0,00	0,00	-0,02	-0,02	-0,04	0,01	-0,07	-0,03	1,13
<b>Liquidity</b>	0,09	0,02	0,09	0,02	0,08	0,09	0,03	0,19	0,06	0,12	0,11
<b>Total Pension Fund (EoP)</b>											
<b>US\$ Millions</b>	15.877	22.267	25.419	27.517	30.819	31.056	34.656	35.937	35.385	35.826	49.224

Source: SAFP

Pension Funds Portfolio Composition  
(Percentages and Million US Dollars)

Mexico	1998	1999	2000	2001	2002	2003
<b>Government</b>	96,80	97,41	92,59	89,82	85,54	84,46
<b>Corporate Bonds</b>	3,05	2,50	5,41	7,77	12,32	11,04
<b>Banks</b>	0,16	0,09	1,99	2,41	2,14	4,50
<b>Total Pension Fund (EoP) US\$ Millions</b>	5.705	11.424	16.949	27.094	31.197	35.749

Source: CONSAR

Pension Fund Portfolio Composition  
(Percentages and Million US Dollars)

G.Peru	1996	1997	1998	1999	2000	2001	2002	2003
<b>Central Government</b>	0,61	0,33	4,94	7,09	9,02	13,77	12,95	19,47
<b>Time Deposits</b>	25,21	24,93	22,72	22,29	15,09	22,73	25,40	16,45
<b>Mortgage Bonds</b>	0,57	0,47	0,35	0,19	0,08	0,13	0,10	0,07
<b>Securitized</b>	0,00	0,00	0,38	0,45	2,02	2,21	1,57	1,53
<b>Financial Institutions Bonds</b>	19,63	16,82	18,89	16,77	19,92	14,36	7,70	4,87
<b>Corporate Bonds</b>	22,10	22,69	19,21	15,50	17,54	16,31	13,07	12,12
<b>Equity</b>	31,87	34,77	32,71	37,14	28,95	24,81	31,19	35,52
<b>Mutual Funds</b>	0,00	0,00	0,80	0,58	0,67	0,50	0,78	1,03
<b>Foreign Assets</b>	0,00	0,00	0,00	0,00	6,67	4,78	7,20	8,78
<b>Liquidity</b>	0,00	0,00	0,00	0,00	0,03	0,40	0,04	0,16
<b>Total Pension Fund (EoP) US\$ Millions</b>	948	1.505	1.729	2.405	2.750	3.618	4.525	6.367

Source: Superintendencia de Banca y Seguros

Pension Fund Portfolio Composition  
(Percentages and Million US Dollars)

H.Uruguay	1999	2000	2001	2002	2003
<b>Government</b>	62,69	71,19	66,35	69,71	77,57
<b>Time Deposits</b>	23,70	17,31	16,56	6,04	1,95
<b>Corporate Bonds</b>	5,80	4,99	4,33	1,40	1,04
<b>Real Estate, Industrial, Forest</b>	0,00	0,00	0,00	2,90	4,71
<b>Loans to Affiliates</b>	1,98	1,76	1,68	0,51	1,80
<b>Liquidity</b>	5,84	4,75	11,07	19,43	12,92
<b>Total Pension Fund (EoP) US\$ Millions</b>	591	811	1.045	893	1.241

Source: BCU

Note: Government includes Banco Central de Uruguay and Banco

Hipotecario de Uruguay

Liquidity over 1% is invested in deposits in BCU

TABLE 2  
Evolution of portfolio limits in Chile, 1981-  
1998

Asset	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
Convertible			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, public companies			30	30	30	37	37	37	37
Mutual funds				10	10	10	5	5	5
Real estate funds				10	10	10	10	10	10
Venture capital funds							5	5	5
Securitized credit funds							5	5	5
Foreign securities					3	9	9	12	12
Fixed income					3	9	9	12	12
Variable income						4,5	4,5	6	6
Hedging instruments						9	9	9	12

Source: Srinivas, Whitehouse and Yermo (2000)

TABLE 3  
Mexico  
Corporate Bonds Primary Issues  
(Millions Pesos)

Year	Market	Siefores	Siefores/ Market
2001	23.698	11.661	49,2%
2002	45.504	20.790	45,7%
2003	92.171	24.142	26,2%

Source: CONSAR

<b>TABLE 4</b>				
<b>Investment Limits by Instrument - 2004</b>				
<b>Assets</b>	<b>Argentina</b>	<b>Bolivia</b>	<b>Brazil</b>	<b>Chile (3)</b>
Government	80/100	100	100	50
Federal	50/100	100	100	
Provincial and Municipal	30	0	80 (1)	
Central Bank		100	100	
Corporate Bonds	40	30	80 (1)	40
Long Term	40			40
Short Term	20			40
Convertible	40			10
Privatized Companies	20			
Banking Bonds	70	60	80 (1)	50
Secured Mortgage Bonds	40	30		50
Letter of Credits				50
Time Deposits	30	20		50
Short-Term Loans				
Repurchase (REPO) Agreements				
State-owned Company Stocks	50	20	50	30
Industry Stocks				
Preferred Stocks				
Privatized Company Stocks	20			
Indexed Instruments (Stocks)				
Securitized Instruments	10	30		
Primary Placements, New Ventures				
Mutual Funds	20	5		20
Real Estate Funds			14/8	
Venture Capital Funds				
Securitized Credit Funds	20			
Direct Investment Funds	10		10	
(Total) Foreign Assets	10	10		30
Government	10			
Corporate Bond / Equities	10			
Fixed Income			10	
Variable Income				
Hedging Instruments	10		80 (2)	5
NOTE:				
In Colombia there is a 15% limit to securitized investment instruments, real estate, and infrastructure.				
(1) For low-risk, fixed income assets, including their aggregate sum. 20% medium to high-risk, fixed income.				
(2) Fixed income derivatives				
(3) Effective for Fund C.				
(4) Limits are set by credit risk: AAA up to 100%, AA up to 35%, A up to 5%.				
(5) All aggregate assets, excluding national government securities, have a 70% limit. Additionally, excluding BCU, BHU, and time deposits, are subject to a maximum 40% limit.				
SOURCE: Pension Regulators, based on Srinivas, Whitehouse and Lermo (2000).				

<b>TABLE 4</b>				
<b>Investment Limits by Instrument - 2004</b>				
<b>Assets</b>	<b>Colombia</b>	<b>Mexico (4)</b>	<b>Peru</b>	<b>Uruguay (5)</b>
Government	50	100	40	60
Federal			30	
Provincial and Municipal				
Central Bank			30	30
Corporate Bonds	30	100	40	25
Long Term			15	
Short Term				
Convertible				
Privatized Companies				
Banking Bonds	50	100	25	25
Secured Mortgage Bonds	40		40	30
Letter of Credits				
Time Deposits			30	30
Short-Term Loans			10	
Repurchase (REPO) Agreements	15		10	
State-owned Company Stocks	30	0	35	25
Industry Stocks			20	
Preferred Stocks			3	
Privatized Company Stocks				
Indexed Instruments (Stocks)	5			
Securitized Instruments	20		10	
Primary Placements, New Ventures				
Mutual Funds	5		15	25
Real Estate Funds				30
Venture Capital Funds				
Securitized Credit Funds				
Direct Investment Funds				
(Total) Foreign Assets	20	20	10,5	0
Government				
Corporate Bond / Equities				
Fixed Income	20			
Variable Income				
Hedging Instruments			5	
NOTE:				
In Colombia there is a 15% limit to securitized investment instruments, real estate, and infrastructure.				
(1) For low-risk, fixed income assets, including their aggregate sum. 20% medium to high-risk, fixed income.				
(2) Fixed income derivatives				
(3) Effective for Fund C.				
(4) Limits are set by credit risk: AAA up to 100%, AA up to 35%, A up to 5%.				
(5) All aggregate assets, excluding national government securities, have a 70% limit. Additionally, excluding BCU, BHU, and time deposits, are subject to a maximum 40% limit.				
SOURCE: Pension Regulators, based on Srinivas, Whitehouse and Lermo (2000).				

<b>TABLE 5</b>							
<b>Fiscal Performance and Public Debt Investment</b>							
Year	Argentina Public Sector	Debt/GDP	Gov't Securities	Brazil Gov't Securities Plus Fixed income Funds	Debt/GDP	Colombia Public Debt	Debt/GDP
1994			3.8%	16.2%	30.0%		
1995			4.4%	16.3%	30.6%		
1996	52.9%	41.7%	5.7%	22.5%	33.3%	23.8%	25.8%
1997	43.4%	42.0%	3.7%	23.0%	34.4%	20.8%	29.7%
1998	50.0%	42.6%	6.5%	29.3%	41.7%	30.0%	32.3%
1999	52.3%	39.7%	6.3%	37.9%	48.7%	41.7%	39.8%
2000	54.6%	43.6%	6.6%	43.3%	48.8%	49.2%	44.5%
2001	68.0%	51.2%	11.3%	51.7%	52.6%	48.7%	49.3%
2002	76.7%	133.6%	13.3%	54.3%	55.5%	49.4%	57.2%
2003	68.1%	135.9%	12.7%	57.3%	58.7%	48.6%	60.6%

SOURCE: Pension Regulators, IFS, SHCP, BCRP, Rial and Vicente (2003)

<b>TABLE 5</b>								
<b>Fiscal Performance and Public Debt Investment</b>								
Year	Chile Public Sector	Debt/GDP	Mexico Gov't	Foreign Debt /GDP	Peru Public Debt	Foreign Debt /GDP	Uruguay Public Sector	Debt/GDP
1988	35.4%	55.6%						
1989	41.6%	48.7%						
1990	44.1%	47.2%						
1991	38.3%	39.1%						
1992	40.9%	32.0%						
1993	39.3%	29.5%						
1994	39.7%	23.1%						
1995	39.4%	17.9%						
1996	42.1%	15.1%						
1997	39.6%	13.2%						
1998	41.0%	12.7%	96.8%	21.7%	4.9%	34.3%		
1999	34.6%	14.2%	97.4%	17.5%	7.1%	37.5%	68.53%	40.80%
2000	35.7%	13.9%	92.6%	14.0%	9.0%	35.9%	75.94%	45.50%
2001	35.0%	15.9%	89.8%	12.3%	13.8%	35.0%	77.42%	54.70%
2002	30.0%	16.8%	85.5%	12.2%	13.0%	36.4%	89.14%	92.40%
2003			84.5%	12.6%	19.5%	37.4%	90.49%	111.00%

SOURCE: Pension Regulators, IFS, SHCP, BCRP, Rial and Vicente (2003)



**TABLE 7**

**IMPACT OF FISCAL PERFORMANCE IN GOVERNMENT SECURITIES INVESTMENTS**

**Panel II**

**Fixed-effects (within) regression**  
 Group variable (i) : id  
 R-sq: within = 0.2803  
       between = 0.0093  
       overall = 0.0114  
 corr(u\_i, Xb) = -0.2651

Number of obs = 42  
 Number of groups = 5  
 Obs per group: min = 5  
                   avg = 8.4  
                   max = 16  
 F(2,35) = 6.81  
 Prob > F = 0.0032

Gov_sec	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Debt/GDP	.1157257	.0471282	2.456	0.019	.0200503	.2114011
Deficit1/GDP	2.943956	1.056409	2.787	0.009	.7993311	5.088581
_cons	.3500178	.0234455	14.929	0.000	.3024209	.3976146
sigma_u	.31662077					
sigma_e	.07262572					
rho	.95001578	(fraction of variance due to u_i)				

F test that all u\_i=0: F(4,35) = 101.88 Prob > F = 0.0000

**Random-effects GLS regression**  
 Group variable (i) : id  
 R-sq: within = 0.2803  
       between = 0.0094  
       overall = 0.0113

Number of obs = 42  
 Number of groups = 5  
 Obs per group: min = 5  
                   avg = 8.4  
                   max = 16

Random effects u\_i ~ Gaussian  
 corr(u\_i, X) = 0 (assumed)  
 Wald chi2(2) = 13.89  
 Prob > chi2 = 0.0010

min		5%	theta	95%	max
		median			
0.9195	0.9195	0.9319		0.9549	0.9549

Gov_sec	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Debt/GDP	.1142211	.0461341	2.476	0.013	.0237998	.2046423
Deficit1/GDP	2.88427	1.026942	2.809	0.005	.8715002	4.89704
_cons	.3735073	.1782022	2.096	0.036	.0242375	.7227771
sigma_u	.40225974					
sigma_e	.07262572					
rho	.96843272	(fraction of variance due to u_i)				

**Breusch and Pagan Lagrangian multiplier test for random effects:**

$$Gov\_sec[id,t] = Xb + u[id] + e[id,t]$$

Estimated results:

	Var	sd = sqrt(Var)
Gov_sec	.0576594	.2401236
e	.0052745	.07262572
u	.1618129	.40225974

Test: Var(u) = 0

chi2(1) = 44.08  
 Prob>chi2 = 0.0000

**Hausman specification test**

	---- Coefficients ----		
Gov_sec	Fixed Effects	Random Effects	Difference
Debt/GDP	.1157257	.1142211	.0015046
Deficit1/GDP	2.943956	2.88427	.0596859

Test: Ho: difference in coefficients not systematic

$\chi^2(2) = (b-B)'[S^{-1}](b-B), S = (S_{fe} - S_{re})$   
= 0.08  
Prob>chi2 = 0.9619

TABLE 8  
COUNTRY RISK PREMIUM

Year	Argentina	Brazil	Colombia	Mexico	Peru
Emerging Market Bond Index (EMBI)					
1998	601	800		577	573
1999	722	1.036	614	607	603
2000	671	727	668	371	567
2001	1.553	890	601	366	650
2002	5.741	1.376	706	319	616
2003	5.570	837	510	245	429

Source: JP Morgan

TABLE 9  
REAL INTEREST RATE

Year	Argentina	Bolivia	Brazil	Colombia	Chile	Mexico	Peru	Uruguay
1995	9.91	7.35	25.42	12.67	5.17	-0.53	5.31	4.10
1996	7.07	9.39	14.63	9.04	6.73	0.76	3.41	3.94
1997	6.95	9.57	18.34	6.44	5.53	0.31	7.70	4.20
1998	6.75	6.17	25.82	15.56	10.12	-0.84	8.98	5.64
1999	10.01	9.50	16.59	11.25	5.99	-1.12	12.10	10.18
2000	9.07	6.20	10.59	3.58	4.50	-0.31	9.00	6.37
2001	18.26	9.64	9.85	4.68	3.08	1.07	9.67	10.53
2002	3.38	7.41	8.21	2.19	0.92	-1.41	2.78	17.91
2003	6.22	7.37	10.34	1.61	1.68	-0.77	1.95	

Source: IMF

TABLE 10

CHILE  
MULTIFUNDS: VARIABLE INCOME LIMITS

Fund	Minimun	Maximun
A	40	80
B	25	60
C	15	40
D	5	20
E	Not Allowed	Not Allowed

Source: SAFFP

TABLE 11

CHILE  
MULTIFUND COMPOSITION

Fund	Dec.2002	Dec.2003
A	1.4%	5.3%
B	11.1%	18.7%
C	71.2%	55.8%
D	10.6%	16.2%
E	5.8%	4.0%
Total	100.0%	100.0%

Source: SAFP

**TABLE 12**

**REAL INTEREST RATE IMPACT ON FOREIGN ASSET INVESTMENT LIMITS**

**Panel I: All countries excluding Mexico**

**Fixed-effects (within) regression**  
 Number of obs = 59  
 Group variable (i) : id Number of groups = 7  
 R-sq: within = 0.1312 Obs per group: min = 7  
 between = 0.2837 avg = 8.4  
 overall = 0.1617 max = 9  
 F(1,51) = 7.70  
 corr(u\_i, Xb) = 0.2682 Prob > F = 0.0077

Ext_lim	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Real_Int	-.2321133	.0836374	-2.775	0.008	-.4000224	-.0642042
_cons	7.273556	.7164944	10.152	0.000	5.835134	8.711979
sigma_u	5.5127245					
sigma_e	2.2940574					
rho	.85239042	(fraction of variance due to u_i)				

F test that all u\_i=0: F(6,51) = 45.55 Prob > F = 0.0000

**Random-effects GLS regression**  
 Number of obs = 59  
 Group variable (i) : id Number of groups = 7  
 R-sq: within = 0.1312 Obs per group: min = 7  
 between = 0.2837 avg = 8.4  
 overall = 0.1617 max = 9  
 Random effects u\_i ~ Gaussian Wald chi2(1) = 8.33  
 corr(u\_i, X) = 0 (assumed) Prob > chi2 = 0.0039

theta				
min	5%	median	95%	max
0.8389	0.8389	0.8575	0.8575	0.8575

Ext_lim	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Real_Int	-.240995	.0835048	-2.886	0.004	-.4046615	-.0773286
_cons	7.070698	2.135577	3.311	0.001	2.885044	11.25635
sigma_u	5.3120296					
sigma_e	2.2940574					
rho	.84281233	(fraction of variance due to u_i)				

**Breusch and Pagan Lagrangian multiplier test for random effects:**

$$\text{Ext\_lim [id,t]} = \text{Xb} + \text{u[id]} + \text{e[id,t]}$$

Estimated results:

	Var	sd = sqrt(Var)
Ext_lim	35.10228	5.924718
e	5.262699	2.2940574
u	28.21766	5.3120296

Test: Var(u) = 0

chi2(1) = 128.82  
 Prob>chi2 = 0.0000

### Hausman specification test

	---- Coefficients ----		
	Fixed	Random	
Ext_lim	Effects	Effects	Difference
Real_Int	-.2321133	-.240995	.0088817

Test: Ho: difference in coefficients not systematic

chi2( 1) = (b-B)'[S<sup>-1</sup>](b-B), S = (S<sub>fe</sub> - S<sub>re</sub>)  
= 3.56  
Prob>chi2 = 0.0592

**TABLE 13**

**REAL INTEREST RATE IMPACT ON FOREIGN ASSET INVESTMENT LIMITS**

**Panel II: Countries that increased limits**

**Fixed-effects (within) regression**  
 Group variable (i) : id  
 R-sq: within = 0.3021  
       between = 0.9910  
       overall = 0.2735  
 corr(u\_i, Xb) = 0.2484

Number of obs = 26  
 Number of groups = 3  
 Obs per group: min = 8  
                   avg = 8.7  
                   max = 9  
 F(1,22) = 9.52  
 Prob > F = 0.0054

Ext_lim	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Real_Int	-.5343941	.1731817	-3.086	0.005	-.893551	-.1752373
_cons	12.20972	1.223992	9.975	0.000	9.671313	14.74812
sigma_u	4.8092204					
sigma_e	3.1305806					
rho	.70237497	(fraction of variance due to u_i)				

F test that all u\_i=0: F(2,22) = 19.38 Prob > F = 0.0000

**Random-effects GLS regression**  
 Group variable (i) : id  
 R-sq: within = 0.3021  
       between = 0.9910  
       overall = 0.2735  
 Random effects u\_i ~ Gaussian  
 corr(u\_i, X) = 0 (assumed)  
 Wald chi2(1) = 9.04  
 Prob > chi2 = 0.0026

theta				
min	5%	median	95%	max
0.0000	0.0000	0.0000	0.0000	0.0000

Ext_lim	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Real_Int	-.802063	.2668201	-3.006	0.003	-1.325021	-.2791053
_cons	13.84631	1.90151	7.282	0.000	10.11942	17.5732
sigma_u	0					
sigma_e	3.1305806					
rho	0	(fraction of variance due to u_i)				

**Breusch and Pagan Lagrangian multiplier test for random effects:**

Ext\_lim [id,t] = Xb + u[id] + e[id,t]

Estimated results:

	Var	sd = sqrt(Var)
Ext_lim	32.78654	5.725953
e	9.800535	3.1305806
u	0	0

Test: Var(u) = 0  
 chi2(1) = 30.43  
 Prob>chi2 = 0.0000

### Hausman specification test

	---- Coefficients ----		
	Fixed	Random	
Ext_lim	Effects	Effects	Difference
Real_Int	-.5343941	-.802063	.2676689

Test: Ho: difference in coefficients not systematic

chi2( 1) = (b-B)'[S<sup>-1</sup>](b-B), S = (S\_fe - S\_re)  
= 0.00  
Prob>chi2 = 1.0000