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Investment Returns  
in Privately Managed  
Pension Funds: An Initial  
Assessment

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**COMPARING AGGREGATE INVESTMENT RETURNS IN PRIVATELY MANAGED PENSION FUNDS: AN INITIAL ASSESSMENT**

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## ABSTRACT/RÉSUMÉ

### **Comparing aggregate investment returns in Privately Managed Pension Funds: an initial assessment**

This report presents an initial assessment of the financial performance of privately managed pension funds, both mandatory and voluntary, in Latin America and Central and Eastern Europe, as well as selected OECD countries. It provides a comparative description of private pension funds in the 23 countries included in the report, examining the value assets under management, the weight of investments in the economy and the allocation of investments among the various asset categories and financial instruments available. The report also presents a new dataset on the investment performance achieved by the privately managed pension funds, including the annual real rates of return, the annual geometric average of real returns, as well as summary statistics of these returns for all countries for the period for which data is available.

*JEL codes: G23, G28*

*Keywords: Pension funds; pension plans; defined benefit; defined contribution; occupational plans; personal plans; investment regulation; asset allocation; investment returns; asset valuation*

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### **Comparer le rendement global des investissements des fonds de pension à gestion privée : première évaluation**

Ce rapport présente une première évaluation de la performance financière des fonds de pension à gestion privée, tant obligatoires que volontaires, en Amérique latine et centrale et en Europe de l'Est, ainsi que dans certains pays de l'OCDE. Il décrit en les comparant les fonds de pension à gestion privée dans les 23 pays considérés, examinant la valeur des actifs sous gestion, le poids des investissements dans l'économie et la répartition des investissements entre les diverses classes d'actifs et divers instruments financiers disponibles. Le rapport présente aussi une nouvelle série de données concernant les performances obtenues par les fonds de pension à gestion privée, à savoir notamment taux de rendement annuel réel, moyenne géométrique annuelle des rendements réels, et statistiques succinctes des rendements pour tous les pays sur la période sur laquelle les données sont disponibles.

*Classification JEL : G23, G28*

*Mots clés : fonds de pension ; plans de pension ; prestations définies ; cotisations définies ; plans professionnels ; plans personnels ; réglementation des investissements ; allocation d'actifs ; rendement des investissements ; valorisation des actifs*

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# **REPORT A**

## **COMPARING AGGREGATE INVESTMENT RETURNS IN PRIVATELY MANAGED PENSION FUNDS: INITIAL ASSESSMENT**

**by Waldo Tapia<sup>1</sup>**

### **I. Introduction**

This report presents an initial assessment of the financial performance of privately managed pension funds, both mandatory and voluntary, in Latin America and Central and Eastern Europe, as well as selected OECD countries.<sup>2</sup>

The report provides first a comparative description of the privately managed pension funds in the 23 countries included in the study. For this purpose, it classifies countries covered according to (1) whether pension funds are mainly occupational or personal;<sup>3</sup> (2) the prevalence of defined benefit or defined contribution pension plans; (3) the flexible or strict nature of investment regulations that pension plans are subjected to; and (4) the levels of contributions to privately managed pension plan.

Section three presents an international comparison of the privately managed pension funds in terms of the total value of pension assets under management, the level of assets as percentage of the economy and the allocation of pension assets among the various asset categories and financial instruments available.

Section four presents an initial overview of the investment performance achieved by the privately managed pension funds. This section provides the annual real rates of return, the annual

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<sup>1</sup> The author is a consultant of the Private Pension Unit, Financial Affairs Division, Directorate for Financial and Enterprise Affairs, Organization for Economics and Co-operation and Development. Financial support from the BBVA is gratefully acknowledged. The views expressed are the sole responsibility of the author and do not necessarily reflect those of the OECD or its member countries.

<sup>2</sup> The Latin America countries are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Mexico, Peru, and Uruguay, whereas the Central and Eastern Europe (CEE) countries are the Czech Republic, Estonia, Hungary, Kazakhstan, and Poland. These countries have reformed their pensions systems over the past two decades introducing privately managed funded pensions that have reached a certain minimum size and are expected to play a significant role in the provision of retirement income. The OECD countries are Australia, Canada, Japan, the Netherlands, Sweden, the United Kingdom, and the United State. Hong Kong (China) has also being included in the study. These countries have large privately managed funded pension funds.

<sup>3</sup> According to the OECD pension taxonomy, an *occupational pension plan* is linked to an employment or professional relationship between the plan member and the entity that establishes the plan (the plan sponsor). They may be established by employers or groups thereof (e.g. industry associations) and labour or professional associations, jointly or separately. The plan may be administered directly by the plan sponsor or by an independent entity (a pension fund or a financial institution acting as pension provider). *Personal pension plans* on the other hand are not linked to an employment relationship. However, the employer (e.g. Slovakia) or the State (e.g. Czech Republic) may nonetheless contribute to personal pension plans.

geometric average of real returns, as well as summary statistics of these returns for all countries for the period for which data is available.<sup>4</sup>

## II. Comparative Description of Privately Managed Pension Funds

There is a large variety of pension arrangements across the countries covered in this study. For example, pension provision through privately managed pension plans could be mandatory or voluntary, pension plans could be linked an employment relationship, making them occupational pension plans, or being personal plans. Moreover, pension provision could be through define contribution or define benefit arrangements. Additionally, privately managed pension funds operate under different investment regulations and in some countries they are subject to minimum return requirements.

Therefore, this section provides a comparative description of privately managed pension funds according to whether private provision is mandatory or voluntary, whether they are occupational or personal pension plans, and according to whether they are defined benefit or defined contribution. Finally, the last part of the section describes the type of investment regulations that these privately managed pension plans face in their respective countries, and the minimum return requirements.

### 1. Occupational plans vs. personal plans

Western Europe, North America and Asia-Pacific countries have well developed privately managed pension funds based on occupational pension plans (Table 1).<sup>5</sup> These plans are voluntarily as in the United Kingdom and the United States, mandatory as in Australia or quasi-mandatory (i.e. most workers are enrolled as a result of employment agreements between unions and employers) as in the Netherlands. Latin American (with the exception of Brazil) and Central and Eastern European countries (with the exception of Czech Republic), on the other hand, rely mainly in mandatory personal pension plans.

**Table 1: Comparative description of privately managed pension funds examined in the report by form of provision**

Country	Date Implemented	Mandatory		Voluntary	
		Occupational	Personal	Occupational	Personal
Latin American countries					
Argentina	1994		✓		
Bolivia	1997		✓		
Brazil	1977			✓	
Chile	1981		✓		
Colombia	1994		✓		
Costa Rica	2001		✓		
El Salvador	1998		✓		
Peru	1993		✓		
Mexico	1998		✓		
Uruguay	1996		✓		
Central and Eastern European countries					
Czech Republic	1994				✓
Estonia	2002		✓		

<sup>4</sup> An associated report describes the valuation methodology of pension fund assets and the different calculation methodologies used by the asset managers in order to assess the performance of pension funds.

<sup>5</sup> Table 1 does not describe all the different types of privately managed pension plans available in all countries, but only those included in this study. For example, all OECD countries have voluntary personal pension plans, but they are not included in this study.

Hungary	1998		✓		
Poland	1999		✓		
Kazakhstan	1998		✓		
<b>North American countries</b>					
Canada	1965			✓	
United States	1947			✓	
<b>Western European countries</b>					
Netherlands	1952	✓			
Sweden	1967			✓	
United Kingdom	1834			✓	
<b>Asia - Pacific countries</b>					
Australia	1992	✓			
Hong Kong	2000	✓			
Japan	1944			✓	

#### *a. Occupational pension plans*

Occupational pension, mainly found mainly Western Europe, North America, Asia-Pacific, and Brazil.<sup>6</sup> Among these countries, occupational plans can be either voluntary, voluntary contracting from social security, quasi-mandatory or mandatory.

Participation in occupational pension plans is voluntary in the United States, Canada and Brazil, and employers are not obliged to provide pension plans to their employees. However, employers are encouraged to provide them through special tax provisions. These pension plans can be essentially of two types: single employer or multi-employer plans. The former only cover employees of a single company, whereas, multi-employer plans are established pursuant to a collectively bargained agreement with an organization representing employees in a common industry.

Voluntary contracting out pension plans are used in Japan and the United Kingdom. Under this approach, employees and employers have the option of not fully participating in the Social Security program. Contributions to Social Security may be reduced in exchange for reduced social security benefits. When choosing this option, pension plans must be established for employees that replace the lost social security benefits.

Quasi-mandatory pension plans, on the other hand, are not mandated by law but are required by labour contracts. The Netherlands and Sweden are examples of countries where occupational plans are quasi-mandatory. Occupation plans are implemented generally through national-wide or industry-wide collective labour agreements. In the Netherlands, for instance, there is no legal obligation for employers to set-up a pension scheme. However, participation in an industry-wide pension fund is often determined by a collective labour agreement or can even be declared mandatory by the State. Sweden, on the other hand, supports its occupational plans on nation-wide collective agreements between employer and employees organizations. In both countries, permanent employees are obliged to participate in the occupational pension plan.

Finally, occupational pension plan are mandatory in Australia (the Superannuation Guarantee system) and Hong Kong (the Mandatory Provident Fund system, MPF). The regulatory framework in both countries obliges the employer to contribute a percentage of employee's salary into the pension funds on behalf of employees.

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<sup>6</sup> Brazil is the only country in Latin America that has not followed the region-wide trend towards a pension system based on funded personal pension plans.

## *b. Personal pension plans*

Since the early 1980s, personal pension plans have been broadly introduced in many developing countries, especially in Latin America and Central and Eastern Europe.<sup>7</sup> All personal pension plans in Latin American countries and nearly all in Central and Eastern European countries, with the exception of Czech Republic, are mandatory.<sup>8</sup>

Among Latin American countries, there were three models used to introduce mandatory privately managed fully funded pensions based in personal accounts. Some countries (Chile, Bolivia, El Salvador, and Mexico) closed their *Pay-As-You-Go* (PAYG) mandatory public system completely to new entrants, and required employees to contribute instead to privately-managed fully-funded personal accounts.<sup>9</sup> In other countries the PAYG public system coexists with privately managed fully funded pensions based on personal account (Argentina, Uruguay and Costa Rica). Colombia and Peru offer the privately managed fully funded personal accounts only as an alternative to the existing publicly managed PAYG pension system. In these two countries, new entrants to the labour market have a period to decide whether to either of them.<sup>10</sup> Finally, in either model, members contribute to a fully-funded individual accounts managed by specialized financial institutions called pension fund administrators. These companies invest the funds.

Following the Latin American model, several transitioning economies in Central and Eastern Europe introduced in the late 1990s mandatory privately managed fully funded pension plans based on personal accounts personal pension plans as part of their national pension systems. In contrast with the Latin American experience where a significant number of countries effectively close down or phase out the PAYG system, Central and Eastern Europe countries kept a reformed PAYG system together with mandatory privately managed pensions based on individual accounts. However, the Czech Republic has so far decided against compulsory personal pension plans. Instead, they adopted in 1994 a supplementary pension insurance system which complements the mandatory publicly managed PAYG system. All pension funds in Central and Eastern Europe countries are required to operate on a purely defined contribution basis.

## **2. Defined benefits and defined contribution plans**

In broad terms, depending on how pension benefits are calculated and who bears the risks embedded, in particular longevity and investment risks, pension plans can be either defined benefit or defined contribution plans.<sup>11</sup> Defined benefit plans are structured in such a manner that the employer

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<sup>7</sup> Chile was the first country that introduced mandatory personal pension accounts back in 1981. This was part of a comprehensive reform of its social security system replacing the mandatory publicly managed pay-as-you-go (PAYG) system by a mandatory privately fully-funded system based on individual accounts.

<sup>8</sup> Latin American and Central and Eastern European countries have also voluntary personal pension plans, but they are not included in this study.

<sup>9</sup> The transition provisions provide compensation for accrued benefits under the old system.

<sup>10</sup> By default, employees are automatically affiliated to privately managed pension funds. Those who joined the private pension system but contributed to public pensions were provided with recognition bonds, representing the contribution registered under the old social security scheme.

<sup>11</sup> Following the OECD pension taxonomy, defined benefit plan is any pension plan other than a defined contribution plan, including all plans in which the financial or longevity risk are borne by the plan sponsor. Benefits to members are typically based on a formula linked to members' wages or salaries and length of employment. Alternatively, Defined contribution plan is a pension plan by which benefits to members are based solely on the amount contributed to the plan by the sponsor or member plus the investment return thereon. This does not include plans in which the employer that sponsors the plan guarantees a rate of return. See the OECD (2004), "Classification and Glossary of Private Pensions" for a full distinction.

assumes a portion (or all) of the investment risk, whereas defined contribution plans are constructed in such a manner that the participant assumes virtually all of the investment risk.

Occupational pension plans in OECD countries have traditionally been structured as defined benefit plans. However, in recent years there has been a shift from defined benefit to defined contribution plans, in particular in the United Kingdom and in the United States.<sup>12</sup> In these countries companies have closed or frozen their defined benefit plans, or have transferred them to defined contribution plans, mainly as a result of concerns about the impact that rising life expectancy and new regulations regarding liabilities may have on their financial situation.

In contrast, occupational pension plans in the Netherlands and Sweden have mainly preserved their defined benefit character in recent years by introducing some defined contribution features in their mainly defined benefit plans.<sup>13</sup> In the Netherlands, for instance, defined benefit plans cover over 91% of members of the quasi-mandatory occupational pension plans and represent over 95% of total assets.<sup>14</sup> Similarly, pension plans in Japan have largely preserved their defined benefit character.

Brazil, like many other countries with occupational pension plans, has also witnessed a trend toward defined contribution plans. Since 1995 no new defined benefit plan has been created and some of the existing defined benefit plans have been either closed to new members or migrated to the so-called mixed plans.<sup>15</sup> Indeed, the majority of closed funds sponsored by public and private companies operate under a mixed system. According to a study carried out by the Secretary of Pension Funds show that by the end of 2003 around 36% of plans were defined benefit, 16% were defined contribution and 47% mixed.<sup>16</sup>

Occupational plans in Hong Kong and Australia offer mainly defined contribution plans. According to the Australian Prudential Regulatory Authority, over 80% of members in the Superannuation Guarantee system are covered by a defined contribution plan.<sup>17</sup> However, as many of the funds were originally structured as defined benefit funds, many of these funds offer defined contribution plans to new members while preserving the defined benefit option for their present

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<sup>12</sup> In 1980, around 32% of active members of an occupational pension plan were covered by a defined contribution plan in the United States. This proportion almost doubled over the next 25 years to reach 62% by 2004 (U.S. Department of Labor (2006), "Private Pension Plan Bulletin Historical Tables"). The United Kingdom Government Actuary Department (GAD) reported in 2006 that the number of private sector employees belonging to defined benefit plans fell from 4.8 million in 2000 to 3.7 million in 2005. This shift has also taken place in Canada, albeit at a slower pace. Defined contribution plans increase their share of members from 8% in 1990 to 16% in 2004. In the private sector, defined contribution accounted for 25% of all members in 2004 compared with 13% a decade earlier (E. Tamagno (2006), "Occupational Pension Plans in Canada: Trends in Coverage and the Income of Seniors").

<sup>13</sup> In the Netherlands, pension plans may be better viewed as hybrid plans. They are like defined benefit plans as accrued pension rights are based on employee's wages and years of service, and contribution rates can be raised in response to funding shortfalls. They are like defined contribution plans in that the annual indexation factor, which is applied to both the accrued rights of active workers and the benefits of retired workers, is tied to investment returns.

<sup>14</sup> Broadbent, J, M Palumbo and E Woodman (2006), "The shift from defined benefit to defined contribution pension plans – implications for asset allocation and risk management"

<sup>15</sup> According to Brazilian regulations, the mixed arrangements are defined contribution plans with some ingredients of defined benefit provision like the cash balance plans, floor benefit plans and target benefit plans.

<sup>16</sup> Reis, A and L Paixão (2005), "Private Pension in Brazil".

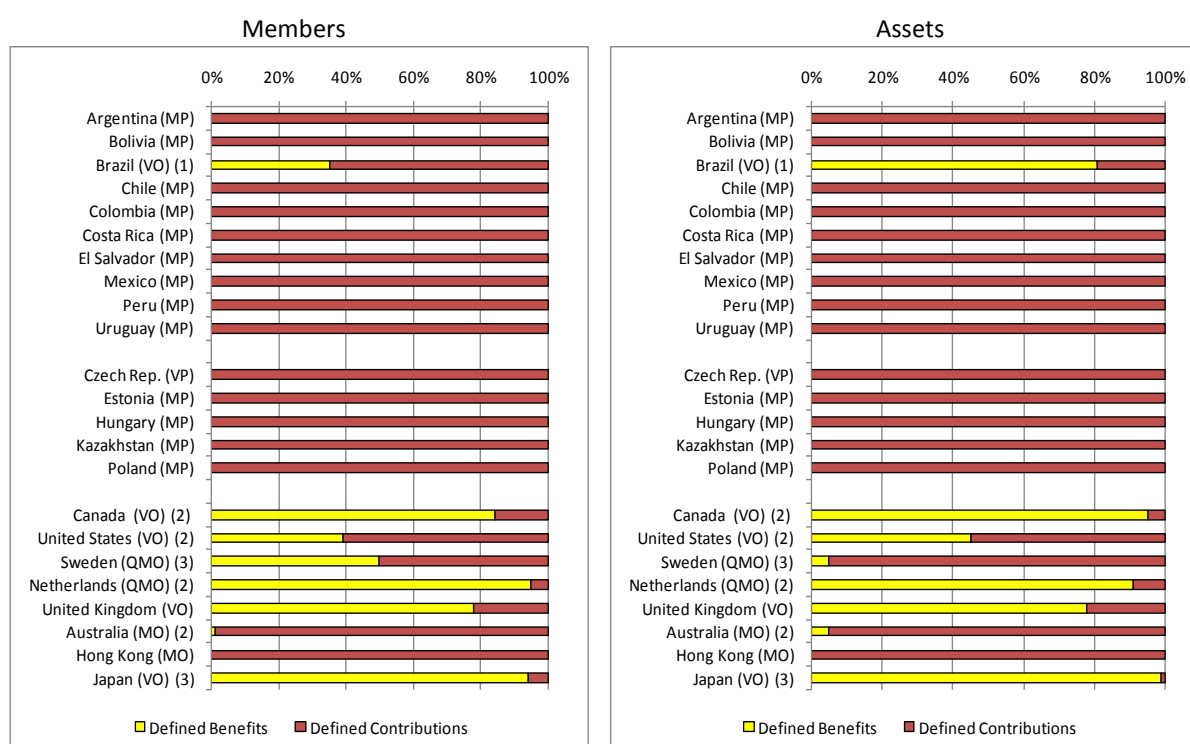
<sup>17</sup> The data only includes entities with more than four members.



members. In 2004, defined contribution plans covered 60% of the overall superannuation market, hybrid plans accounted for 36% and pure defined benefit plans hold only about 4% of the market.<sup>18</sup>

Unlike occupational pension provision, personal pension plans in Latin America and Central and Eastern European countries are entirely of the defined contribution type. These plans are based on contributions to individual accounts in pension funds, which are managed by specialized pension fund management companies (see Figure 1).

**Figure1: Proportion of members and asset in defined benefit and defined contribution pension plans, 2005**



Source: OECD for Latin America and Central and Eastern European countries. E. Tamagno (2006) for Canada. Broadbent, J, M Palumbo and E Woodman (2006) for Sweden, the Netherlands and Japan. U.S. Department of Labor for the United States. The Government Actuary's Department (GAD) for the United Kingdom. Australian Prudential Regulatory Authority (APRA) for Australia. Mandatory Provident Fund Schemes Authority (MPFA) for Hong Kong.

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) 2006 figures

(2) 2004 figures

(3) 2003 figures

### 3. Investment regulation of private pension funds

There are two alternative approaches to portfolio regulation for privately managed pension funds among the 23 countries included in the report: the prudent person principle and quantitative portfolio restrictions. The prudent person principle avoids the imposition of stringent portfolio limits and focuses on regulating the behaviour of investment managers. The quantitative approach prescribes various investment limits which investment managers are obliged to follow in their portfolio allocation on behalf of pension funds.

<sup>18</sup> Australian Prudential Regulatory Authority (2005), "Superannuation Trends, 2004".

These choices may be justified by the relative development of their respective capital markets. For example, the relatively under-developed capital market in Latin American and Central and Eastern Europe countries explain partially the strict investment regulation in these countries. On the contrary, pension funds in countries with better-developed capital markets generally require only a light regulatory framework.

Additionally, mandatory retirement savings arrangements put more responsibility on the government than voluntary arrangements do. Under mandatory arrangements, governments assume a higher degree of responsibility and hence there is a ‘stronger’ case for a more stringent regulatory approach. Finally, countries with defined benefit pensions are in less need for detailed investment regulations as employers stand behind the promised pension benefit. This contrast with the detailed regulation of portfolio in defined contribution pensions, whose value depend more closely on fund performance. Table 2 summarizes the main differences in investment regulation across the different countries.

**Table 2: Main differences in the investment regulation for the different privately managed pension funds**

Country	Investment only in authorized instruments	Limits by instruments	Limits by set of instruments	Limits by issuer	Limit by risk	Minimum return	Foreign limits
<b><u>Latin American Countries</u></b>							
Argentina	√	√		√	√	√	√
Bolivia	√	√	√	√	√		√
Brazil	√	√		√	√	√	√
Chile	√	√	√	√	√	√	√
Colombia	√	√	√	√	√	√	√
Costa Rica	√	√	√	√	√		√
El Salvador	√	√	√	√	√	√	√
Peru	√	√	√	√	√	√	√
Mexico	√	√	√	√	√		√
Uruguay	√	√	√	√	√	√	√
<b><u>Central and Eastern European Countries</u></b>							
Czech Republic	√	√		√			√ (*)
Estonia	√	√		√			√ (*)
Hungary	√	√		√			√ (*)
Kazakhstan	√	√		√		√	√ (*)
Poland	√	√	√	√		√	√ (*)
<b><u>North American Countries</u></b>							
Canada		√		√			√
United States							
<b><u>Western European Countries</u></b>							
Netherlands							
Sweden		√		√			
United Kingdom							
<b><u>Asia Pacific Countries</u></b>							
Australia							
Hong Kong							
Japan							

Source: OECD

Notes: √(\*): Investment regulation specifies the geographical region in where the pension funds may be invested

Pension funds in the Anglo-Saxon countries are generally required to follow “prudent man rules”, whereas Latin American and Central and Eastern Europe countries have tended to adopt a quantitative limit approach as their core regulatory mechanism.

These choices may be justified by the relative development of their respective capital markets. For example, the relatively under-developed capital market in Latin American and Central and Eastern Europe countries explain partially the strict investment regulation in these countries. On the contrary, pension funds in countries with better-developed capital markets generally require only a light regulatory framework.

Additionally, mandatory retirement savings arrangements put more responsibility on the government than voluntary arrangements do. Under mandatory arrangements, governments assume a higher degree of responsibility and hence there is a 'stronger' case for a more stringent regulatory approach. Finally, countries with defined benefit pensions are in less need for detailed investment regulations as employers stand behind the promised pension benefit. This contrast with the detailed regulation of portfolio in defined contribution pensions, whose value depend more closely on fund performance.

#### *a. Western Europe, North America and Asia-Pacific Countries*

Traditionally, pension funds in the Anglo-Saxon countries have tended to adopt a prudent person principle as their core regulatory mechanism. These governments impose few, if any, rules on pension funds' asset allocation. For example, the regulatory framework in the United Kingdom and the United States requires that asset managers invest pension assets on a diversified basis. However, this principle of diversification is stated as a general principle, rather than in terms of specific quantitative rules. Both countries supplement the general standard by explicitly addressing the issue of self-investment. Specifically, they restrict employer-related investments using an explicit, quantitative limit to do so.

In Australia, the prudent person approach governs the investment decisions of trustees, whether they make the decision on their own, or based on the advice of the appointed asset manager. Legally defined trust covenant encourage portfolio diversification, but diversification is not explicitly required. The only quantitative limitation is an explicit restriction on self-investment.<sup>19</sup> Canada, on the other hand, has elected to use some quantitative limitations in addition to the prudent person principle in place. For example, by limiting real estate investment to 25% of a pension fund's portfolio and limiting fund investment in foreign assets to 30%.<sup>20</sup>

Similarly, other countries less associated with the Anglo-Saxon tradition have also adopted a prudent person approach to regulation. For instance, in the Netherlands the only quantitative regulation is on the investment in the shares of the sponsoring company. Similarly, Japan abolished quantitative regulation of asset allocation and switched to the prudent person principle in 1990.

#### *b. Latin American countries*

Given the compulsory nature of participation, pension systems in Latin American countries have tended to establish a strict quantitative limit approach to regulate the composition of portfolios. This approach specifies certain categories of instruments in which the pension funds assets can be invested. In addition, the regulation also specifies a range for the maximum percentage of the fund that can be invested in each instrument.<sup>21</sup>

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<sup>19</sup> In Australia, self invested is limited to 5%.

<sup>20</sup> Investment regulation in Canada also requires that asset managers invest pension assets on a diversified basis (e.g. maximum of 10% of total book value of assets may be invested in securities stocks, bonds and notes of one company or person.

<sup>21</sup> The regulatory framework usually allows pension funds to invest in four main asset categories: government bonds, capital market instruments (stocks and bonds), bank deposits and foreign assets, with varying limits in different countries.

Although the general model of restriction is similar among countries, there are significant differences regarding the values at which the different limits have been set. The greater differences are found in the limit on foreign securities and equities. Thus, while El Salvador and Uruguay have not yet authorized the investment of assets abroad, Chile allows pension funds to invest up to 30% in foreign instruments. Similarly, allocation into equities has been strictly limited in countries as Mexico and Uruguay, whereas others, as Chile, have raised the limit on equity holding up to 80%.<sup>22</sup> Investment limits on government bonds have been typically generous in all countries, reflecting not only the fact that these assets would form part of a well-balanced portfolio, but also because governments needed to finance the cost of transition from a stated-managed social security system.<sup>23</sup>

Currently, Uruguay has one of the most restrictive investment regimes among Latin American countries, while Chile and Peru have the most liberal regulations. Both countries have progressively liberalized their investment regulations, as capital market became more developed and confidence in the operation of the system increased. Unlike most Latin American countries, pension plans Brazil, is one example of a non-OECD country that has been moving in recent years from a stringent quantitative limitations approach towards a greater reliance on a prudent person rule.

### *c. Central and Eastern European countries*

Similar to Latin American countries, the investment regulation in Central and Eastern European countries have tended to impose thought quantitative restrictions on investment of pension fund assets. Generally, there are limits per instrument, per issuer, per risk, per group of instruments, and some specific limits for issuers that have property relations with the pension fund manager.

Most of Central and Eastern European countries limit equity exposure. The difference is only the rate of direct limitation. In Poland, the limit is 40%, while in Estonia and Kazakhstan pension funds are allowed to invest up to 50% of their assets.<sup>24</sup> Czech Republic and Hungary are the only countries covered by the study with no investment restriction on equities.<sup>25</sup>

Limits on foreign securities are set up as a percentage of total assets, but investment regulation also specifies the geographical region in where the pension funds may be invested. In Hungary, for instance, the direct limit of 30% on foreign investments is supplemented by a further limit on non-OECD country investments (set at 20% of all foreign investments). Estonia makes no distinction between domestic assets and securities issued in EEA and OECD countries<sup>26</sup>. Poland has the strictest

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<sup>22</sup> Since August 2002, Chilean pension funds managing companies are required to offer four different types of funds, called simply funds B, C, D, and E, with varying degrees of risk. Companies may also offer an additional fund A. The funds are differentiated mainly by the proportion of their portfolio invested in variable income. Similarly in Mexico, since January 2005 pension funds managing companies are required to two different types of funds, called SIEFORE 1 (no equity exposure) and SIEFORE 2 (up to 15% of equity exposure). See the Tapia, W (2007), "Private pension systems across countries" for additional information.

<sup>23</sup> In Mexico, a new investment law approved on November 12, 2004 authorized two main changes in the investment regime of pension funds. The regulation allows pension funds to invest up to 15% in equities and up to 20% in foreign securities.

<sup>24</sup> Since the beginning of the mandatory private pension system, Estonian pension fund managing companies can offer more than one fund, provided that investment policies differ significantly and that one of these funds is invested in fixed income products only. Three types of funds with different risk/return characteristics are on offer and admissible: Conservative fund (with no equity exposure), Balanced fund (up to 25% in equity exposure) and Aggressive fund (up to 50% in equity exposure).

<sup>25</sup> In Czech Republic this investment regulation was eliminated in 2004, whereas in Hungary in 2005.

<sup>26</sup> In Estonia, there is a limit on investments in countries outside the EEA and OECD – for companies registered in such countries, 30% of assets may be invested in their securities, for instruments traded only in such countries, 20% of pension fund assets may be invested in those securities.

rule on foreign investments, only 5% of assets are to be used for such instruments. In Kazakhstan, on the other side, the limit on foreign investment introduces a risk factor to differentiate between issuer with higher or lower risk.

In general, there is no maximum limit for fixed income instrument, but certain countries set up specific limits per issuer and per risk rating. Estonia, for instance, is the only country to limit investments in government bonds (35%). Kazakhstan, on contrary, imposes a minimum limit in securities issues by the central government (not less than 25%).

Unlike the mandatory systems, the voluntary system in Czech Republic operates one of the more liberal investment regulatory regimes in the region. Assets may be invested in a broad range of financial instruments that have been authorized by the investment regulation. There are no legal restrictions on pension funds investing in equities and foreign assets. However, foreign investment is permitted only for securities traded in OECD markets.

#### **4. Minimum return**

Several mandatory personal plans in Latin America and Central and Eastern Europe regulate the performance of portfolio by requiring privately managed pension funds to guarantee a minimum return, measure in either absolute (nominal or real) term or relative to the performance of other pension funds. The aim of this minimum return requirement is to protect the value of the affiliate's pensions against over aggressive behavior by the asset managers.

Chile, Argentina, Peru, Uruguay, and Colombia require pension funds to achieve rates of return above a prescribed minimum, typically calculated relative to the industry average. For example, in Chile, managers are required to earn a minimum, which is lesser of 200 basis points below the average system return or half the average return of the industry during the last 36 months. Those who fail to meet this criterion are required to compensate the portfolio with resources from a fluctuation reserve fund, which is established with the manager's own capital. If the reserve is insufficient to top up the fund's return to the minimum, the government guarantees the minimum return.

Among Central and Eastern European countries, Kazakhstan and Poland, also guarantee a minimum rate of return. Poland and Kazakhstan, define the minimum return as the above Latin American countries.<sup>27</sup> In Hungary, until 2002, mandatory pension funds were subject to a relative minimum return guarantee. The minimum return was a percentage of the official return index of long-term government bonds. Now pension funds need to disclose a target rate of return, but missing it has no consequences.

#### **5. Contribution rate**

Levels of contributions to privately managed pension plans vary greatly across the countries covered in this study, reflecting the relative importance given to private pension provision. Additionally, the structure of pension provision and the coverage of pension plans in the countries should also be taken into account when comparing their pension contribution levels.

Extensive data on occupational pension contributions are not easily available. They often vary from company to company and even within one single company for different groups of employees. In some countries, average contribution rates usually vary between industries or according to the employee's age and sex, and the size of the company.

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<sup>27</sup> In Poland, the minimum rate of return is defined as the lower of the following two values: (i) the average real annualised rate of return for all pension funds over the last 36 months, minus four percentage points, or (ii) The average real annualised rate of return for all pension funds over the last 36 months, minus 50 % of this average rate.

Occupational plans may be contributory or non-contributory. In non-contributory pension plans the entire cost of the plan is borne by the employer, while in contributory plans employees pay a portion of the cost. Generally, the plan rules determine whether the employee contributes and at what rate. In the United States, for instance, defined benefit pension plans are funded by the employer, whereas defined contribution pension plans are mainly funded by the employee. In the United Kingdom, the total contribution is normally shared between the employer and the employees, although some pension plans are financed exclusively by the employer. In Australia and Japan, on the other hand, the contribution rate to occupational pension plans are primarily financed by the employer.<sup>28</sup>

In some countries, including the Netherlands, Japan, the United Kingdom the contribution rate may vary considerably among pension plans, due to the fact that some plans are integrated within the social security system. As a result, the contribution rates for occupational plans cover both private and public pension system.<sup>29</sup>

Mandatory defined contribution pension systems in Latin America are financed mainly through contributions paid solely by the employee. Chile, El Salvador, Peru and Uruguay require contributions of more than 10% of earnings (including administrative charges and disability insurance). In Mexico, on the other hand, the total contribution (6.5% of earnings), is shared between the employer (5.15%), the employee (1.125%) and the government (0.225%). Additionally, the government pays into the individual account a flat-rate amount (the so-called social quota) of MXN 2.74 for each day of work.

Contribution rates tend to be lower in the mandatory defined contribution systems of Central and Eastern Europe, ranging from 6% in Estonia to 10% in Kazakhstan. This is no surprise since all the Eastern European countries with defined contribution programs have retained a sizeable public, earnings-related pension, something which few Latin American countries have done. In the Czech Republic, contributions to the voluntary pension system depend on the conditions stipulated in the pension plan. However, contributions may not be lower than CZK 100/month. The State makes additional contributions on behalf of individuals, which are subject to certain limits.

**Table 3: Contribution rate of privately managed pension funds covered in the report**

Country	Contribution rate
<b>Latin America countries</b>	
Argentina	Employees paid a total contribution of 7% of their taxable income, of which 4.481% goes into their individual account, 1.269% to the insurance company and 1.250% cover the administrator's commission.
Bolivia	Employees paid a total contribution of 12.2% of their taxable income, of which 10% goes into their individual account, 1.7% to the insurance company and 0.5% to cover the administrator's commission.
Brazil	The contribution rate depends on plans rule, however usually contributions are limited to a maximum of 20% of salary. Both employees and employers contribute to the pension plan. Employee contribution is around 6% of salary, and employer contribution range from 8% to 10% of salary.
Chile	Employees paid a total contribution of 12.3% of their taxable income, of which 10% goes into their individual account, 0.95% to the insurance company and 1.35% cover the administrator's commission.
Costa Rica	The total contribution rate is 4.25% of the employee's taxable income. Of this percentage, 1% is paid by the employee and 3.25% by the employer.
El Salvador	Employees paid a total contribution of 13% of their taxable income, of which 10.02% goes into their

<sup>28</sup> In Australia, individuals can choose to make extra voluntary contributions to their pension fund and receive tax benefits for doing so.

<sup>29</sup> In Japan, for instance, the total contribution rate to the Employee Pension Funds has two components. The first part substitutes the earnings-related public pension system. This means that companies may opt out of the public scheme on the condition that Employee Pension Funds provide 50% higher benefits than the earnings-related public pension system (10% for existing Employee Pension Funds). The second component offers complementary pension benefits.

	<i>individual account, 1.28% to the insurance company and 1.71% to cover the administrator's commission.</i>
Mexico	<i>The total contribution rate is 6.5% of the employee's taxable income. Of this percentage, 1.125% is paid by the employee, 5.15% by the employer, and 0.225% by the government.</i>
Peru	<i>Employees paid a total contribution of 10.91% of their taxable income, of which 8% goes into their individual account, 0.91% to the insurance company and 1.99% to the pension fund managing company to cover the administrator's commission.</i>
Uruguay	<i>Employees paid a total contribution of 15% of their taxable income, of which 12.17% goes into their individual account, 0.98% to the insurance company and 1.85% cover the administrator's commission.</i>
<b>Central and Eastern European countries</b>	
Czech Republic	<i>Members pay monthly contributions according to the conditions stipulated in the pension plan. However, contributions may not be lower than CZK 100/month. The State makes additional contributions on behalf of individuals, which are subject to certain limits.</i>
Estonia	<i>The total contribution rate for the private pension is 6% of the employee's taxable income. Of this percentage, 2% is paid by the employee and 4% by the employer.</i>
Hungary	<i>The total contribution rate for the private pension is 8% of the employee's taxable income, which is paid entirely by the employee.</i>
Poland	<i>The total contribution rate for the private pension system is 7.3% of the employee's taxable income, which is paid entirely by the employee.</i>
Kazakhstan	<i>The total contribution rate for the private pension system is 10 % of the employee's taxable income, which is paid entirely by the employee.</i>
<b>North American countries</b>	
Canada	<i>Registered pension plans may be contributory or non-contributory. The contribution rate to registered pension plans varies between schemes. The total employee and employer contribution rate must not exceed the lower of 18% of salary or CAD 18,000 a year.</i>
United States	<i>Defined benefit pension plans are usually non contributory, whereas defined contributions plans are contributory. The contribution rate varies between schemes. Among defined contribution plans, the average member contribution rate in 2005 was 7.31% of their income.</i>
<b>Western European countries</b>	
Netherlands	<i>The level of contribution depends on each individual scheme. The employer and employee usually both pay contributions. By 2005, the average employer and employee contribution was 10.8% and 5.3% respectively.</i>
Sweden	<i>Contribution to the occupational pension plans varies significantly between schemes. The contributions are typically between 2 and 5% of wages.</i>
United Kingdom	<i>Occupational plans can be contributory or non contributory. By 2004, the weighted average contribution in defined benefit schemes was 4.3% for employees and 14.5% for employers. Contributions to defined contribution schemes were lower, at 2.9% for employees and 6.0% for employers.</i>
<b>Asia-Pacific countries</b>	
Australia	<i>The Superannuation Guarantee Act requires employers to contribute a prescribed minimum amount into superannuation funds. The prescribed minimum contributions were set initially at 3% in 1992, rising gradually to 9% in 2002-03. Employers need not contribute for workers earning less than A\$ 450 a month.</i>
Hong Kong	<i>The total contribution rate for the MPF plans is 10% of the employee's relevant income. Of this percentage, 5% is paid by the employee and 5% by the employer.</i>
Japan	<i>Contributions into the EPF are divided into two parts. The first part is the contribution that substitutes a portion the old-age benefits of the earnings-related public pension system (13.55% to 14.15 of the basic wage). This contribution is shared by employers and employees. The second part (rebate for EPF) is the contribution for the additional private occupational pension benefits provided by the EPF. From April 2003, the rebate for the EPF varies between 2.4% to 3.0%.</i>

### III. International Comparison of Privately Managed Pension Funds by Assets and Asset Allocation

#### 1. Pension assets

The total amount of assets held by privately managed pension funds vary significantly across the countries included in the study (Table 4). This variation reflects the size of the economy as well as factors related to the design of the pension system (e.g. contribution rate), coverage levels and the maturity of the system. By the end of 2005, total assets in the 23 countries covered in this study amounted to over US\$ 16.5 billion.

**Table 4: Pension fund assets for the different privately managed pension funds, 1990-2005**

Country	Assets (millions US\$)					
	1990	1995	2000	2002	2004	2005
<b><u>Latin American Countries</u></b>						
Argentina (MP)	-	2,497	20,381	11,409	18,238	22,565
Bolivia (MP)	-	-	842	1,144	1,716	2,060
Brazil (VO)(1)	-	76,992	73,899	54,475	105,194	137,558
Chile (MP)	-	25,143	35,886	35,515	60,799	74,756
Colombia (MP)	-	266	3,584	5,482	11,075	16,015
Costa Rica (MP)	-	-	-	138	474	711
El Salvador (MP)	-	-	482	1,097	2,148	2,896
Mexico (MP)	-	-	17,012	31,748	43,033	55,205
Peru (MP)	-	583	2,752	4,527	7,844	9,397
Uruguay (MP)	-	-	811	893	1,678	2,153
<b><u>Central and Eastern European Countries</u></b>						
Czech Rep. (VP)	-	-	1,172	2,053	3,886	5,152
Estonia (MP)	-	-	-	15	213	370
Hungary (MP)	-	-	626	2,976	6,989	9,336
Kazakhstan (MP)	-	-	-	-	3,833	4,847
Poland (MP)	-	-	2,337	8,087	17,140	26,513
<b><u>North American Countries</u></b>						
Canada (VO) (2)	170,830	251,322	409,894	341,777	541,542	682,966
United States (VO)	3,372,779	6,102,599	10,163,210	8,764,040	11,638,070	12,348,250
<b><u>Western European Countries</u></b>						
Sweden (QMO, MP) (3)	-	-	-	18,542	26,373	33,211
Netherlands (QMO)	-	201,496	435,380	448,021	733,911	739,984
United Kingdom (VO)	583,937	789,063	1,142,825	978,903	1,467,118	1,763,762
<b><u>Asia Pacific Countries</u></b>						
Australia (MO)	-	115,902	190,595	210,402	416,434	477,366
Hong Kong (MO) (4)	-	-	-	7,059	15,456	19,465
Japan (VO) (5)	179.63858	378.77863	465.77638	380.00662	258.9394	-

Source: OECD

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) For Brazil data includes information only from closed pension entities.

(2) Data for Canada includes information from Trustee pension funds.

(3) Data for Sweden includes information from occupation pension funds and the Premium Pension System.

(4) Data for Hong Kong include information from the Mandatory Provident Fund pension system.

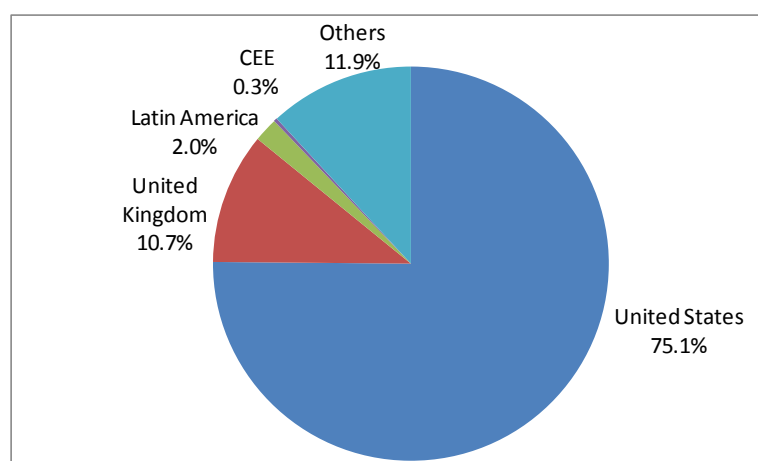
(5) Data for Japan includes information from the Employee's Pension Fund system. Data for 2005 is not available.

Pension funds in the United States manage by far the largest amount of assets, encompassing about three-fourth of all pension assets included in the report. The United Kingdom comes next, followed by the Netherlands. In these three countries, assets have grown sharply over the last 10 years, from US\$7.0 trillion in 1995 to US\$14.8 trillion by 2005, representing a compound growth rate of 7.7% per annum.

The relatively small size of accumulated assets in Latin America and Central and Eastern European countries is partly explained by the recent implementation of their private systems. Privately managed pension funds in Latin America (with the exception of Chile and Brazil) and Central and Eastern Europe have less than ten years (See Figure 2).



**Figure 2: Distribution of total assets of the private pension systems covered in the report**



Source: OECD

Note: Others include the Netherlands, Canada, Japan, Hong Kong and Sweden

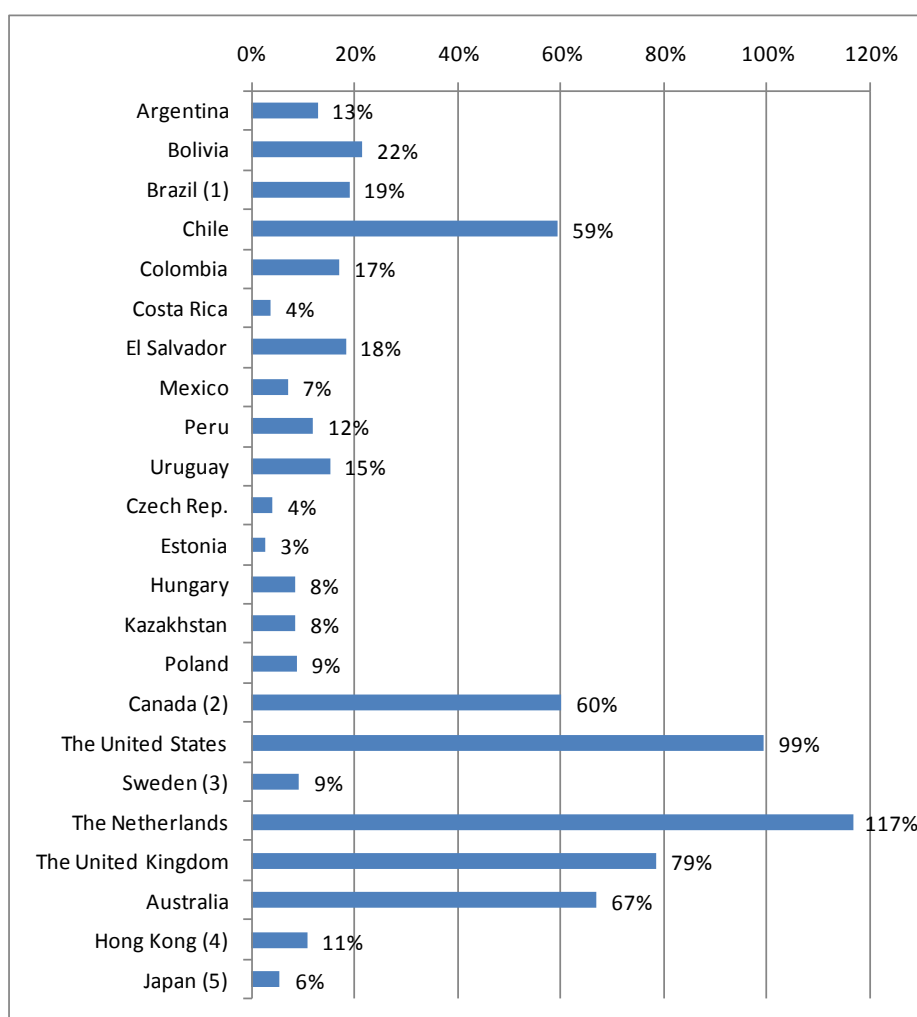
Pension funds in Latin American countries have accumulated a vast amount of assets in all countries where they have been established, with a total value of US\$ 323 billion at the end of 2005. Brazil and Chile have the largest pension fund industries in Latin America, accounting for approximately 66% of all pension assets in the region. The large size of the private pension industry in these two countries is largely a result of their early establishment and, in Brazil's case, of the size of the economy. Mexican reforms have been in place for almost 10 years and assets are also large (US\$ 55 billion) reflecting the fact that Mexico has the greatest number of participants in the region, and is the second largest economy in Latin America. On the contrary, countries such as Bolivia, Costa Rica, and Uruguay, have accumulated assets around or less than US\$ 2 billion.

In the Central and Eastern Europe countries, privately managed pension funds are still too young to have accumulated a large amount of pension assets in spite of their successful pension reforms. By the end of 2005, the assets under management amounted US\$ 46 billion. Poland has the largest amount of pension assets in the region, over US\$ 26.5 billion in 2005. Hungary and Czech Republic trails behind with US\$ 9.3 billion and US\$ 5.1 billion respectively.

As a percentage of the size of the economy (Figure 3), privately managed pension funds in the Netherlands are by far the largest, at nearly 120% of the country's GDP. Second comes the voluntary occupational system in the United States (99%) followed by the United Kingdom (79%) and Australia (67%). In Latin America, assets under management represent on average around 15% of the GDP, although in Chile reach approximately 60%. Brazilian pension funds, the second most developed system in Latin America, represent less than 20% of GDP, despite their earlier establishment in the late 1970s. Other countries in the region, such as Costa Rica and Mexico represent less than 20%.

Finally, among Central and Eastern European countries, pension fund's assets represent about 6% of GDP, although in Poland this figure is approximately 11%. Hungarian pension funds, one of the most developed in the region, and Kazakhstan represent 8%. In Czech Republic and Estonia, on the other side, pension system's total assets represent less than 4% of GDP.

**Figure 3: Pension fund assets as a percentage of the GDP (2005)**



Source: OECD

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) For Brazil data includes information only from closed pension entities.

(2) Data for Canada includes information from Trustee pension funds.

(3) Data for Sweden includes information from occupation pension funds and the Premium Pension System.

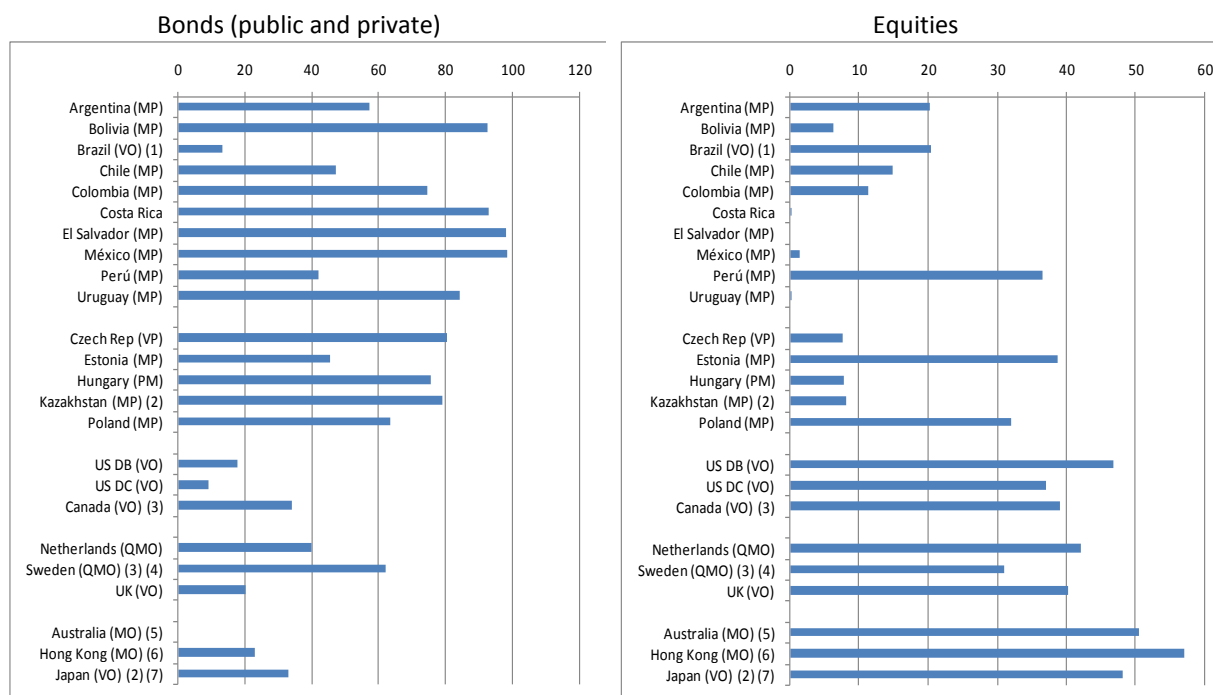
(4) Data for Hong Kong include information from the Mandatory Provident Fund pension system.

(5) Data for Japan includes information from the Employee's Pension Fund system. Data for 2005 is not available.

## 2. Asset allocation

Asset allocations show a wide dispersion among countries analysed in the study. Some pension plans hold its entire portfolio in fixed income securities whereas other funds have none or only few fixed income holdings. Equity investments also vary dramatically, ranging from 0% to almost 60% of the asset allocation. The same applies to foreign investment. Figure 4 illustrates the percentage of total pension assets invested in equities and bonds for the different countries included in the study.

**Figure 4: Structure of total assets: percentage of total assets allocated in bonds and equities 2005**



Source: OECD

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) For Brazil data includes information only from closed pension entities. Data for open pension entities was not available.

(2) 2004 figures.

(3) Data for Canada includes trustee pension funds.

(4) Data corresponds to asset allocation of ALECTA, the default fund manager of the white-collar employee's pension plan.

(5) No specification for bonds.

(6) Asset allocation for the Mandatory Provident Fund (MPF).

(7) Asset Allocation for the Employees' Pension Funds (EPF).

This difference in assets allocation can be partly explained in defined benefit occupational plans the liability structure, whereas in defined contribution personal plans the differences are justified mainly by the investment regulation in each country. Other variables affecting strategic asset allocation could include factors such as the age structure of members<sup>30</sup>, historical reasons, sponsor's own preferences or the expected capital market return.

#### *a. Western Europe, North America and Asia-Pacific Countries*

Trends amongst the major asset managers show that the asset allocation over the past decade has been influenced by the volatility in equity markets. Pension funds in the United States, the United Kingdom and Australia have traditionally had a larger proportion of their portfolio invested in equities. This was a successful strategy in the 1990s but less so in 2000s. Partially because market movement, and partially through deliberate asset allocation moves, the proportion in equities in these

<sup>30</sup> Pension funds with younger participants tend to have more equity exposure, whereas more mature pension funds tend to have more fixed income investments.

countries generally came down at least a few percentage points over the past few years. In the United Kingdom, for example, the average equity allocation in the 1990s was around 65%, whereas during 2005 fell to 40%. This figure probably understates the actual equity risk position and the downward trend in the equity market. On the contrary, there was a long-term rise in the proportion of pension fund assets invested in bonds from 12% in 1990 to 20% in 2005.

On the other side, occupational plans in Canada, the Netherlands, Japan and Sweden all usually had very high bond allocations. Encouraged by the equity bull market of the 1990s, pension funds in these countries began to invest strongly in equities in late 1990s and early 2000s, a move that could be seen as miss-timed. The general recovery in the equity markets restored some confidence in equities.

#### *b. Latin American countries*

The strict investment regulations and the lack of development of capital market have led to high allocation of funds into government paper. Furthermore, the high yield of government bonds, reflecting country as well as default risk, have made them even more attractive to pension funds. By the end of 2005, the average share of government paper in pension fund portfolios was 46% of total assets, which is larger than the prevailing average in advanced economies, but smaller than the average allocation in other emerging economies.

This average however, masks large differences across countries. During 2005, pension funds in six countries held more than 60% of their portfolio in government bonds: Mexico (82.1%), El Salvador (81%), Bolivia (70%), Argentina (60.9%) and Uruguay (60.0%). Yet, it is relatively unimportant in Peru and Chile, with less than 20%. In Brazil, on the other side, pension funds have increased noticeably their allocation in government bonds, from 2% in 1994 to around 12% in 2005. It might be explained by the high interest rate offered in the last years and the absence of long-term investment alternatives in the Brazilian capital market<sup>31</sup>.

Investment in equities has remained low in all countries in the region, with the exception of Peru, where 36% of the total assets were allocated in equities. Argentina, Chile, and Colombia have between 11% and 15% of the portfolio invested in stocks. In Bolivia, the level is around 6%, while in the rest of the countries equity investment is close to zero. In Brazil, the allocation to equities is higher than the average in the region; however, it has diminished over the last 10 years from 31% in 1996 to 20% in 2005<sup>32</sup>.

Another noteworthy aspect of the invest regime in Latin America is the small portion of fund assets invested in foreign instruments. In fact, only six countries allow an internationally diversified portfolio. In the rest of countries, investment abroad has usually been banned or discouraged in order to channel saving into the domestic economy. Chile has the largest proportion of its portfolio invested abroad (30.2%). Peru comes next (10.2%), followed by Colombia (10.4%) and Argentina (8.9%). Costa Rica and Mexico, on the other side, foreign investment represented less than 3%. El Salvador, Dominican Republic and Uruguay, on the other hand, invest exclusively in domestic assets.

#### *c. Central and Eastern European countries*

Given the restrictive investment regulation and the conservative investment policies followed by asset managers in Central and Eastern European countries, pension assets are strongly invested in bonds (i.e. government bonds). In Hungary and Poland, for example, over 60% the total assets was invested in government securities. Equity allocation during 2005, on the other side, was relatively significant in Poland (32%) and Estonia (39%), however in the rest of countries was below 10%.

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<sup>31</sup> Adacir Reis, Leonardo André Paixão (2004), "Private Pensions in Brazil", State Secretary for Pension Funds.

<sup>32</sup> It should be noted that the data for Brazil is based only on equities in closed pension funds.

## IV. An Initial Overview of the Investment Performance of Privately Managed Pension Funds

This section examines the investment performance of the privately managed pension funds in the 23 countries included in the study. It only provides an initial assessment of their financial performance, abstracting from making any international comparison between countries or systems or suggesting any conclusions in terms of performance.<sup>33</sup>

In order to assess the investment performance of privately managed pension funds, this section examines first the different methodologies used by asset managers and pension funds to value pension assets and calculate investment returns.

### 1. Asset valuation

The majority of occupational pension systems (i.e. OECD countries) included in this report use a valuation methodology based on the market value. Valuation rules, however, are less clear in Latin America and Central and Eastern Europe countries. Table 5 summarizes the different methodologies used for valuing pension funds assets.<sup>34</sup>

**Table 5: Valuation methodologies of pension funds assets**

Area	Country	Valuation Methodology
Latin America	Argentina	Market value except certain public bonds, which are valued at "book value".
	Bolivia	Market value.
	Brazil	Market value except certain bonds, which are valued at "book value".
	Chile	Market value.
	Colombia	Market value except certain variable income securities (equities), which are valued according to a liquidity index during the valuation date.
	Costa Rica	Market value except for those instruments which a period of maturity less than 180 days, where the valuation at market price is optional.
	El Salvador	Market value.
	Mexico	Market value. However, due to practical limitations, funds are marked-to-model.
	Peru	Market value.
	Uruguay	Market value.
CEE	Czech Republic	Market value except financial instruments held to maturity, securities of a collective investment fund or financial instruments not actively traded on a market, for which the valuation procedure is the average price of executed transactions.
	Estonia	Market value except cash and deposits with credit institutions, which are valued according to their book value.
	Hungary	Market value.
	Poland	Market value.
	Kazakhstan	Market value.
North America	Canada	Market value.
	United States	Market value.
Western Europe	Netherlands	Market value.
	Sweden	Market value.
	United Kingdom	Market value.
Asia - Pacific	Australia	Market value.
	Hong Kong	Market value.
	Japan	Market value.

Source: OECD

<sup>33</sup> Report C and D provide a deeper analysis on the investment performance of privately managed pension funds.

<sup>34</sup> More information on valuation methodologies please refers to the country report document.

In Latin America, there are compulsory regulations in every country for the valuation of pension assets, which almost with no exception, are based on market prices. In Argentina and Brazil, however, part of the bond portfolio is valued by the accrual criterion, where the return on the bond is calculated as the internal rate of return at the moment of purchase. In Mexico, on the other side, instead to follow the market value criteria, the asset value is determined by a specific body called “Valuation Committee”<sup>35</sup>. In Costa Rica, the valuation at market price is mandatory only for some certain instruments whose period of maturity is higher or equal to 180 days. For the rest of countries, legal requirements establish a transparent basis for valuing pension fund assets according to their economic or market value.

Among Central and Easter European countries, valuation of pension fund assets at market prices is carried out by pension fund administrators in Hungary, Poland and Kazakhstan. Czech Republic and Estonia, on the other hand, have followed different criteria for valuing part of their portfolio.

## ***2. Investment return***

Personal pension plans in Latin American and Central and Easter European countries have a detailed regulation defining the methodology for calculating returns. This regulation is usually established by the supervision authority, either as the official calculation or as a control, verifying the asset managers’ calculations. Calculation methods are even more important in those countries that regulate the performance of portfolio through minimum or relative rate-of-return guarantees. On the contrary, the definition of and criteria for calculating and reporting total return among Western Europe, North America and Asia-Pacific countries is stated in the investment policy established by the asset manager.

### *a. Latin American Countries*

In order to calculate the investment rate of return, all Latin American countries divide pension funds into shares o quotas of equal value and characteristics. Each quota is a unit of measurement defined by the asset manager. The price of the quota is obtained as the ratio between the net wealth (assets minus liabilities) of the pension fund divided by the total number of quotas. The values of the quota increases or decrease according to changes in the investment return of the pension funds.

### *b. Central and Eastern European Countries*

Like Latin American countries, Poland calculates the rate of return according to the variation in the weighted average value of the accounting unit during a specific period. The accounting unit value refers to the fund assets value divided by the number of accounting units. Its value increases and decreases in response to the yield of the pension fund investments.

In Hungary, calculates the annual rate of return in two stages. Returns are first calculated for each quarter and then compounded over the fourth quarter for which the return is required. Quarterly returns measure the change in the market value of assets, netting out the impact of benefits and contributions, divided by the initial market value of assets plus the net value of the net inflows<sup>36</sup>. Estonia, on the other hand, calculates the investment rate of return according to the variation in the net assets value (NAV) of the fund. The management company determines the internal procedural rules for determining of the net asset value of a pension fund.

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<sup>35</sup> According to the Valuation Committee, the “Proveedores de Precio” (Price Providers) determines the prices for the asset valuation. They provide daily a vector of prices of market, which includes all the financial assets managed by financial institutions. This vector includes national and international values.

<sup>36</sup> Net inflow: contribution - benefits

### *c. Canada*

The performance for private occupational pension plans in Canada was measured using the Return on Investment (ROI) ratio. To calculate ROI, the investment income and the net sale of securities is divided by the market value of assets during the previous period. Net on sale of securities is calculated as net profit on sale of securities minus net loss on sale of securities.

### *d. The United States*

Returns for defined benefit and defined contribution plans were calculated as the change in assets, netting out the impact of benefit payment from the plan and contribution to the plan, to initial assets plus half of net inflows. Rates of return presented were weighted by plan assets, and then identified the median.

### *e. The Netherlands*

Similar to Canada, the Netherlands use the Return on Investment (ROI) ratio to calculate the annual investment return. Thus, the annual rate of return measure the variation of the total yield on investment of a specific year with respect to the market value of assets accumulated during the preceding year.

### *f. The United Kingdom*

Occupational pension plans in the United Kingdom employs the “time-weighted” rate of return (TWR) as the base performance statistic. This return takes into account investment income as well as realised and unrealised capital profits or losses. The investment return is measured through the Total Fund Median. It is the middle result or 50th percentile of the returns from all the UK Pension Funds at the total level. This means that this return is irrespective of fund size.

### *g. Hong Kong*

Hong Kong uses the internal rate of return (IRR), known as dollar-weighted return (DWR), to calculate the annualized rate of return. Thus, the annualized rate of return for each year is the discount rate that equates the net present value of all the net monthly contributions made to the pension system within the one-year period to the net present value of the accrued benefits at the end of year period.

## ***3. General description of the average annual real rate returns achieved by each country***

This section just reports the evolution of returns in each country since their private pension systems have been in place as well as basic statistics.<sup>37</sup> As a result of differences in reporting frameworks and valuation methodologies, as well as differences in the regulatory environment, in the time-frame of their pension systems and, most importantly, because of differences in investment efficiency and idiosyncratic characteristics of each country pension system, it is meaningless to compare investment performance across countries using just reported returns.<sup>38</sup>

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<sup>37</sup> The data on returns comes from relevant authorities, pension fund associations, central banks, capital market supervisory agencies and market sources. The report uses data from the first year available. Rates of returns are reported in real terms after deflating by the consumer price index. Appendices 1 and 2 report the complete time series of investment returns, detailed basic statistics and a detailed description of the different sources of information used from each country.

<sup>38</sup> Certain of these aspects are specific to pension funds, such as the investment horizon and the existence of future commitments; others are specific to the regulatory framework in each country, including the investment regulatory regime, the criteria for valuing portfolio and the methodology used for pension funds to calculate investment returns; and finally, there are aspect related with the level of development and the performance of

Nevertheless, it is important to see in isolation how investment returns have evolved in the different countries. In this regard, Table 6 reports average real returns (nominal returns in local currency less price inflation) for the countries examined in this report since the system has been in place and for the last five-year period (December 2000 – December 2005).

**Table 6: Basic statistical information on investment performance of private pension funds by country**

Countries	Entire period														Dec 2000-Dec 2005	
	Data since	Geo. Mean	Arith. Mean	Std. Deviation	Skewness	Kurtosis	Range	Min. Value	Max. Value	Percentil					Geo. Mean	Std. Deviation
										5	25	50	75	95		
<i><b>Latin American Countries</b></i>																
Argentina (MP)	1995	9.7	10.2	11.6	-0.04	-0.02	41.3	-10.4	31.0	-6.2	4.1	11.1	18.0	25.4	7.3	15.0
Bolivia (MP)	1998	10.1	10.2	4.6	-0.08	-1.35	12.5	3.5	16.0	4.1	7.3	10.0	13.9	15.9	9.6	5.9
Brazil (VO)	1995	5.7	5.9	6.3	0.16	0.27	21.5	-5.4	16.0	-3.0	3.2	5.8	8.1	16.0	2.7	4.8
Chile (MP)	1982	9.5	9.8	8.5	0.92	0.31	32.1	-2.6	29.6	-0.7	4.2	6.7	15.8	27.4	6.1	2.7
Costa Rica (MP)	2002	5.8	5.9	3.3	0.37	-1.93	7.3	2.5	9.8	2.7	3.7	5.6	7.8	9.4	4.6	3.3
El Salvador (MP)	1999	5.7	5.8	4.5	1.10	0.86	12.6	1.5	14.1	1.7	2.3	4.8	7.8	12.2	3.7	2.5
Mexico (MP)	1998	7.3	7.3	3.8	0.33	-0.34	11.5	1.6	13.1	2.7	5.4	6.7	9.1	12.8	6.5	4.0
Peru (MP)	1994	14.3	14.6	8.8	-0.82	-0.02	27.8	-2.7	25.1	-0.7	10.5	17.2	19.6	24.6	15.0	6.1
Uruguay (MP)	1997	14.7	15.3	13.0	1.23	0.38	37.0	3.6	40.6	4.0	6.4	10.9	19.8	37.1	19.2	16.4
<i><b>Central and Eastern European Countries</b></i>																
Czech Republic (VP)	1995	1.0	1.1	1.6	0.32	-0.71	5.1	-1.2	3.9	-1.0	-0.2	0.9	2.1	3.5	1.5	1.5
Estonia (MP)	2002	5.2	5.3	4.5	-1.68	3.16	10.2	-1.3	8.9	-0.1	4.7	6.7	7.4	8.6	4.1	4.5
Hungary (MP)	1998	2.3	2.4	5.4	0.49	-1.96	13.2	-3.2	10.0	-3.0	-1.7	0.2	7.8	9.6	3.1	5.8
Kazakhstan (MP)	1999	7.9	8.4	12.7	1.85	3.96	35.8	-2.9	32.9	-2.1	1.6	6.0	7.9	26.8	2.3	5.3
Poland (MP)	2000	8.7	8.7	4.9	-0.43	-1.32	12.5	1.9	14.5	2.5	5.4	9.6	12.1	14.0	9.6	4.8
<i><b>North American Countries</b></i>																
Canada (VO)	1990	6.1	6.2	3.2	-0.19	-1.61	8.6	1.9	10.5	1.9	2.5	6.7	9.2	10.1	3.3	1.7
United States DB (VO)	1988	7.1	7.5	9.6	-0.52	-0.88	31.7	-11.0	20.6	-7.4	-1.5	9.0	13.8	19.3	1.5	13.9
United States DC (VO)	1988	6.1	6.5	8.7	-0.63	-0.39	29.2	-11.6	17.6	-7.6	0.5	7.9	11.7	17.3	0.7	13.1
<i><b>Western Europe Countries</b></i>																
Netherlands (QMO)	1986	6.0	6.3	8.2	-0.81	-0.18	30.2	-11.5	18.6	-7.7	1.7	8.3	12.6	14.3	1.7	10.9
Sweden (QMO)	1990	6.2	6.6	9.7	-0.36	-0.91	32.1	-12.8	19.3	-7.0	-0.1	7.0	14.3	18.6	1.0	10.4
United Kingdom (VO)	1982	8.7	9.5	12.5	-0.95	0.07	44.2	-18.1	26.1	-15.6	5.0	12.1	17.5	24.6	1.9	16.5
<i><b>Asia-Pacific Countries</b></i>																
Australia (MO)	1990	8.9	9.1	5.7	-1.13	2.05	23.8	-4.9	18.9	-2.4	8.4	10.0	11.9	15.1	4.9	8.4
Hong Kong (MO)	2000	2.1	2.7	13.2	0.68	0.50	31.3	-11.2	20.1	-9.9	-4.7	1.0	8.4	17.8	1.7	13.2
Japan (VO)	1990	3.4	3.7	8.9	0.31	0.27	34.0	-12.2	21.8	-10.1	-0.5	3.4	6.1	17.9	4.8	13.9

Source: OECD.

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(i) Higher returns do not entail better performance because this data does not take into account several dimensions (see main text) to allow performance comparisons.

(ii) For Kazakhstan and the United States data is not available for 2005.

(iii) For Sweden data represents information from ALECTA, the default fund manager of the white-collar employees' pension plan.

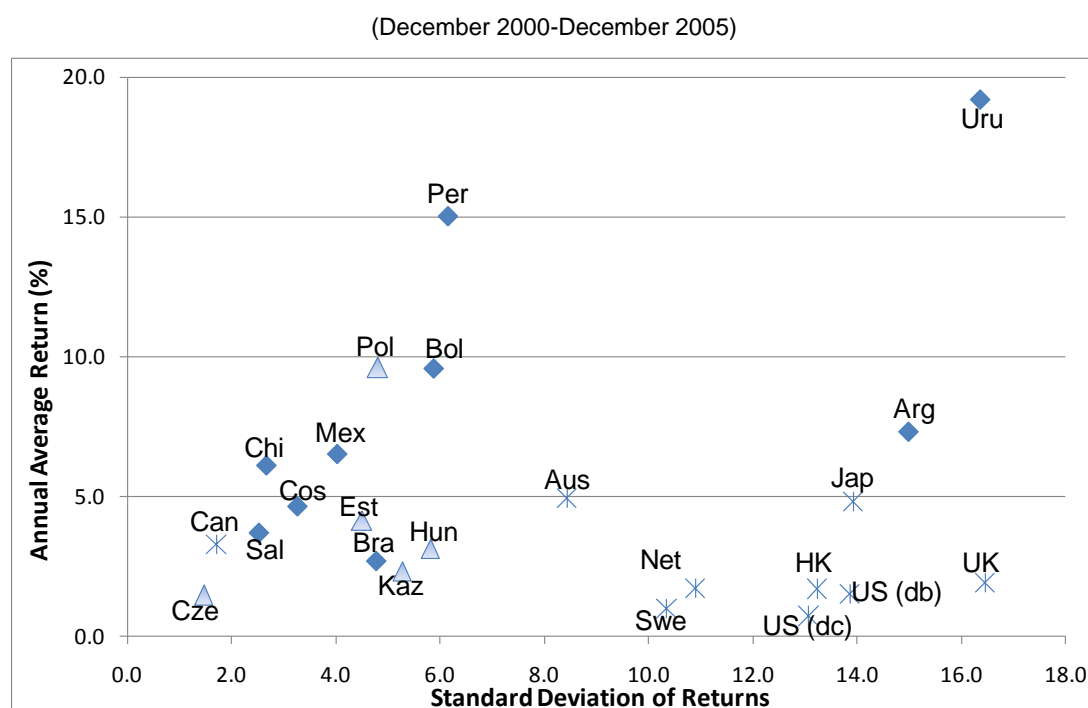
(iv) For Hong Kong data is available for the period from March to March.

the local financial market. For more information on investment regulation, criteria for valuing portfolio and the methodology used for pension funds to calculate investment returns please refer to the country report document.



It is interesting to notice that by assessing average rate of return in the last five years (2000-2005) against the volatility of these returns as measured by the standard deviation, most countries have had relative low average returns and relative low volatility (Figure 5).<sup>39</sup> However, some countries achieved relatively high returns with relatively high volatility (Uruguay and, to some extent Argentina), others achieved relative high returns with low relatively volatility (Bolivia, Peru and Poland), and, finally, most OECD countries (e.g. the United Kingdom and the United States) had low average returns over the 5-year period and relatively high volatility.

**Figure 5: Average annual return and standard deviation**



Source: OECD

Notes:

(\*) For Kazakhstan and the United States, data is for the period 2000-2004. Figures for 2005 are not available.

(\*\*) For Sweden, data represents information from ALECTA. ALECTA is the default fund manager of the white-collar employees' pension plan.

(\*\*\*) For Hong Kong, data is available for the period from March to March

### *a. Performance analysis by region*

#### *i. Latin American countries*

Average annual real investment rates of returns have been high in all Latin American countries for the entire period since the inception of the privately managed pension system, ranging from 5.7% in Brazil to almost 15% in Uruguay. However, real returns show considerable volatility over the period. This volatility in real returns can be explained largely by macroeconomic circumstances. Table 7 provides average annual real rates of return for the entire period and for three different sub-periods.

<sup>39</sup> Unfortunately, it is not possible to use longer time series to assess average returns against volatility, as this series is only available for all countries during the last 5-year period.

**Table 7: Average annual returns of private pension funds in Latin American countries**

Country	Data since	Beginning of the system		Beginning - Dec 1995		Dec 1995-Dec 2000		Dec 2000 - Dec 2005	
		Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)
Argentina (MP)	1995	11.6	9.7	-	-	9.5	10.5	15.0	7.3
Bolivia (MP)	1998	4.6	10.1	-	-	2.2	6.5	5.9	9.6
Brazil (VO)	1995	6.3	5.7	-	-	7.5	8.2	4.8	2.7
Chile (MP)	1982	8.5	9.5	9.6	12.3	6.5	5.3	2.7	6.1
Costa Rica (MP)	2002	3.3	5.8	-	-	-	-	3.3	4.6
El Salvador (MP)	1999	4.5	5.7	-	-	4.4	4.2	2.5	3.7
Mexico (MP)	1998	3.8	7.3	-	-	3.9	5.1	4.0	6.5
Peru (MP)	1994	8.8	14.3	-	-	11.6	11.1	6.1	15.0
Uruguay (MP)	1997	13.0	14.7	-	-	2.7	7.4	16.4	19.2

Source: OECD.

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

This high volatility can be appreciated by comparing average annual real rates of return for the entire period with those for different sub-periods. For example, in Chile achieved average annual real returns of around 12% up to the mid-1990s. This high real return can be partly explained by the large share of pension funds portfolios invested in public debt, which paid high real interest rates following the severe financial crisis of the early 1980s. However, average annual real returns have been much lower since 1995 because the financial crisis of the second half of the 1990s and regional stock market crisis of 1995, 1998 and 2001. Similarly, in Argentina the average annual real return was around 17% during the period 1994-1997, against a 7.2% from 1997 to 2001. The financial crisis in 2001 had serious effects on the financial situation of the pension system affecting overall real returns of the system. These returns were negative in 2001 (-10.3%). However, during the following years after the crisis, the average annual real return rose to over 12%.

The same pattern applies to other countries. Mexico had average annual real rates around 7.2% between 1998 and 2003, dropping to 1.6% in 2004 because of the lower returns in government bonds, which, due to legal requirements and restrictions on bond holdings, constituted just over 80% of the investment portfolio.

Brazil's annual real rate of returns also shows high. For instance, during the period December 1995 to December 2000, pension funds registered an average annual real return of around 8.2%, against 2.7% from December 2000 to December 2005. The financial crisis in the region had serious consequences on the performance of the pension funds, since the real return of the system registered a negative return in 2002 (-5.4%).

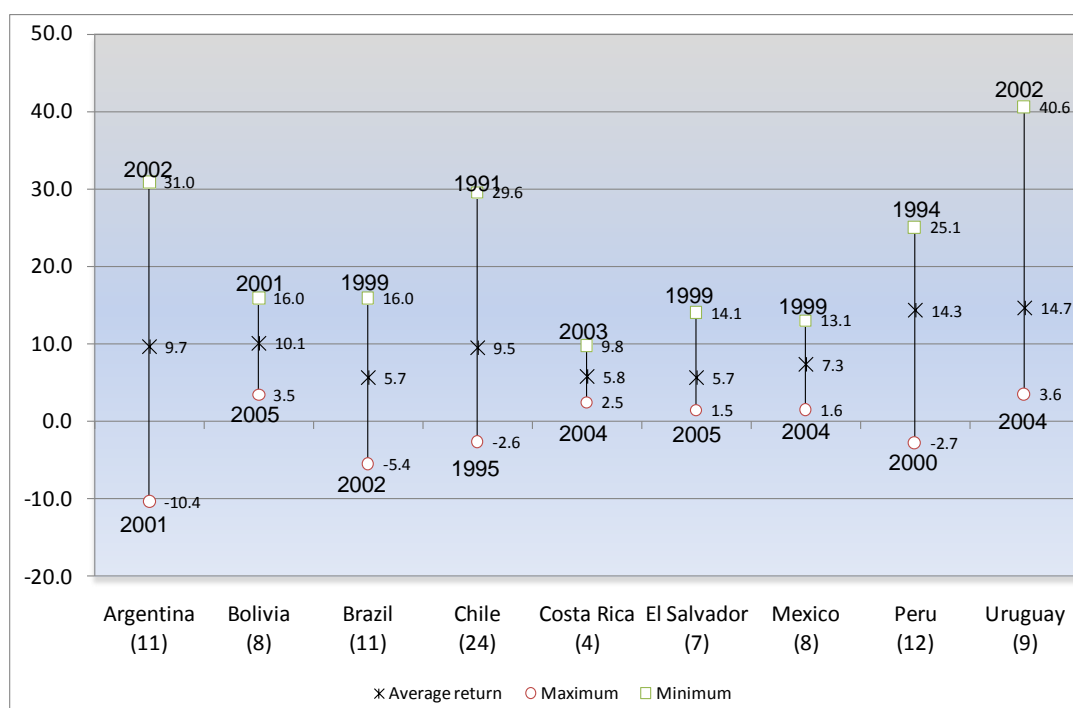
### *Risk Measurements*

The level of risk incurred to achieve the previously reported average annual real rate of returns, measured by the standard deviation of the series of real rate of returns, varies from 3.3% and 3.8% in Costa Rica and Mexico respectively, to 11.6% in Argentina and 13.0% in Uruguay, with Chile at 8.5%. Brazil, on the other side, shows an intermediate level of risk of 6.3% for the period December 1995 to December 2005.

The level of risk can also be gauged by looking at the minimum and maximum annual real rates of returns, as it gives us a measure of the range of returns around the mean (figure 6). In this context, Argentina and Uruguay have the highest range as wide as 41 and 37 percentage points respectively. In Argentina, annual returns ranged from -10.4% to 31.0%, while in Uruguay from 3.6% to 40.6%. Costa Rica, on the other hand, has the narrowest range, 7.3 percentage points, with annual returns ranking from 2.5% to 9.8%.

**Figure 6: Average, minimum and maximum annual returns of pension funds in Latin American Countries**

(the numbers in parentheses identify the number of years included in the calculation )



## ii. Central and Eastern European Countries

The average annual real investment rates of returns has been positive for all Central and Eastern European countries included in the report, ranging from 1.0% in Czech Republic to 8.8% in Poland. Table 8 shows the average real annual return from the start of the system until December 2004.

**Table 8: Average annual returns of private pension funds in Central and Easter European countries**

Country	Data available since	Beginning of the system		Beginning - Dec 1995		Dec 1995-Dec 2000		Dec 2000 - Dec 2005	
		Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)
Czech Rep. (VP)	1994	1.6	1.0	-	-	1.9	1.0	1.5	1.5
Estonia (MP)	2002	4.5	5.2	-	-	-	-	4.5	4.1
Hungary (MP)	1998	5.4	2.3	-	-	5.6	0.6	5.8	3.1
Kazakhstan (MP) <sup>(1)</sup>	1998	12.7	7.9	-	-	-	-	5.3	2.3
Poland (MP)	1999	4.9	8.7	-	-	-	-	4.8	9.6

Source: OECD

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) For Kazakhstan data is not available for 2005

Following the trend exhibited in Latin American countries, the average annual real investment rates of returns show important fluctuations for the entire period since the pension reform has been place. This uneven performance could be partially explained by the very high proportion of assets held in government bonds (around 60%) and the irregular trends in government securities yields over the past years.

In Poland, for example, annual returns have fluctuated sharply since the establishment of the privately managed pension system. Based on six years of their operation, annual real return has averaged around 9%, which is primarily attributed to the outstanding result in 2002 (around 15%). However, one year before, the real returns reached less than 2%. So far, in the course of 2003 and

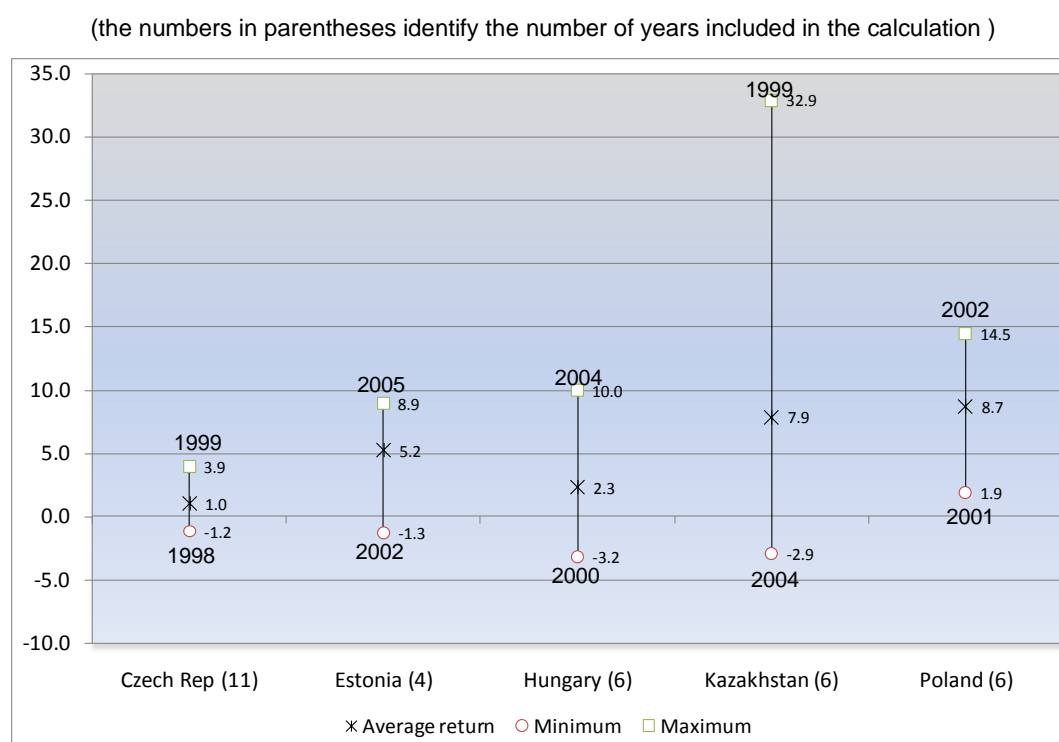
2004 the yield has remained over 8%. Similar trend can be found in Hungary, where the real rate of returns showed negative returns in 2000 (-3.2%), 2001 (-2.5%), and 2003 (-1.4%), after a high real rate of return in 1999 (over 7%). In 2004, the pension industry achieved an outstanding real rate of return of 10%.

Kazakhstan, on the other hand, averaged a real rate of return around 8% per annum during the period December 1998 to December 2004, the largest in the region. However, this result is largely explained by the exceptional rate of return (33%) obtained during the first years after the implementation of the system (1999). During the following years, the annual rate of returns has dropped from 5.5% in 2000 to -2.9% in 2004.

### *Risk Measurements*

Kazakhstan shows by far the largest standard deviation (over 12%). For the rest of countries the standard deviation ranged between 1.6% and 5.4%. In term of the range of returns around the mean, Kazakhstan had the widest range, between a minimum annual return of 2.9% (2004) and a maximum annual return of 32.9% (1999). Czech Republic, on the other side, had the narrowest range as 4.0 percentage points, with annual returns ranging from -1.17% (1998) to 9.8% (1999).

**Figure 7: Average, minimum and maximum annual returns of pension funds in Central and Eastern European countries**



### iii. Western-European, North-America and Asia-Pacific Countries

The annual average real rate of return across occupational pension plans in most developed countries is characterized mainly by very high dispersion, ranking from 2.1% and 3.4% in Hong Kong and Japan respectively to 8.9% in Australia. Additionally, annual average real rate of return shows high volatility according to the sub- period used for calculation. For instance, the annual average real rate of return for the sub-period December 1994-December 1999 was much higher than in the other sub-periods. Table 9 shows the annual average real rate of return for the entire period and for three different sub-periods.

**Table 9: Average annual returns of private pension funds in Western-European, North-America and Asia-Pacific countries**

Country	Data available since	Beginning of the system		Beginning - Dec 1995		Dec 1995-Dec 2000		Dec 2000 - Dec 2005	
		Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)	Standar deviation	Average return (%)
<b><u>North American Countries</u></b>									
Canada (VO)	1965	3.2	6.1	3.1	6.0	1.5	9.1	1.7	3.3
United States DB (VO) <sup>(1)</sup>	1988	9.6	7.1	9.0	8.9	7.0	10.3	13.9	1.5
United States DC (VO) <sup>(1)</sup>	1988	8.7	6.1	5.5	7.7	9.2	9.6	13.1	0.7
<b><u>Western Europe Countries</u></b>									
Netherlands (QMO)	1986	8.2	6.0	7.4	6.2	5.7	10.1	10.9	1.7
Sweden (QMO) <sup>(2)</sup>	1990	9.7	6.2	8.4	3.9	5.8	14.6	10.4	1.0
United Kingdom (VO)	1982	12.5	8.7	12.4	11.0	7.4	9.5	16.5	1.9
<b><u>Asia-Pacific Countries</u></b>									
Australia (MO)	1990	5.7	8.9	1.4	9.9	4.3	11.9	8.4	4.9
Hong Kong (MO) <sup>(3)</sup>	2000	13.2	2.1	-	-	-	-	13.2	1.7
Japan (VO)	1990	8.9	3.4	4.3	2.9	8.4	2.4	13.9	4.8

Source: OECD

Notes: MP= mandatory personal plans, VP= voluntary personal plans, MO= mandatory occupational plans, VO= voluntary occupational plans, QMO=quasi-mandatory occupational plans.

(1) For the United States, data is not available for 2005

(2) For Sweden, data represents information from ALECTA. ALECTA is the default fund manager of the white-collar employees' pension plan

(3) For Hong Kong, data is available for the period from March to March

The annual average real return among North American countries followed a high volatility for the different period analyzed. In United States, for instance, the annual real return varied enormously from the end of 1990s to the early 2000s. Comparing for the different sub-periods, pension funds registered an average real return around 6% per annum, during the period 1988-1994, against an average real return around 10% per annum from December 1995 to December 2000. Later, due to the sluggish world-wide economic conditions and the stock market slump had serious consequences on the performance of the pension funds, since the average real return of the system fell to 1.7% and 0.7% per annum for defined benefit and defined contribution plans respectively, for the period December 2000 to December 2004.

Additionally, the data available for the United States allows comparing between defined benefit and defined contribution plans. Over the period 1988-2004 the results suggests that the average annual real rate of returns for defined benefit was superior to defined contribution plans, 7.1% versus 6.1%. In the late 1990s, defined contribution plans performed very well, even outperforming defined benefit plans from 1997 to 1999. But, during the following years defined benefit plans outperformed defined contribution plans. The period 2000-2002 was bad investment years for both. However, defined benefit plans did not fall as far as defined contribution plans. The higher proportion in equities for defined contribution plans in the late 1990s allowed outperforms this type of plans; however it also meant that defined contribution registered results more negative during the stock market crisis in 2000, and then did better when the stock market recovered.

Similar trend is found in pension plans in Sweden, the Netherlands and the United Kingdom where annual real rate of returns are characterized by episodes of a high volatility. For example, in the Netherlands, because of the comparatively high equity exposure of pension funds, the annual average real rate of return soared over 10% during the bull market between December 1995 and December 2000. Later, a sharp downturn was observed during the period December 2000 to December 2005, when the annual real rate of return averaged 1.7% per annum. This bad period was mainly a consequence of the negative returns registered in 2002 (-11.5%).

In the United Kingdom, on the other side, the average annual return of a typical fund was 8.7% over the period December 1982 December 2005 although statistics show important differences across

different sub-periods. During the end of 1980s up to mid-1990s, pension funds achieved an average return of 11% annually. Since December 1995 up to December 1999, the average real return was lower, 9.5% annually. This relatively attractive rate of return was mostly due to the high reliance on equities (over 60% of the portfolio). This period of positive returns was followed by negative results - as a result of the strong fell in the UK equity market- in 2001 (-10.9%) and 2002 (-18.12%).

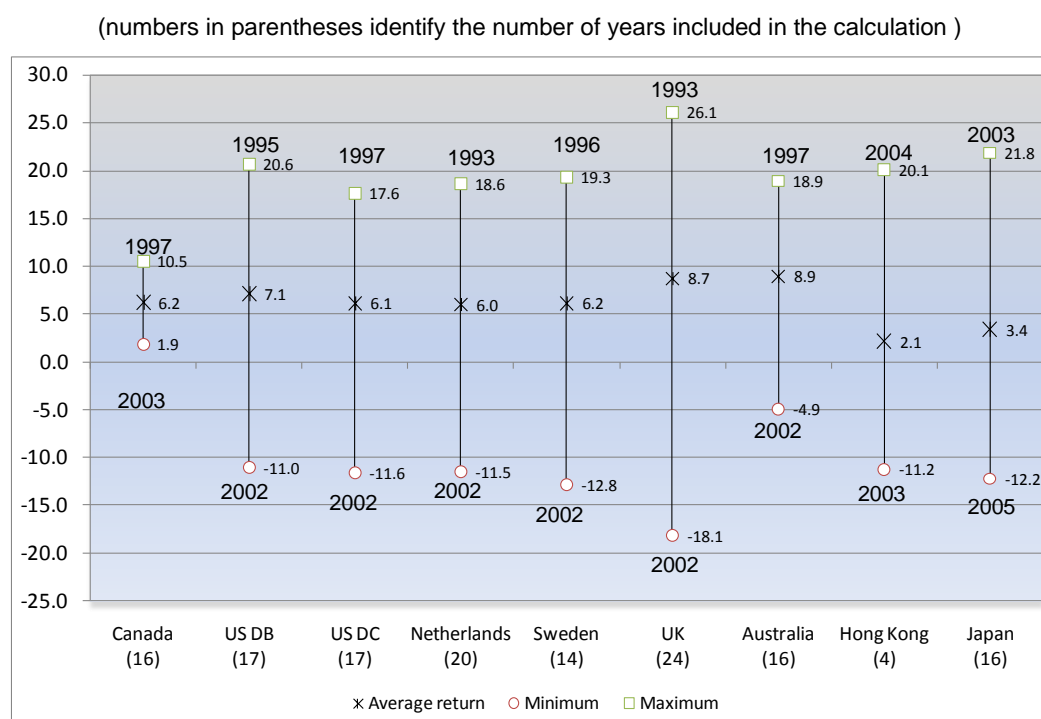
The high volatility can be also appreciated among pension plans in the Asia-Pacific area. Comparing across different periods in the Australian's pension system, the average real returns were very high in the nineties, 10.8% annually, while during the period December 2000 to December 2005, the real return averaged 5%. The same pattern apply to Japan, where the pension system averaged a real return around 2.4% per annum during the period December 1995 to December 2000 as a consequence of the negative return in 2000 (-9.4%), however the pension system recorded positive returns for the period December 2000 to December 2005, averaging 4.8% per annum.

### *Risk Measurements*

Exploring the risk level from the perspective of standard deviation, the Hong Kong had the highest level of risk (13.2 %), followed by the United Kingdom (12.5 %) and Sweden (9.7 %). Canada and Australia, in contrast, had the lowest level of risk, 3.2% and 5.7% respectively.

In term of the range of return around the mean, the results were similar to those based on the analysis of standard deviation. The United Kingdom had the highest range (44.2%), with annual returns ranged from -18.1% (2002) to 26.1% (1993). Japan comes next, with a range between -12.8% and 21.8%. Again, Canada had the lowest risk level with annual returns ranking from 1.9% (2003) to 10.5% (1997).

**Figure 8: Average, minimum and maximum annual returns of pension funds in Western-European, North-America and Asia-Pacific countries**



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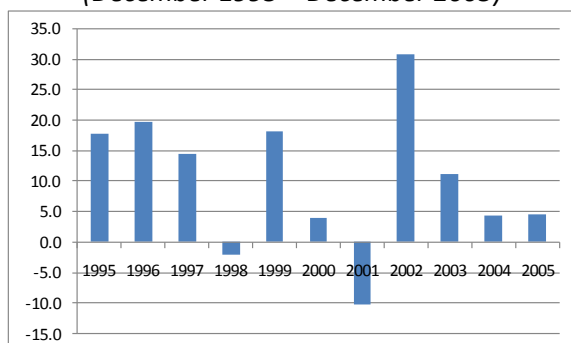
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**ANNEX 1. ANNUAL REAL RATE OF RETURN ACHIEVED BY PRIVATELY MANAGED  
PENSION FUNDS AND SOME BASIC STATISTICS**

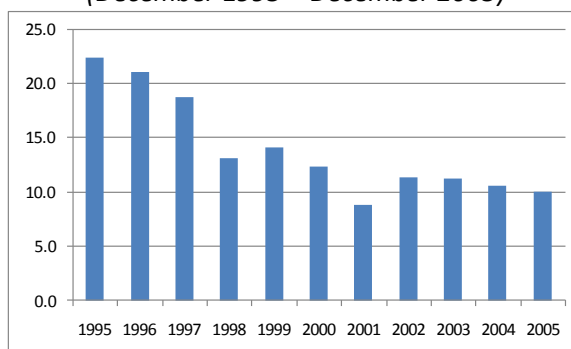


## ARGENTINA

*Annual real rate of return  
(December 1995 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1995 – December 2005)*



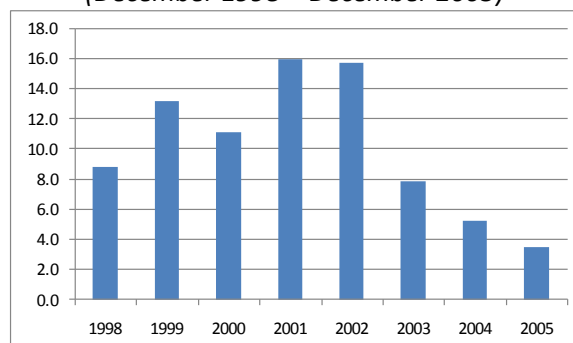
*Basic statistical information on investment  
performance*

*(December 1995 – December 2005)*

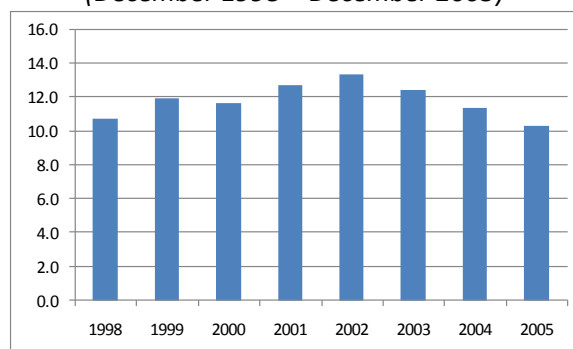
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Geo. Mean	9.7
Ari. Mean	10.2
Sta. Deviation	11.6
Skewness	0.0
Kurtosis	0.0
Range	41.3
Minimum	-10.4
Maximum	31.0
Percentil 5	-6.2
Percentil 25	4.1
Percentil 50	11.1
Percentil 75	18.0
Percentil 95	25.4

## BOLIVIA

*Annual real rate of return  
(December 1998 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1998 – December 2005)*



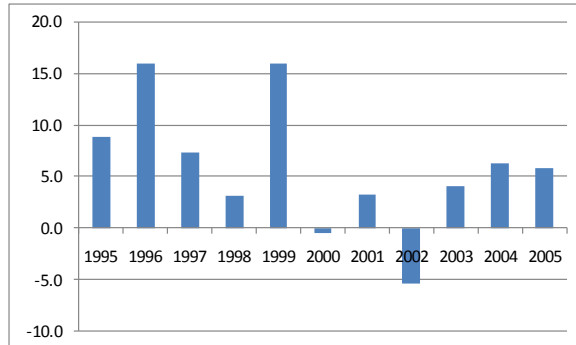
*Basic statistical information on investment  
performance*

*(December 1998 – December 2005)*

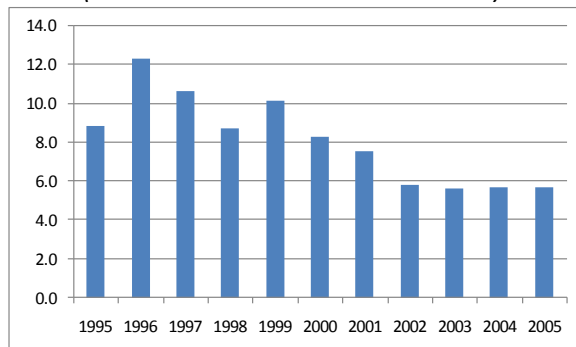
Number of years	8
Geo. Mean	10.1
Ari. Mean	10.2
Sta. Deviation	4.6
Skewness	-0.1
Kurtosis	-1.3
Range	12.5
Minimum	3.5
Maximum	16.0
Percentil 5	4.1
Percentil 25	7.3
Percentil 50	10.0
Percentil 75	13.9
Percentil 95	15.9

## **BRAZIL**

*Annual real rate of return  
(December 1995 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1995 – December 2005)*

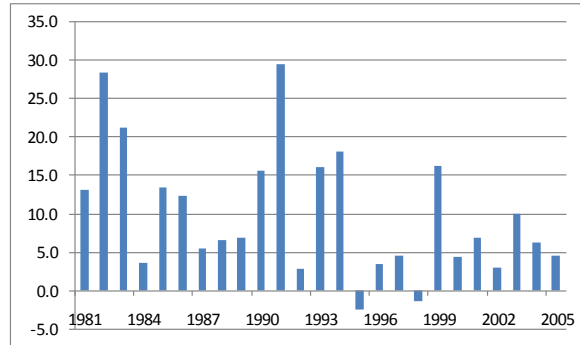


*Basic statistical information on investment  
performance  
(December 1995 – December 2005)*

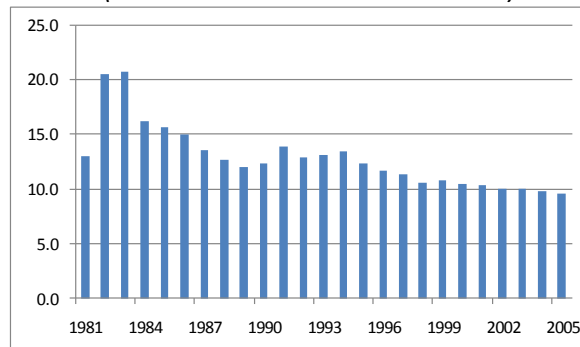
Number of years	11
Geo. Mean	5.7
Ari. Mean	5.9
Sta. Deviation	6.3
Skewness	0.2
Kurtosis	0.3
Range	21.5
Minimum	-5.4
Maximum	16.0
Percentil 5	-3.0
Percentil 25	3.2
Percentil 50	5.8
Percentil 75	8.1
Percentil 95	16.0

## **CHILE**

*Annual real rate of return  
(December 1981 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1981 – December 2005)*

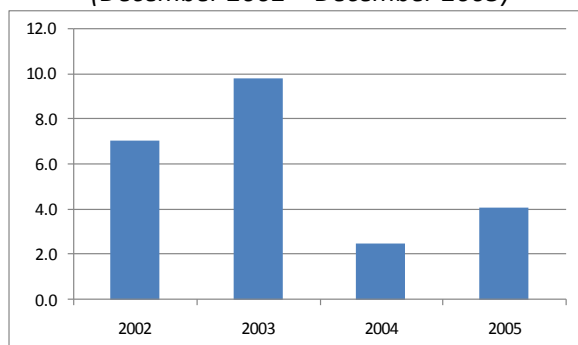


*Basic statistical information on investment  
performance  
(December 1981 – December 2005)*

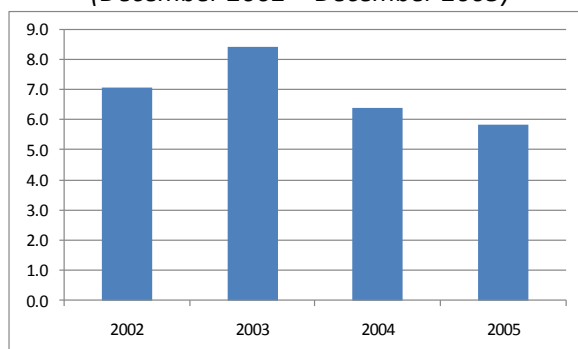
Number of years	24
Geo. Mean	9.5
Ari. Mean	9.8
Sta. Deviation	8.5
Skewness	0.9
Kurtosis	0.3
Range	32.1
Minimum	-2.6
Maximum	29.6
Percentil 5	-0.7
Percentil 25	4.2
Percentil 50	6.7
Percentil 75	15.8
Percentil 95	27.4

### COSTA RICA

*Annual real rate of return  
(December 2002 – December 2005)*



*Annual real rate of return-geometric mean  
(December 2002 – December 2005)*



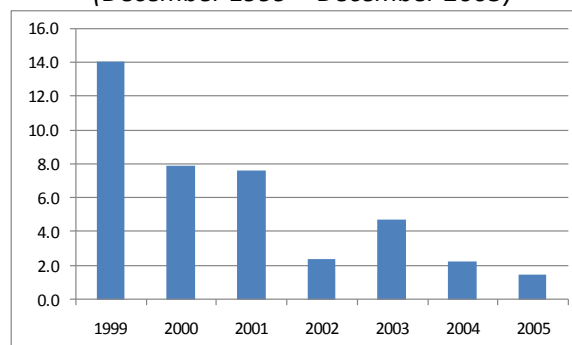
*Basic statistical information on investment  
performance*

*(December 2002 – December 2005)*

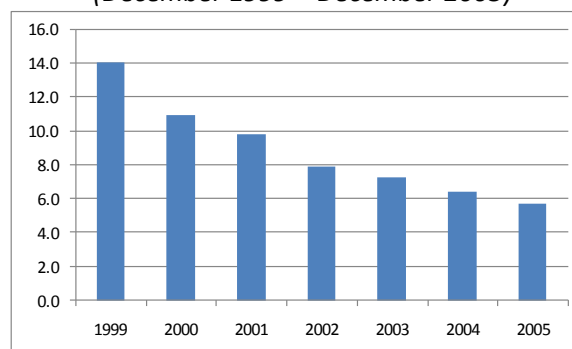
Number of years	4
Geo. Mean	5.8
Ari. Mean	5.9
Sta. Deviation	3.3
Skewness	0.4
Kurtosis	-1.9
Range	7.3
Minimum	2.5
Maximum	9.8
Percentil 5	2.7
Percentil 25	3.7
Percentil 50	5.6
Percentil 75	7.8
Percentil 95	9.4

### EL SALVADOR

*Annual real rate of return  
(December 1999 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1999 – December 2005)*



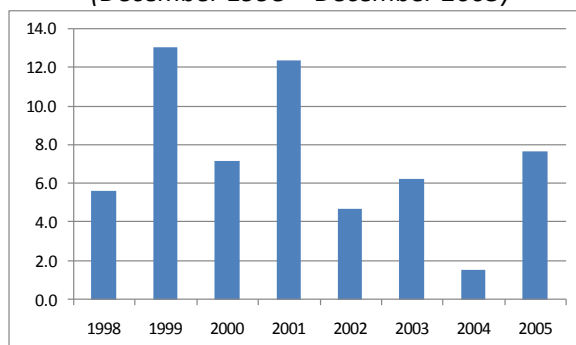
*Basic statistical information on investment  
performance*

*(December 1999 – December 2005)*

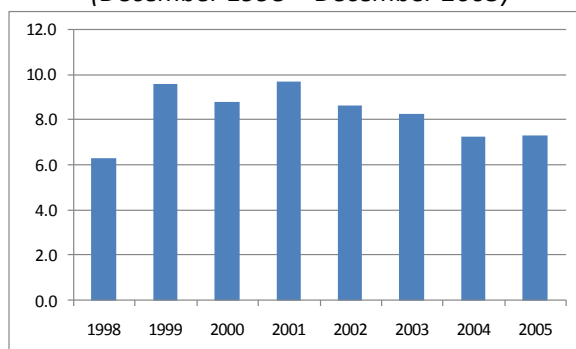
Number of years	7
Geo. Mean	5.7
Ari. Mean	5.8
Sta. Deviation	4.5
Skewness	1.1
Kurtosis	0.9
Range	12.6
Minimum	1.5
Maximum	14.1
Percentil 5	1.7
Percentil 25	2.3
Percentil 50	4.8
Percentil 75	7.8
Percentil 95	12.2

## MEXICO

*Annual real rate of return  
(December 1998 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1998 – December 2005)*



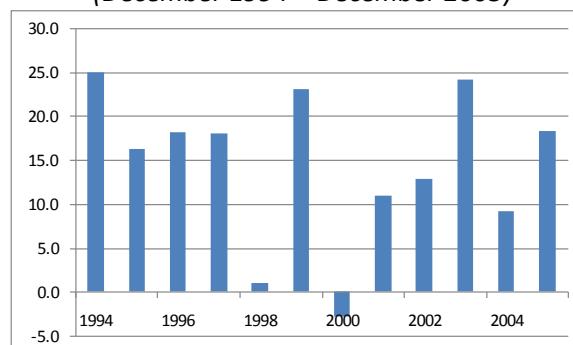
*Basic statistical information on investment  
performance*

*(December 1998 – December 2005)*

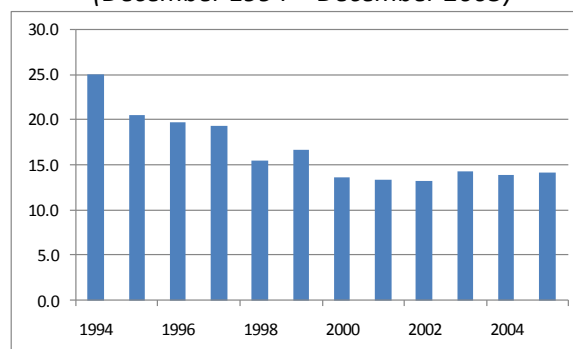
Number of years	8
Geo. Mean	7.3
Ari. Mean	7.3
Sta. Deviation	3.8
Skewness	0.3
Kurtosis	-0.3
Range	11.5
Minimum	1.6
Maximum	13.1
Percentil 5	2.7
Percentil 25	5.4
Percentil 50	6.7
Percentil 75	9.1
Percentil 95	12.8

## PERU

*Annual real rate of return  
(December 1994 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1994 – December 2005)*



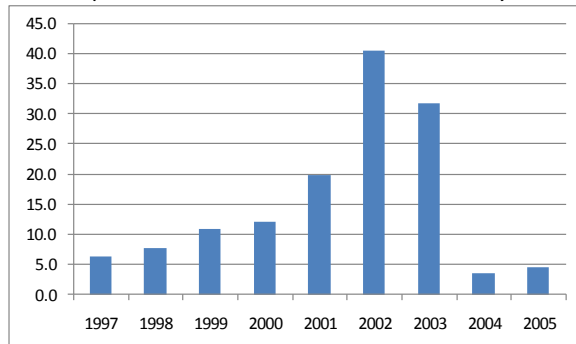
*Basic statistical information on investment  
performance*

*(December 1994 – December 2005)*

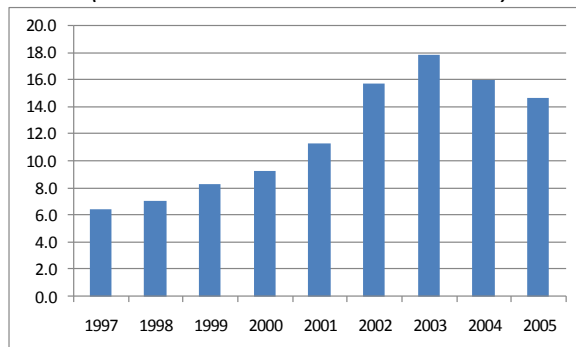
Number of years	12
Geo. Mean	14.3
Ari. Mean	14.6
Sta. Deviation	8.8
Skewness	-0.8
Kurtosis	0.0
Range	27.8
Minimum	-2.7
Maximum	25.1
Percentil 5	-0.7
Percentil 25	10.5
Percentil 50	17.2
Percentil 75	19.6
Percentil 95	24.6

## URUGUAY

*Annual real rate of return  
(December 1997 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1997 – December 2005)*

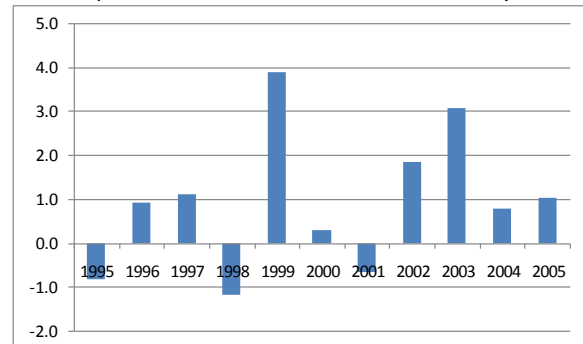


*Basic statistical information on investment  
performance  
(December 1997 – December 2005)*

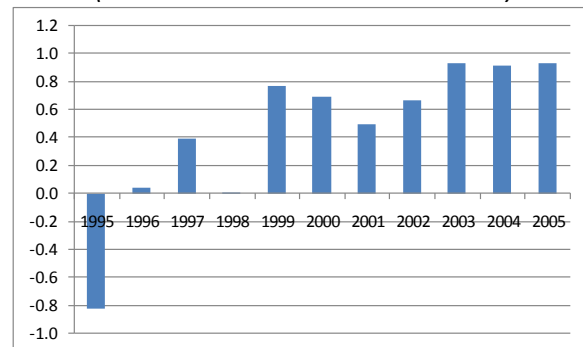
Number of years	9
Geo. Mean	14.7
Ari. Mean	15.3
Sta. Deviation	13.0
Skewness	1.2
Kurtosis	0.4
Range	37.0
Minimum	3.6
Maximum	40.6
Percentil 5	4.0
Percentil 25	6.4
Percentil 50	10.9
Percentil 75	19.8
Percentil 95	37.1

## CZECH REPUBLIC

*Annual real rate of return  
(December 1995 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1995 – December 2005)*

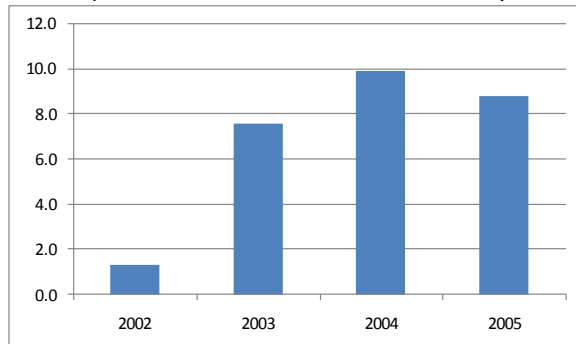


*Basic statistical information on investment  
performance  
(December 1995 – December 2005)*

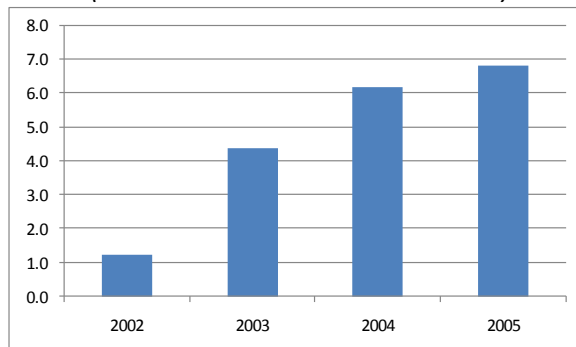
Number of years	11.0
Geo. Mean	1.0
Ari. Mean	1.1
Sta. Deviation	1.6
Skewness	0.3
Kurtosis	-0.7
Range	5.1
Minimum	-1.2
Maximum	3.9
Percentil 5	-1.0
Percentil 25	-0.2
Percentil 50	0.9
Percentil 75	2.1
Percentil 95	3.5

## ESTONIA

*Annual real rate of return  
(December 2002 – December 2005)*



*Annual real rate of return-geometric mean  
(December 2002 – December 2005)*



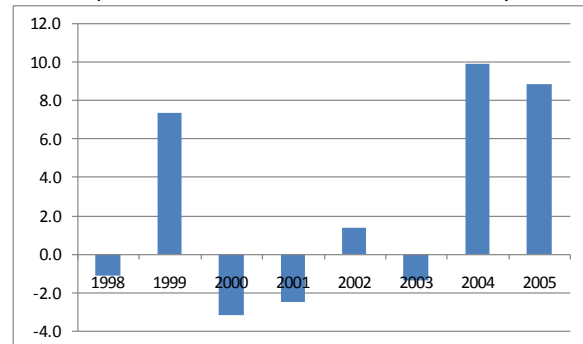
*Basic statistical information on investment  
performance*

*(December 2002 – December 2005)*

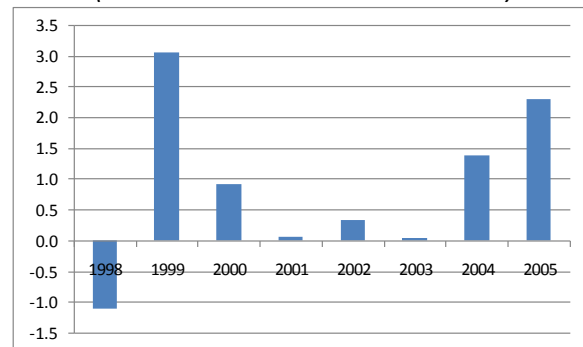
Number of years	4.0
Geo. Mean	5.2
Ari. Mean	5.3
Sta. Deviation	4.5
Skewness	-1.7
Kurtosis	3.2
Range	10.2
Minimum	-1.3
Maximum	8.9
Percentil 5	-0.1
Percentil 25	4.7
Percentil 50	6.7
Percentil 75	7.4
Percentil 95	8.6

## HUNGARY

*Annual real rate of return  
(December 1998 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1998 – December 2005)*



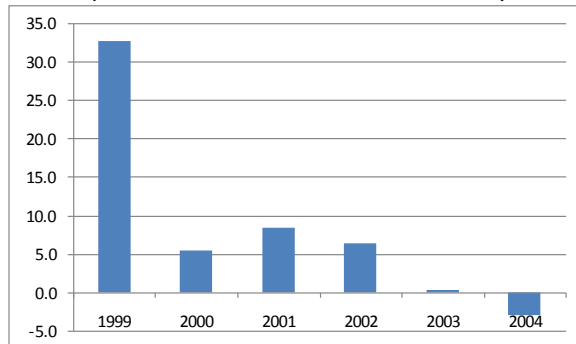
*Basic statistical information on investment  
performance*

*(December 1998 – December 2005)*

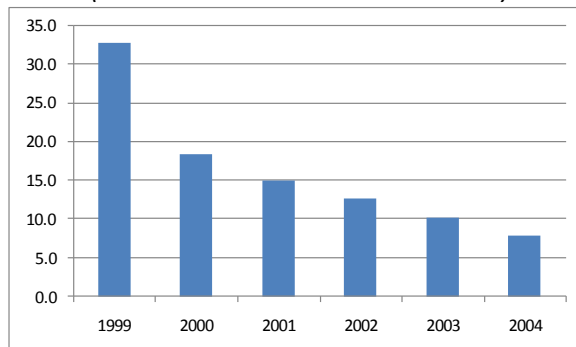
Number of years	8.0
Geo. Mean	2.3
Ari. Mean	2.4
Sta. Deviation	5.4
Skewness	0.5
Kurtosis	-2.0
Range	13.2
Minimum	-3.2
Maximum	10.0
Percentil 5	-3.0
Percentil 25	-1.7
Percentil 50	0.2
Percentil 75	7.8
Percentil 95	9.6

## **KAZAKHSTAN**

*Annual real rate of return  
(December 1999 – December 2004)*



*Annual real rate of return-geometric mean  
(December 1999 – December 2004)*

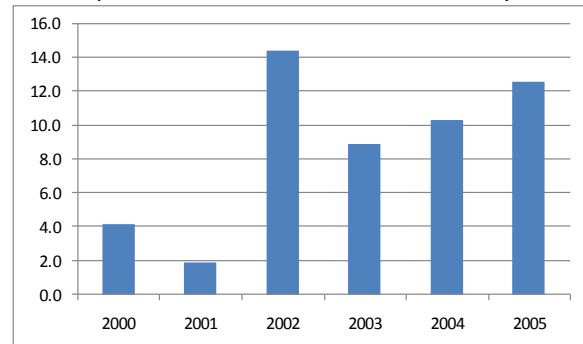


*Basic statistical information on investment  
performance  
(December 1999 – December 2004)*

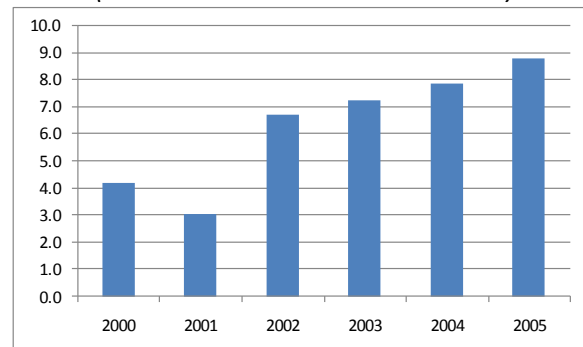
Number of years	6.0
Geo. Mean	7.9
Ari. Mean	8.4
Sta. Deviation	12.7
Skewness	1.8
Kurtosis	4.0
Range	35.8
Minimum	-2.9
Maximum	32.9
Percentil 5	-2.1
Percentil 25	1.6
Percentil 50	6.0
Percentil 75	7.9
Percentil 95	26.8

## **POLAND**

*Annual real rate of return  
(December 2000 – December 2005)*



*Annual real rate of return-geometric mean  
(December 2000 – December 2005)*

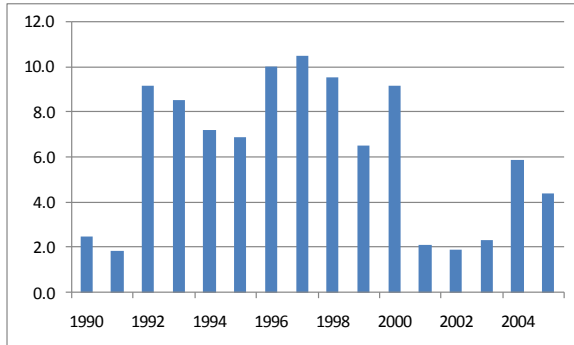


*Basic statistical information on investment  
performance  
(December 2000 – December 2005)*

Number of years	6.0
Geo. Mean	8.7
Ari. Mean	8.7
Sta. Deviation	4.9
Skewness	-0.4
Kurtosis	-1.3
Range	12.5
Minimum	1.9
Maximum	14.5
Percentil 5	2.5
Percentil 25	5.4
Percentil 50	9.6
Percentil 75	12.1
Percentil 95	14.0

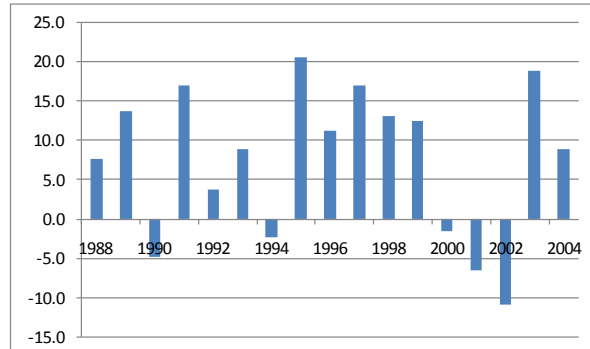
## CANADA

*Annual real rate of return  
(December 1990 – December 2005)*

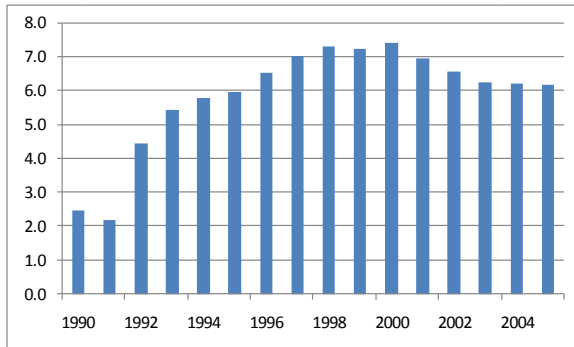


## THE UNITED STATES (DB)

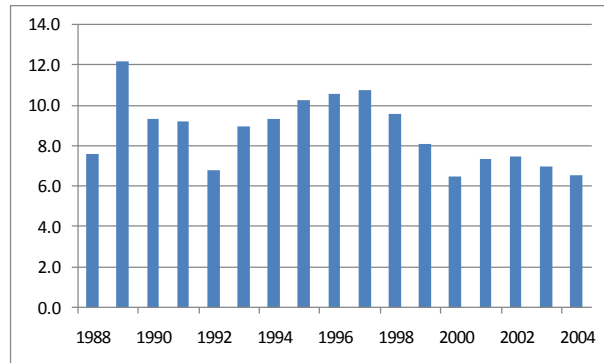
*Annual real rate of return  
(December 1988 – December 2004)*



*Annual real rate of return-geometric mean  
(December 1990 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1988 – December 2004)*



### Basic statistical information on investment performance

(December 1994 – December 2005)

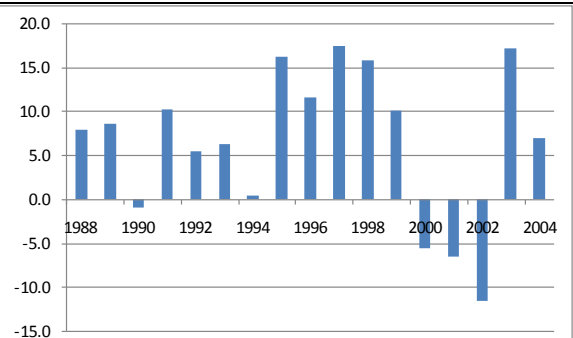
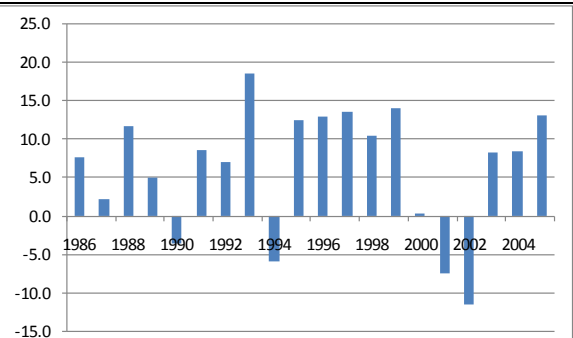
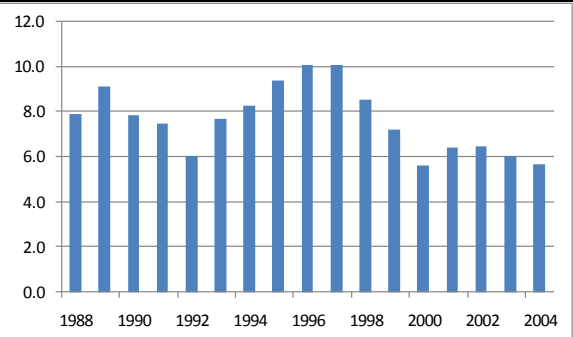
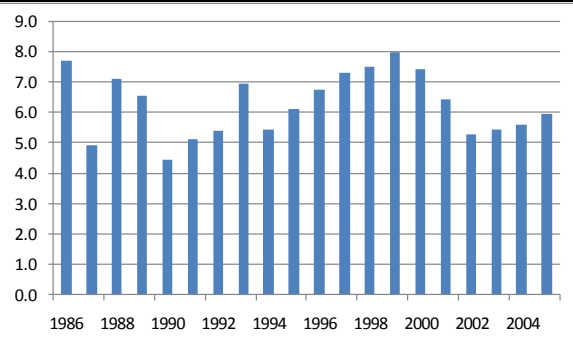
Number of years	16.0
Geo. Mean	6.1
Ari. Mean	6.2
Sta. Deviation	3.2
Skewness	-0.2
Kurtosis	-1.6
Range	8.6
Minimum	1.9
Maximum	10.5
Percentil 5	1.9
Percentil 25	2.5
Percentil 50	6.7
Percentil 75	9.2
Percentil 95	10.1

### Basic statistical information on investment performance

(December 1988 – December 2004)

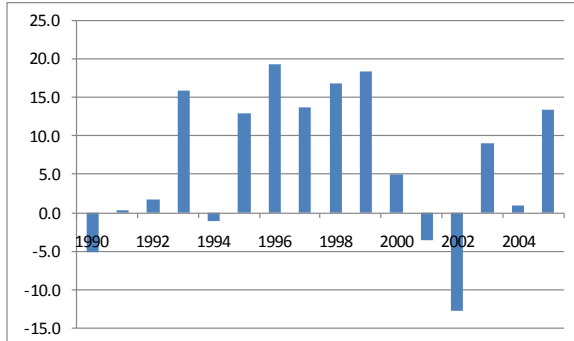
Number of years	17.0
Geo. Mean	7.1
Ari. Mean	7.5
Sta. Deviation	9.6
Skewness	-0.5
Kurtosis	-0.9
Range	31.7
Minimum	-11.0
Maximum	20.6
Percentil 5	-7.4
Percentil 25	-1.5
Percentil 50	9.0
Percentil 75	13.8
Percentil 95	19.3



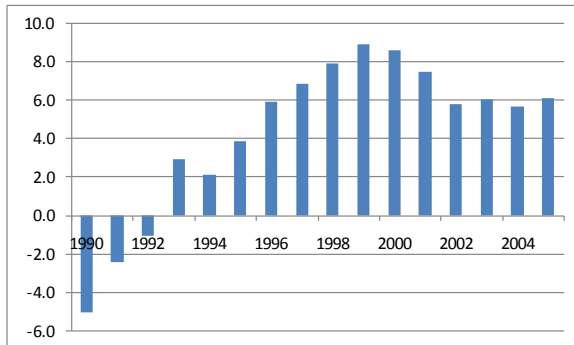
<b>THE UNITED STATES (DC)</b>	<b>THE NETHERLANDS</b>
<i>Annual real rate of return (December 1988 – December 2004)</i>	<i>Annual real rate of return (December 1986 – December 2005)</i>
	
<i>Annual real rate of return-geometric mean (December 1988 – December 2004)</i>	<i>Annual real rate of return-geometric mean (December 1986 – December 2005)</i>
	
<i>Basic statistical information on investment performance (December 1988 – December 2004)</i>	<i>Basic statistical information on investment performance (December 1986 – December 2005)</i>
<div>Number of years</div> <div>Geo. Mean</div> <div>Ari. Mean</div> <div>Sta. Deviation</div> <div>Skewness</div> <div>Kurtosis</div> <div>Range</div> <div>Minimum</div> <div>Maximum</div> <div>Percentil 5</div> <div>Percentil 25</div> <div>Percentil 50</div> <div>Percentil 75</div> <div>Percentil 95</div>	<div>Number of years</div> <div>Geo. Mean</div> <div>Ari. Mean</div> <div>Sta. Deviation</div> <div>Skewness</div> <div>Kurtosis</div> <div>Range</div> <div>Minimum</div> <div>Maximum</div> <div>Percentil 5</div> <div>Percentil 25</div> <div>Percentil 50</div> <div>Percentil 75</div> <div>Percentil 95</div>
<div>17.0</div> <div>6.1</div> <div>6.5</div> <div>8.7</div> <div>-0.6</div> <div>-0.4</div> <div>29.2</div> <div>-11.6</div> <div>17.6</div> <div>-7.6</div> <div>0.5</div> <div>7.9</div> <div>11.7</div> <div>17.3</div>	<div>20.0</div> <div>6.0</div> <div>6.3</div> <div>8.2</div> <div>-0.8</div> <div>-0.2</div> <div>30.2</div> <div>-11.5</div> <div>18.6</div> <div>-7.7</div> <div>1.7</div> <div>8.3</div> <div>12.6</div> <div>14.3</div>

## SWEDEN

*Annual real rate of return  
(December 1990 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1990 – December 2005)*



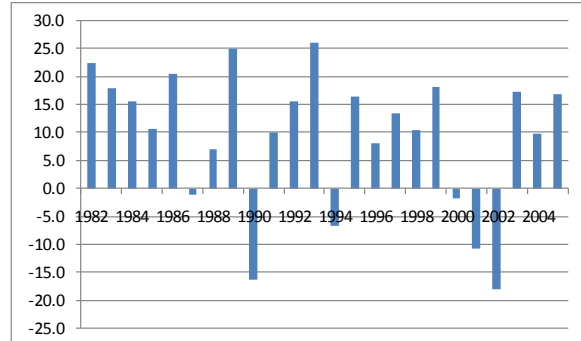
*Basic statistical information on investment  
performance*

*(December 1990 – December 2005)*

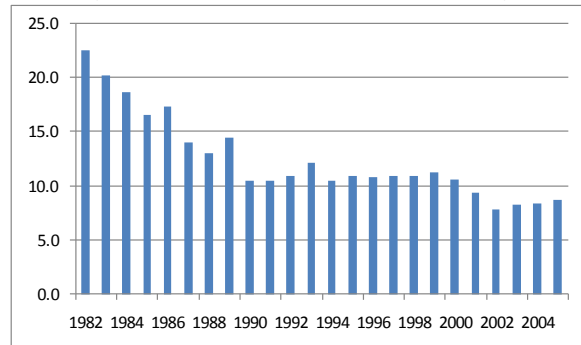
Number of years	16.0
Geo. Mean	6.2
Ari. Mean	6.6
Sta. Deviation	9.7
Skewness	-0.4
Kurtosis	-0.9
Range	32.1
Minimum	-12.8
Maximum	19.3
Percentil 5	-7.0
Percentil 25	-0.1
Percentil 50	7.0
Percentil 75	14.3
Percentil 95	18.6

## THE UNITED KINGDOM

*Annual real rate of return  
(December 1982 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1982 – December 2005)*



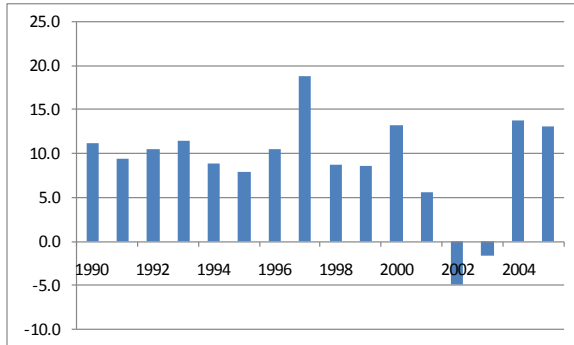
*Basic statistical information on investment  
performance*

*(December 1985 – December 2005)*

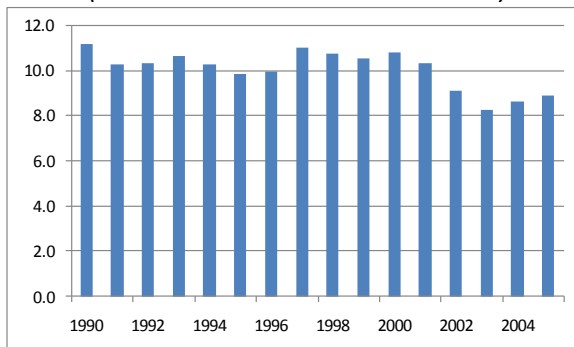
Number of years	24.0
Geo. Mean	8.7
Ari. Mean	9.5
Sta. Deviation	12.5
Skewness	-0.9
Kurtosis	0.1
Range	44.2
Minimum	-18.1
Maximum	26.1
Percentil 5	-15.6
Percentil 25	5.0
Percentil 50	12.1
Percentil 75	17.5
Percentil 95	24.6

## AUSTRALIA

*Annual real rate of return  
(December 1990 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1990 – December 2005)*

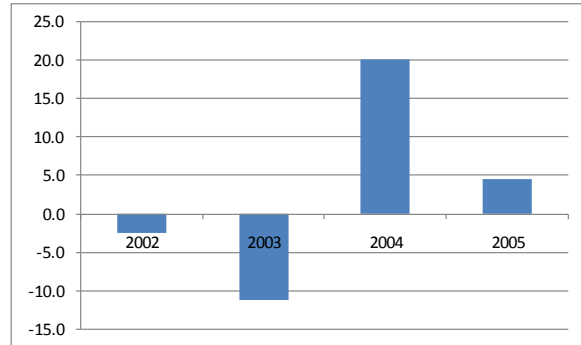


*Basic statistical information on investment  
performance  
(December 1990 – December 2005)*

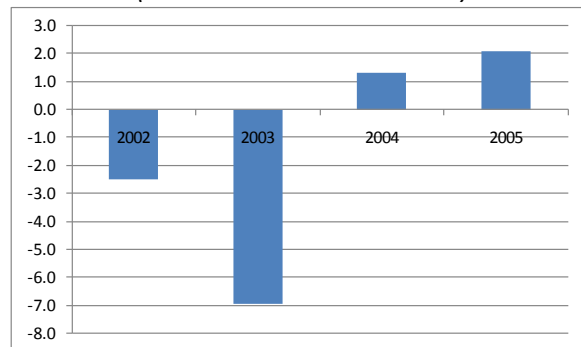
Number of years	16.0
Geo. Mean	8.9
Ari. Mean	9.1
Sta. Deviation	5.7
Skewness	-1.1
Kurtosis	2.0
Range	23.8
Minimum	-4.9
Maximum	18.9
Percentil 5	-2.4
Percentil 25	8.4
Percentil 50	10.0
Percentil 75	11.9
Percentil 95	15.1

## HONG KONG

*Annual real rate of return  
(March 2002 – March 2005)*



*Annual real rate of return-geometric mean  
(March 2002 – March 2005)*

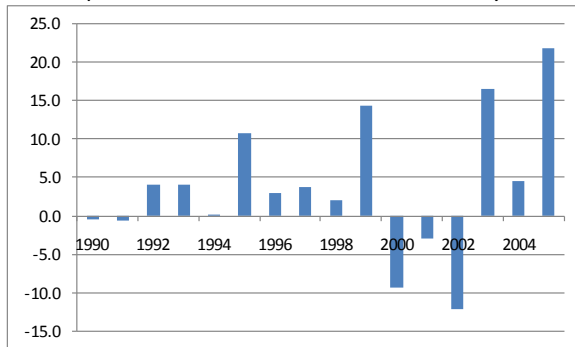


*Basic statistical information on investment  
performance  
(March 2002 – March 2005)*

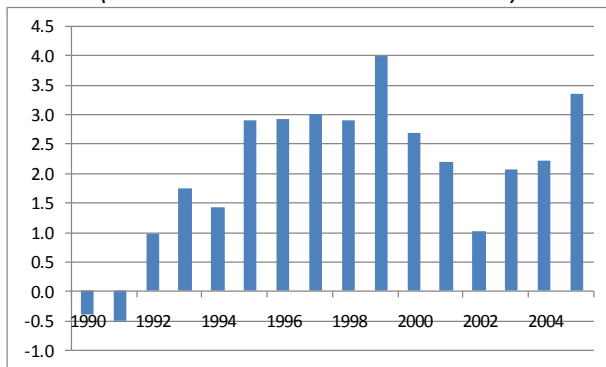
Number of years	4.0
Geo. Mean	2.1
Ari. Mean	2.7
Sta. Deviation	13.2
Skewness	0.7
Kurtosis	0.5
Range	31.3
Minimum	-11.2
Maximum	20.1
Percentil 5	-9.9
Percentil 25	-4.7
Percentil 50	1.0
Percentil 75	8.4
Percentil 95	17.8

## JAPAN

*Annual real rate of return  
(December 1990 – December 2005)*



*Annual real rate of return-geometric mean  
(December 1990 – December 2005)*



*Basic statistical information on investment  
performance*

*(December 1990 – December 2005)*

Number of years	16.0
Geo. Mean	3.4
Ari. Mean	3.7
Sta. Deviation	8.9
Skewness	0.3
Kurtosis	0.3
Range	34.0
Minimum	-12.2
Maximum	21.8
Percentil 5	-10.1
Percentil 25	-0.5
Percentil 50	3.4
Percentil 75	6.1
Percentil 95	17.9

## ANNEX 2: DATA SOURCES

<u>Country</u>	<u>Type of Plans</u>	<u>Institutions</u>	<u>Period</u>	<u>Website</u>
<b>Latin American Countries</b>				
Argentina	Mandatory personal pension system	Superintendency of Pension Fund Management Companies (SAFJP)	1995-2005	<a href="http://www.safjp.gov.ar/SISAFJP/Publicaciones/Boletín+Estadístico/">http://www.safjp.gov.ar/SISAFJP/Publicaciones/Boletín+Estadístico/</a>
Bolivia	Mandatory personal pension system	Superintendencia de Pensiones, Valores y Seguros (Pension, Securities and Insurance Supervisor)	1997-2004	<a href="http://www.spvs.gov.bo/Estadísticas+y+Publicaciones/Estadísticas/Pensiones/">http://www.spvs.gov.bo/Estadísticas+y+Publicaciones/Estadísticas/Pensiones/</a>
Brazil	Voluntary occupational pension system (only closed pension funds)	Associação Brasileira das Entidades Fechadas de Previdência Complementar (ABRAPP) (Association of Closed Pension Funds)	1990-2004	<a href="http://www.abrapp.org.br/portal/conteudo.asp?Areald=197">http://www.abrapp.org.br/portal/conteudo.asp?Areald=197</a>
Chile	Mandatory personal pension system	Superintendency of Pension Fund Administrators (SAFP)	1980-2005	<a href="http://www.safp.cl/inf_estadistica/index.html">http://www.safp.cl/inf_estadistica/index.html</a>
Colombia	Mandatory personal pension system	Financial Supervisor (Superintendencia Financiera)	1994-2005	<a href="http://www.superbancaria.gov.co/">http://www.superbancaria.gov.co/</a>
Costa Rica	Mandatory personal pension system	Pension Fund Supervisor (Superintendencia de Pensiones)	2000-2005	<a href="http://www.supen.fi.cr/aplicaciones/Estadísticas_Nueva.nsf">http://www.supen.fi.cr/aplicaciones/Estadísticas_Nueva.nsf</a>
El Salvador	Mandatory personal pension system	Superintendency of Pension	2001-1005	<a href="http://www.spensiones.gob.sv/">http://www.spensiones.gob.sv/</a>
Mexico	Mandatory personal pension system	Pension Funds Supervisor (CONSAR)	1998-2005	<a href="http://www.consar.gob.mx/consar.shtml">http://www.consar.gob.mx/consar.shtml</a>
Peru	Mandatory personal pension system	Superintendency of banks, insurance and pension (SAFP)	1996-2005	<a href="http://www.sbs.gob.pe/PortalSBS/Estadistica/index.htm">http://www.sbs.gob.pe/PortalSBS/Estadistica/index.htm</a>
Uruguay	Mandatory personal pension system	Uruguayan Central Bank	1997-2005	<a href="http://www.bcu.gub.uy/">http://www.bcu.gub.uy/</a>
<b>Central and Easter European Countries</b>				
Czech Republic	Voluntary personal pension system	Association of Pension Funds (APF CR)	2000-2005	<a href="http://www.apfcr.cz/en/index.php?page=home.php">http://www.apfcr.cz/en/index.php?page=home.php</a>
		Office of the State Supervision in Insurance and Pension Fund	2000-2004	<a href="http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xsl/pension_funds.html">http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xsl/pension_funds.html</a>
Estonia	Mandatory personal pension system	Pensionikeskus (It is a website that has been prepared by the Estonian Central Register of Securities and Ministry of Finance)	2002-2005	<a href="http://www.pensionikeskus.ee/?id=631">http://www.pensionikeskus.ee/?id=631</a>
Hungary	Mandatory personal pension system	Hungarian Financial Supervisory Authority	2000-2005	<a href="http://english.psza.hu/engine.aspx?page=pszaen_reports">http://english.psza.hu/engine.aspx?page=pszaen_reports</a>
Kazakhstan	Mandatory personal pension system	Agency on Supervision and Regulation	1998-2005	<a href="http://www.afn.kz/?uid=CCA0BB44-E3BE-B36A-28DF4DAD33F2D7CB&amp;docid=4">http://www.afn.kz/?uid=CCA0BB44-E3BE-B36A-28DF4DAD33F2D7CB&amp;docid=4</a>

Poland	Mandatory personal pension system	Insurance and Pension funds	Supervisory Commission	2000-2005	<a href="http://www.knuife.gov.pl/english/pension/publications/annual.shtml">http://www.knuife.gov.pl/english/pension/publications/annual.shtml</a>
North American Countries					
Canada	Private Pension Plans	Statistics Canada		1990-2005	<a href="http://www.statcan.ca/english/research/13F0026MIE/13F0026MIE2004001.pdf">http://www.statcan.ca/english/research/13F0026MIE/13F0026MIE2004001.pdf</a>
US	Occupational Pension Plans	The Center for Retirement Research (1)		1990-2004	<a href="http://www.bc.edu/centers/crr/issues/ib_52.pdf">http://www.bc.edu/centers/crr/issues/ib_52.pdf</a>
Asia-Pacific Countries					
Australia	Mandatory occupational pension system (Superannuation)	The Association of Superannuation Funds of Australia Limited (ASFA)		1993-2005	<a href="http://www.superannuation.asn.au">www.superannuation.asn.au</a>
Hong Kong	Mandatory occupational pension system (the Mandatory Provident Fund system)	Mandatory Provident Schemes Authority (MPFA)	Fund	2000-2005	<a href="http://www.mpfahk.org/main.asp?nodeID=66&amp;langNo=3">http://www.mpfahk.org/main.asp?nodeID=66&amp;langNo=3</a>
Japan	Voluntary occupational pension system (the Employee Pension Fund system)	NIKKO INTELLIGENCE, INC	FINANCIAL	1990-2005	<a href="http://www.nikko-fi.co.jp/uploads/photos1/258.xls">http://www.nikko-fi.co.jp/uploads/photos1/258.xls</a>
Western European Countries					
The Netherlands	Occupational Pension Funds	De Nederland Bank and Company	WM	1986-2005	<a href="http://www.statistics.dnb.nl/index.cgi?lang=uk&amp;todo=PenFinGeg">http://www.statistics.dnb.nl/index.cgi?lang=uk&amp;todo=PenFinGeg</a>
Sweden	Occupational pension system	ALECTA		1990-2005	<a href="http://www.alecta.se">www.alecta.se</a>
UK	Occupation Pension Plans	Mellon Investment Solutions	Manager	1982-2005	<a href="http://www.mellon.com/mas">www.mellon.com/mas</a>