

# PENSION RESERVE FUND

Third Quarter, 2010

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## I. BACKGROUND

The Pension Reserve Fund (PRF) was established under the Finance Ministry's Law N° 20.128 (2006) and the first payment into the fund was made on December 28, 2006. The fund's management was entrusted to the Central Bank of Chile (CBC) which acts as Fiscal Agent<sup>1,2</sup> and invests its assets according to instructions given by the Finance Minister<sup>3</sup>. Under the PRF's current investment policy, its assets are held exclusively as international fixed-income instruments with credit ratings as set out in Appendix VIII.2.

This report also includes a review of the relevant markets in which the fund's assets are invested, prepared by the CBC in its role as Fiscal Agent (Section VII).

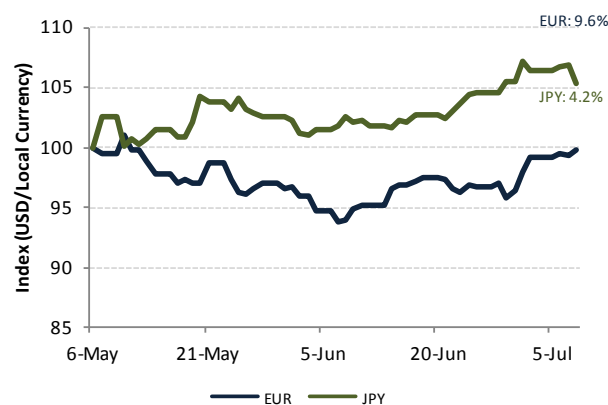
## II. SUMMARY OF RELEVANT MARKETS

In the third quarter of 2010, the main world currencies appreciated against the US dollar and the yield curves of the different economic zones flattened. In general, these trends were characterized by a generalized drop in interest rates, reflecting principally the weakness of recovery in the main industrialized economies and the fiscal situation of some peripheral euro zone countries.

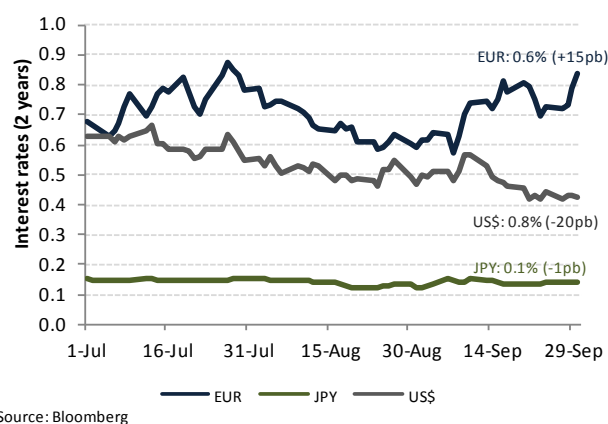
In the third quarter of 2010, the world's main central banks opted to maintain their respective monetary-policy interest rates. In the United States, the Federal Open Market Committee (FOMC) held its target range for the federal funds rate at 0% to 0.25% while the European Central Bank (ECB) and the Bank of Japan (BoJ) maintained their monetary-policy rates at 1% and 0.1%, respectively.

In this international economic context, the US Congress approved a reform of financial regulation presented by the government in June 2009. The new law's main measures include a limit on the investments commercial banks may make with their own capital and the creation of a consumer protection system and a supervision committee charged with overseeing the entire financial system.

**Figure 1**  
Exchange Rates: Euro and Yen against the Dollar



**Figure 2**  
Interest Rates on 2-year Sovereign Bonds



<sup>1</sup> Under the Finance Ministry's Supreme Decree N° 1.383.

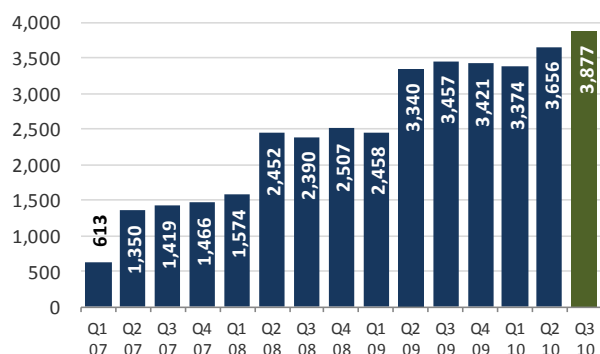
<sup>2</sup> Acceptation Agreement adopted by the Central Bank Board in Ordinary Meeting N° 1.321, held on February 22, 2007.

<sup>3</sup> The Finance Minister determines the PRF's investment policy with the advice of an external Financial Committee.

### III. MARKET VALUE OF FUND

At the close of the third quarter, the PRF held assets that, at market prices, were worth US\$3,877.1 million, up by US\$220.9 million on the end of the previous quarter. This increase was explained by capital gains of US\$200.6 million and accrued interest earnings of US\$20.4 million. Management and custody fees totaled US\$0.1 million.

**Figure 3**  
Market Value of PRF (2007-2010)



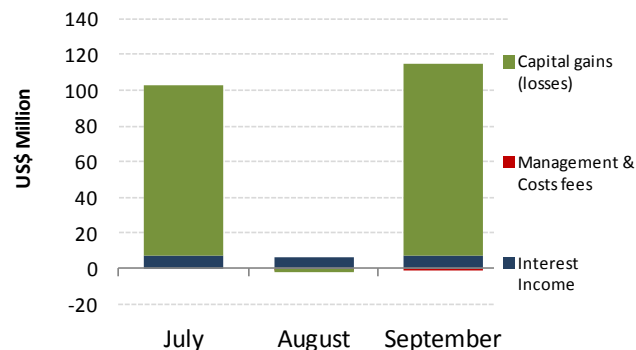
Source: Ministerio de Hacienda

In July, the PRF's value showed an increase of US\$103.0 million. This was explained by capital gains of US\$95.8 million and accrued interest earnings of US\$7.2 million.

In August, the increase in the PRF's value reached US\$3.5 million, explained by accrued interest earnings reached US\$5.7 million and a capital loss of US\$2.2 million.

In September, the PRF's market value rose by US\$114.4 million, due mainly to a capital gain of US\$107.1 million and accrued interest earnings of US\$7.4 million. Management and custody fees for the month were US\$0.1 million.

**Figure 4**  
Variation in Market Value of PRF  
(Q3, 2010)

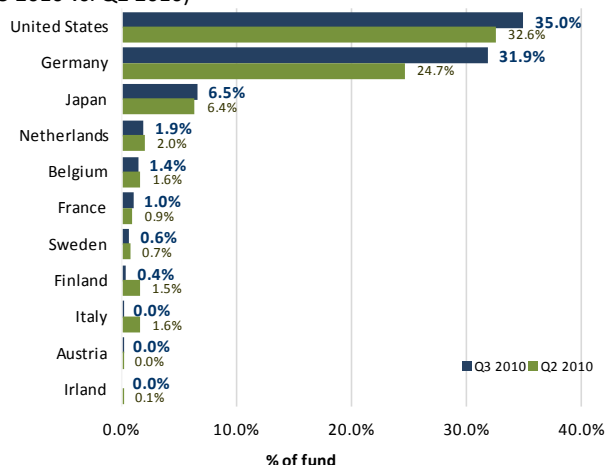


#### IV. INVESTMENT PORTFOLIO

At the close of the third quarter, 78.8% of the PRF's assets were invested in sovereign-risk instruments, 20.0% in bank-risk instruments and 1.1% in multilateral instruments. As compared to the end of the previous quarter, this represented an increase of 6.8% in the fund's exposure to sovereign risk, a drop of 5.7% in its exposure to bank risk and a drop of 1.1% in exposure to multilateral instruments (Table 4).

In the case of sovereign-risk investments, the PRF's exposure to Ireland was eliminated during the third quarter. Figure 5 shows its exposure to different countries in the second and third quarters.

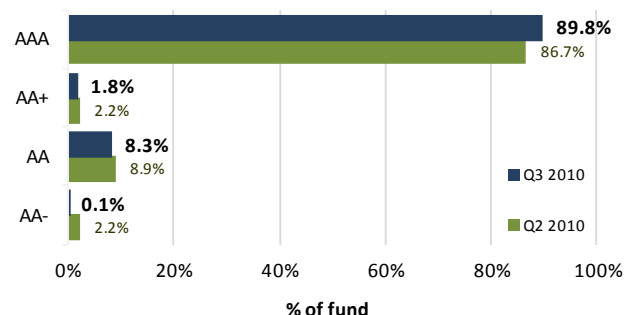
**Figure 5**  
Sovereign-Risk Investments by Country  
(Q3 2010 vs. Q2 2010)<sup>4</sup>



Source: Finance Ministry based on information provided by JPMorgan

At the close of the third quarter, 89.8% of the PRF's investments in sovereign-risk instruments had an AAA risk rating, up by 3.1% on the previous quarter. Figure 6 shows the fund's exposure to sovereign risk by rating in the second and third quarters.

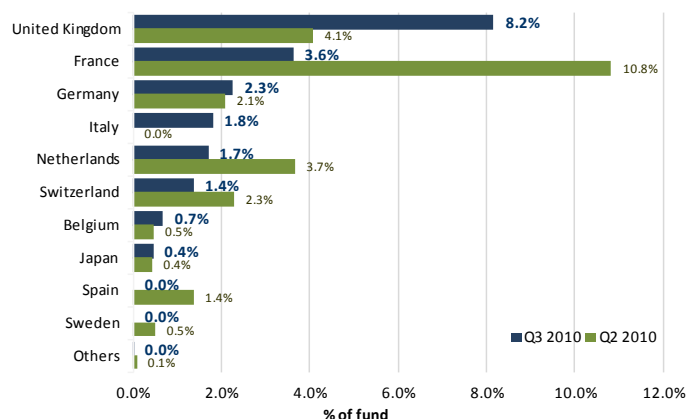
**Figure 6**  
Investments by Sovereign Risk Rating  
(Q3 2010 vs. Q2 2010)<sup>5</sup>



Source: Finance Ministry based on information provided by JPMorgan

In the case of bank-risk instruments, the PRF eliminated its exposure to Spain and Sweden during the third quarter and incorporated instruments from Italy. Figure 7 shows its bank-risk exposure by country in the second and third quarters.

**Figure 7**  
Bank-Risk Investments by Country  
(Q3 2010 vs. Q2 2010)<sup>5</sup>



Source: Finance Ministry based on information provided by JPMorgan

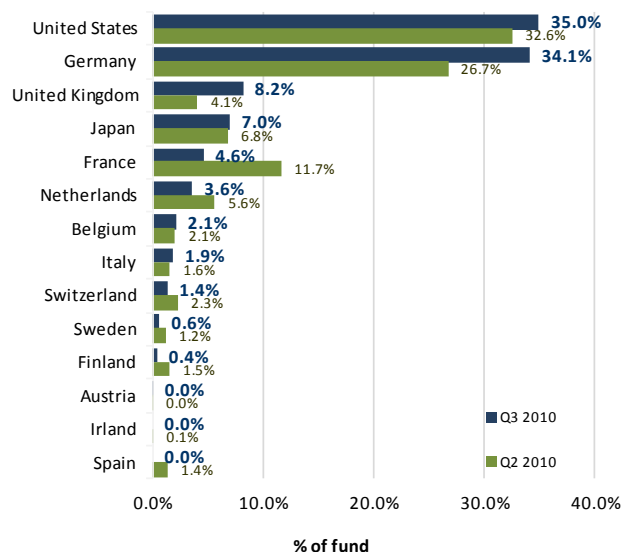
Figure 8 shows that, in terms of the PRF's total portfolio, around 70% of its exposure was to the United States and Germany, principally in the form of sovereign bonds and that, in the third quarter, it eliminated its investments in Ireland and Spain.

<sup>4</sup> Based on settlement date information.

<sup>5</sup> Based on settlement date information.

**Figure 8**

Total Portfolio by Country  
(Q3 2010 vs. Q2 2010)<sup>6</sup>



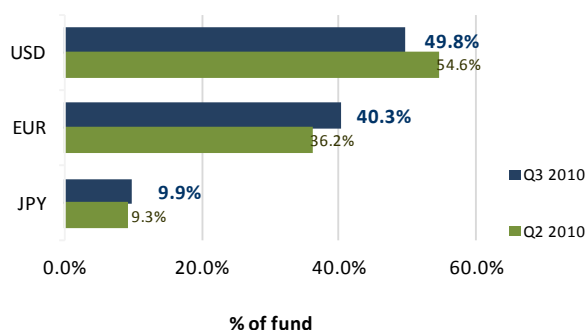
Source: Finance Ministry based on information provided by JPMorgan

The average duration of the fund's financial investments at the end of the third quarter was 2.47 years, equivalent to 903 days. As compared to the previous quarter, this represented an increase of 5 months approximately.

At the close of the third quarter, the PRF held assets in dollars for US\$1,931.4 million (49.8% of its portfolio) while assets in euros and yens amounted to US\$1,561.9 million (40.3%) and US\$383.8 million (9.9%), respectively. As compared to the previous quarter, this allocation represented a slight under-exposure to the dollar at the expense of the euro and yen (Figure 9).

**Figure 9**

Currency Allocation  
(Q3 2010 vs. Q2 2010)



Source: Finance Ministry based on information provided by JPMorgan

**Table 1**  
Historical Summary of PRF

US\$ Millions	2007	2008	2009	2010						Summary Total
				Q1	Q2	July	August	September	Summary Q3	
Starting Value	604.6	1,466.4	2,506.8	3,420.8	3,373.7	3,656.2	3,759.2	3,762.7	3,656.2	0.0
Contributions	736.4	909.1	836.7	0.0	337.3	0.0	0.0	0.0	0.0	3,424.0
Withdrawals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest Income	45.6	71.2	71.9	16.9	14.8	7.2	5.7	7.4	20.4	240.8
Capital gains (losses)	79.8	60.4	5.9	-64.0	-69.4	95.8	-2.2	107.1	200.6	213.3
Management & Custody Costs	0.0	-0.3	-0.3	-0.1	-0.2	0.0	0.0	-0.1	-0.1	-1.0
Final Value	1,466.4	2,506.8	3,420.8	3,373.7	3,656.2	3,759.2	3,762.7	3,877.1	3,877.1	3,877.1

Source: Finance Ministry based on information provided by JPMorgan

**Table 2**  
Allocation by Type of Risk and Currency  
(Q3 2010 vs. Q2 2010)

US\$ Million	Local Currency	Q2 2010	Q3 2010	Difference
Sovereign	USD	1,341.6	1,513.0	171.4
	EUR	1,057.8	1,289.2	231.4
	YEN	232.7	253.8	21.1
Bank	USD	571.8	373.9	-197.9
	EUR	264.5	272.7	8.2
	YEN	105.5	130.0	24.5
Multilateral	USD	82.2	44.5	-37.7
	EUR	0.0	0.0	0.0
	YEN	0.0	0.0	0.0
Total by Currency	USD	1,995.6	1,931.4	-64.2
	EUR	1,322.3	1,561.9	239.6
	YEN	338.3	383.8	45.6
Total		3,656.2	3,877.1	220.9
Duration (years)		2.05	2.47	0.42
Duration (days)		748	903	155

Source: Finance Ministry based on information provided by JPMorgan

**Table 3**  
Currency Allocation  
(Q3 2010 vs. Q2 2010)

Currency Allocation	Q2 2010	Q3 2010	Difference
USD	54.6%	49.8%	-4.8%
EUR	36.2%	40.3%	4.1%
JPY	9.3%	9.9%	0.6%
Total	100.0%	100.0%	0.0%

Source: Finance Ministry based on information provided by CBC

**Table 4**  
Allocation by Type of Risk and Country<sup>6</sup>  
(Q3 2010 vs. Q2 2010)

Sovereign Risk	Q2 2010	Q3 2010	Diferencia
United States	32.6%	35.0%	2.4%
Germany	24.7%	31.9%	7.2%
Japan	6.4%	6.5%	0.2%
Netherlands	2.0%	1.9%	-0.1%
Belgium	1.6%	1.4%	-0.2%
France	0.9%	1.0%	0.1%
Sweden	0.7%	0.6%	0.0%
Finland	1.5%	0.4%	-1.2%
Italy	1.6%	0.0%	-1.5%
Austria	0.0%	0.0%	0.0%
Ireland	0.1%	0.0%	-0.1%
Total	72.0%	78.8%	6.8%

Riesgo Bancario	Q2 2010	Q3 2010	Diferencia
United Kingdom	4.1%	8.2%	4.1%
France	10.8%	3.6%	-7.2%
Germany	2.1%	2.3%	0.2%
Italy	0.0%	1.8%	1.8%
Netherlands	3.7%	1.7%	-2.0%
Switzerland	2.3%	1.4%	-0.9%
Belgium	0.5%	0.7%	0.2%
Japan	0.4%	0.4%	0.0%
Spain	1.4%	0.0%	-1.4%
Sweden	0.5%	0.0%	-0.5%
Others	0.1%	0.0%	-0.1%
Total	25.8%	20.0%	-5.7%

Multilateral risk	Q2 2010	Q3 2010	Difference
Supranacional	2.2%	1.1%	-1.1%
Total	2.2%	1.1%	-1.1%

Source: Finance Ministry based on information provided by JPMorgan

<sup>6</sup> Based on settlement date information.

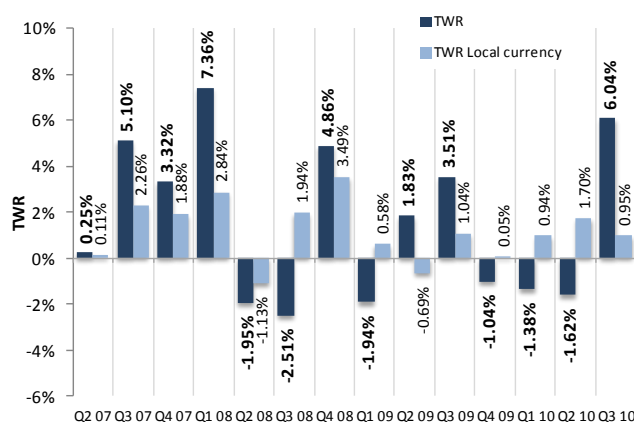
## V. RETURN ON INVESTMENT PORTFOLIO

### V.1. Returns and Performance

Returns on the PRF are shown as the time-weighted return (TWR), the indicator generally used to measure the return on investments and the performance of the portfolio manager or, in other words, the manager's ability to generate returns in excess of a benchmark (BMK<sup>7</sup>). The TWR's method of calculation neutralizes the distortions that can be caused by inflows and outflows outside the manager's control.

In the third quarter of 2010, the fund showed a return of 6.04% in dollars and -4.61% in pesos while, over the first nine months, its return reached 2.88% in dollars and -1.31% in pesos (Table 5). Since its inception,<sup>8</sup> it showed an annualized return of 6.15% in dollars and 3.18% in pesos. Figure 10 sets out the fund's quarterly return in dollars and local currency<sup>9</sup> since March 31, 2007.

**Figure 10**  
Quarterly TWR in Dollars  
(Since inception)

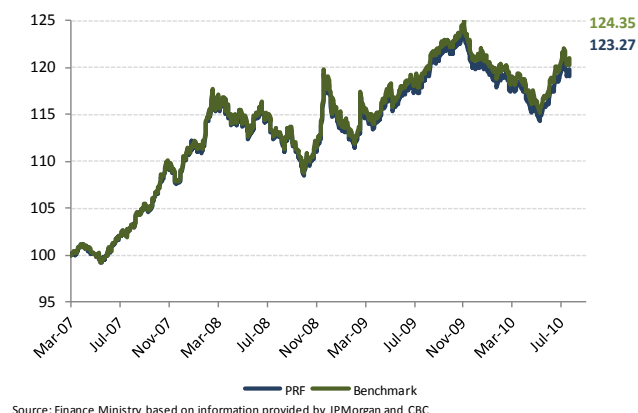


Source: Finance Ministry based on information provided by JPMorgan y CBC

In the third quarter, the fund's performance, measured as the difference between the return on its portfolio and that of the benchmark, was -2 basis points (bps) while its annual return, measured since March 31, 2007, was 27 basis points short of the benchmark.

In order to illustrate the yield on the PRF, an index that reflects daily variations in the return on its investments expressed in dollars is calculated with March 31, 2007 as its base value. Figure 11 shows the indexes for the PRF and the benchmark.

**Figure 11**  
TWR on PRF vs. Benchmark  
(March 31, 2007 = 100)



Source: Finance Ministry based on information provided by JPMorgan and CBC

Over the past three years, the portfolio's volatility expressed as the annualized standard deviation of its monthly returns was 6.74%.

As of the third quarter of 2010, the tracking error ex-post was 0.20% which is consistent with passive management of the fund's assets.

<sup>7</sup> See Appendix VIII.4.

<sup>8</sup> The TWR has been used to calculate returns since March 31, 2007 when the performance of the CBC began to be measured.

<sup>9</sup> Return in local currency excludes exchange-rate effect.



**Table 5**

Return and Risk Indicators

	2007 <sup>(a)</sup>	2008	2009	2010 Q3	2010 Year to date	Since inception (annualized) <sup>(a)</sup>
Return in USD	8.86%	7.59%	2.28%	6.04%	2.88%	6.15%
Benchmark in USD	9.10%	7.76%	2.63%	6.06%	3.03%	6.42%
Differential (bps)	-24	-17	-35	-2	-15	-27
Exchange rate CLP	-8.07%	26.80%	-19.50%	-10.65%	-4.19%	-2.97%
Return in CLP <sup>(b)</sup>	0.79%	34.39%	-17.22%	-4.61%	-1.31%	3.18%

<sup>(a)</sup> Return since the fund's inception calculated as from March 31, 2007 when the performance of the CBC began to be measured.<sup>(b)</sup> Percentage variation in the peso/dollar exchange rate plus the return in dollars.

Q3 2010 <sup>(a)</sup>	
Standard deviation	6.74%
Tracking Error (ex-post)	0.20%

<sup>(a)</sup> Calculated taking monthly returns for the last three years expressed in annual terms.

Returns for periods of more than one year are compound annualized rates while those for less than a year correspond to the change seen in the stated period. In order to ensure a high standard of transparency and to better evaluate the gains or losses obtained on the PRF's investments, the Finance Ministry reports its returns over different periods of time and in different currencies. In the case of the former, it is important to note that, in line with the fund's medium and long-term investment policy, its returns should also be evaluated over this period of time, without taking account of the monthly or quarterly fluctuations that may occur. In the case of returns expressed in different currencies, the return in dollars is the indicator best aligned with the fund's policy of investing only abroad and in overseas currencies. In addition, its return in pesos is reported. This also reflects variations in the peso/dollar exchange rate and may, therefore, show larger fluctuations. Finally, as with any investment, the return obtained in the past does not guarantee that it will be repeated in the future.

## VI. OTHER FLOWS

### VI.1. Securities Lending

A securities lending program consists in the temporary loan of financial instruments under which the lender and borrower establish the conditions and/or collateral with which the latter undertakes to comply.

The PRF's securities lending program is managed by the custodian institution (JPMorgan), using the financial assets held in the fund's portfolio. In the third quarter, operations of this type generated additional income of US\$91,771 for the PRF.

### VI.2. Costs

In the third quarter, management and custody costs totaled US\$77,592 of which US\$38,400 corresponded to the management services provided by the CBC and US\$39,192 to custody fees paid to JPMorgan.

**Table 6**  
Summary of Other Quarterly Flows

<i>Other flows (US\$)</i>	<b>Q3 2010</b>
Management (CBC)	-38,400
Custody (JP Morgan)	-39,192
Others	0
Total costs	-77,592
Securities Lending	91,771
<b>Total Other Flows</b>	<b>14,179</b>

Source: Finance Ministry based on information provided by JPMorgan and CBC

## VII. BEHAVIOR OF RELEVANT MARKETS

## VII.1. General Situation

In the third quarter of 2010, the world's main central banks made no changes in their respective monetary-policy interest rates. In the United States, the Federal Open Market Committee (FOMC) held its target range for federal funds at 0% to 0.25% while the European Central Bank (ECB) and the Bank of Japan (BoJ) maintained their monetary-policy rates at 1% and 0.1%, respectively.

In this international economic context, the US Congress approved a reform of financial regulation presented by the government in June 2009. The new law's main measures include a limit on the investments commercial banks may make with their own capital and the creation of a consumer protection system and a supervision committee charged with overseeing the entire financial system.

The results of stress tests carried out on European banks were published during the third quarter. These showed that, out of the 91 banks analyzed, only seven - five regional Spanish banks, one regional German bank and a Greek bank - did not exceed the minimum capital required by the stress tests (6%).

In a bid to stem the yen's appreciation against the US dollar and protect the Japanese economy's weak recovery, Japan's Finance Ministry ordered the first intervention of the foreign exchange market since 2004. This measure was taken unilaterally by the Japanese government and was not coordinated with other economies.

In the third quarter of 2010, the main international currencies appreciated against the US dollar while the yield curves of the different economic zones flattened. In general terms, this situation was characterized by a generalized drop in interest rates that reflected principally the weakness of recovery in developed economies and the fiscal situation of some peripheral euro zone economies.

## VII.2. Main Macroeconomic Trends

### • United States

The main indicators of confidence in the United States<sup>10</sup> showed a drop as compared to the close of the second quarter, remaining at historically low levels.

In the case of indicators of activity, GDP expanded by 1.7% in the second quarter of 2010, a tenth of a point above market expectations, while unemployment increased from 9.5% to 9.6%, reflecting the loss of an average of 73,000 jobs a month during the quarter. Annual inflation showed no change over the period, holding steady at 1.1%, while annual core inflation dropped from 0.9% to 0.8%.

The yield curve flattened in the United States during the third quarter. The evolution of the structure of interest rates implied that the yield on 2-year and 10-year Treasury bills dropped by 18 bps and 42 bps, respectively. In general, interest rates showed a drop and, on average, the yield on Treasury bills fell by 43 bps.

### • Euro Zone

In Europe, the main indicators of economic confidence<sup>11</sup> showed an increase on their level at the close of the second quarter of 2010.

In the case of indicators of activity, GDP in the euro zone expanded by 1% in the second quarter of 2010, in line with market expectations. Unemployment held steady at 10.1%, its highest level since 1998. Annual inflation rose from 1.4% to 1.8% while annual core inflation showed a slight increase, rising from 0.9% to 1.0%.

In the euro zone, the relevant yield curve flattened.<sup>12</sup> Over the quarter, the yield on 2-year German bonds increased by 23 bps while that on 10-year German

<sup>10</sup> University of Michigan Survey of Consumer Confidence Sentiment and Conference Board Consumer Confidence.

<sup>11</sup> Euro zone indicators of confidence published by the European Commission.

<sup>12</sup> The yield curve referred to by Bloomberg as EUR German Sovereign.

bonds dropped by 30 bps. In general, interest rates showed a mixed performance characterized by an upward shift in yields for maturities of between two and five years and a downward shift in interest rates for maturities of between six and ten years.

#### • Japan

Japan's main indicators of confidence<sup>13</sup> showed a drop on the close of the second quarter of 2010, reversing the upward trend seen in the first half of the year.

In the second quarter of 2010, GDP expanded by 0.4%, in line with market expectations. Unemployment dropped from 5.3% to 5.1%. Annual inflation also showed a drop from -0.7% at the end of the second quarter to -0.9% while annual core inflation held steady at -1.5%.

In the third quarter of 2010, Japan's yield curve flattened. This was reflected in the yield on 2-year Japanese sovereign bonds, which dropped by 1 bp, while that on 10-year bonds fell by 15 bps. In general, interest rates shifted downwards for all maturities and, on average, the yield on Japanese bonds fell by 9 bps.

### VII.3. Fixed-Income Market

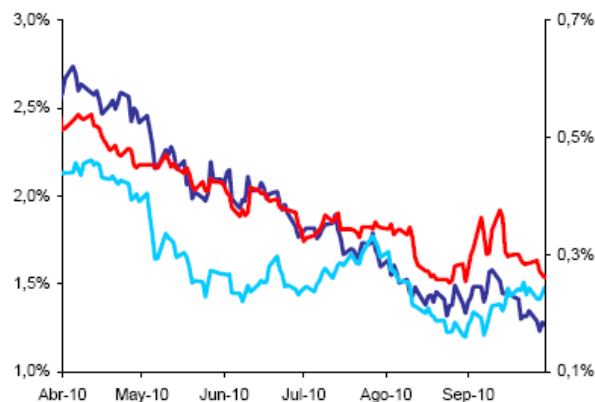
In the fixed-income market, interest rates on 5-year government bonds showed a mixed performance. In the United States and Japan, interest rates dropped while, in the euro zone, they remained stable, closing the quarter with a small increase on the second quarter of 2010 (Figure 12).

Figure 12

<sup>13</sup> Japan Consumer Confidence Overall Nationwide NSA and Japan Consumer Confidence Households NSA.

Interest Rates on 5-year Sovereign Bonds

Blue: United States  
Light blue: Europe  
Red: Japan (secondary axis)



Fuente: Bloomberg

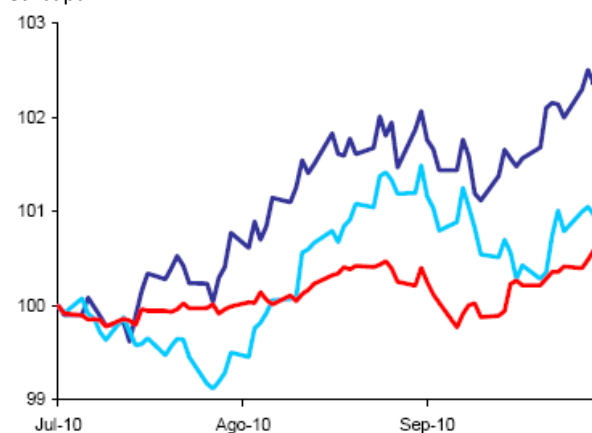
In this context, total returns in the United States, Europe and Japan were positive in the third quarter of 2010 (Figure 13).

Figure 13

Total Returns (JPMorgan Index 1-10 years)

June 30, 2010 = 100

Blue: United States  
Light blue: Europe  
Red: Japan



Fuente: JP Morgan

### VII.4. Main Spreads on Portfolio Securities

The spread on 5-year agency bonds dropped by 1 bp in the third quarter of 2010 (Figure 14).<sup>14</sup> In this context, their return<sup>15</sup> was higher than on 5-year US Treasury bills.

US inflation-linked bonds (TIPS) showed a lower return than (nominal) US Treasury bills of an equivalent maturity.<sup>16</sup> This was reflected in the spread on TIPS<sup>17</sup> which dropped by 24 bps in the third quarter of 2010 (Figure 14).

**Figure 14**

Agency and TIPS Spread vs. Treasuries  
(Spreads in bps compared to 5-year Treasuries)  
Blue: Agencies  
Light blue: TIPS (secondary axis)



Fuente: Bloomberg

## VII.5. Exchange Rates

In the third quarter of 2010, the euro and the yen appreciated against the US dollar by 11.45% and 5.59%, respectively (Figure 15). As a result, the yen/euro exchange rate showed an appreciation of 5.22% over the same period.

**Figure 15**

Exchange Rates  
(Against the dollar)  
Blue: Euro (secondary axis)  
Light blue: Yen



Fuente: JP Morgan

<sup>14</sup> The increase in the agency spread seen in June 2010 was the result of a change in the benchmark instrument due to the change in the maturity of the original issue.

<sup>15</sup> In the third quarter of 2010, the return on 5-year US agency bonds (13.7%) was above that on US Treasury bills of the same maturity (13.1%).

<sup>16</sup> In the third quarter of 2010, the return on 5-year inflation-indexed bonds (6.1%) was below that on US Treasury bills of the same maturity (13.1%).

<sup>17</sup> TIPS spread: Return on a US Treasury bill minus the return on TIPS of an equivalent maturity.

## VIII. APPENDIX

### VIII.1. Positions with Financial Institutions

In the third quarter of 2010, the PRF held deposits with **bank risk** in the following institutions:

- 1 Bank of Scotland PLC
- 2 Barclays Bank PLC
- 3 Credit Industriel et Commercial
- 4 Dexia Bank Belgium
- 5 Fortis Bank
- 6 ING Bank NV
- 7 Intesa Sanpaolo Spa
- 8 Lloyds TSB Bank PLC
- 9 Mizuho Corp Bank
- 10 Norddeutsche Landesbank
- 11 Royal Bank of Scotland (The)
- 12 Societe Generale
- 13 Unicredit Bank
- 14 Unicredit SPA
- 15 Zuercher Kantonalbank

Source: JPMorgan

## VIII.2. Investment Limits

### A. Credit Risk

The PRF's investments must fulfill the following credit-risk conditions and requirements:

The eligible issuers are:

Asset Class (Risk)	Upper Limit
<b>Sovereign</b>	<b>100%</b>
<b>Multilateral</b>	<b>60%</b>
<b>Banks</b>	<b>50%</b>
<b>Agencies</b>	<b>30%</b>

#### A.1 Sovereign Risk

The eligible countries are those, other than Chile, that over the previous 24 months have held a long-term risk classification equivalent to **A-** or higher from at least two of Fitch, Moody's and Standard & Poor's.

Investment limits for eligible sovereign risk (between **AAA** and **A-**) are:

Risk Classification	Upper Limit
<b>AAA</b>	<b>100%</b>
<b>AA+</b>	<b>90%</b>
<b>AA</b>	
<b>AA-</b>	
<b>A+</b>	<b>30%</b>
<b>A</b>	
<b>A-</b>	

#### A.2 Multilateral Risk

The eligible international organizations are those with a long-term risk classification equivalent to **AA-** or higher from at least two of Fitch, Moody's and Standard & Poor's.

Investment limits for eligible multilateral risk (between **AAA** and **AA-**) are:

Risk Classification		Upper Limit (US\$ million)
AAA	Aaa	800
AA+	Aa1	600
AA	Aa2	
AA-	Aa3	

### A.3 Bank Risk

The methodology for selecting institutions and assigning limits is based on international risk classifications and the size of the institutions.

Eligible institutions are those that have a long-term risk classification of **A-** or higher from at least two of Fitch, Moody's and Standard & Poor's, and a minimum net worth equivalent to **US\$1,000 million**.

Investment limits by institution are expressed in discrete intervals according to the table below:

Risk Classification		Upper Limit (US\$ million)
AAA	Aaa	600
AA+	Aa1	400
AA	Aa2	
AA-	Aa3	
A+	A1	300
A	A2	
A-	A3	

### A.4 Agency Risk

The eligible US agencies are those with a long-term risk classification equivalent to **AAA** from at least two of Fitch, Moody's and Standard & Poor's, and a minimum net worth equivalent to **US\$1,000 million**. Investment in any one agency may not exceed **US\$800 million**.

## VIII.3. Methods for Calculating Estimated Returns

The method used to calculate the return on a portfolio depends on the nature of the fund and on whether the yield to the investor or the performance of the portfolio manager is being evaluated.

In the Quarterly Report, two main methods are used: the **Time-Weighted Rate of Return (TWR)** and the **Internal Rate of Return (IRR)**, with the latter serving as a measure of asset-weighted return. While the



TWRR is used to analyze the performance of the fund's management relative to the chosen benchmark, the IRR is used to determine the return to the State of Chile.

A conceptual description of each of these methods is provided below, along with a discussion of their general use in the financial market and their application to Chile's sovereign wealth funds, followed by some brief final comments.

- **Internal Rate of Return**

The Internal Rate of Return (IRR) on the net flows of a given period is the rate of return actually received by an investor.

The Association for Investment Management and Research (AIMR) recommends using the IRR to measure return on investments in instruments that are not publicly traded (property, private equity, etc.) since, in these cases, the portfolio manager has greater control over the amount and timing of cash flows.

The IRR is the implicit rate calculated on the basis of a series of cash flows and is the return at which the initial investment equals the present value of flows and interest or, in other words, the discount rate at which the present value of all cash flows equals zero. This is equivalent to resolving the following equation to the T degree:

$$\sum_{i=0}^{i=T} \frac{CF_i}{(1+r)^i} = 0, \text{ with } CF_i = \text{net flow of day } i.$$

Rates of return calculated using the iterative IRR method are affected by the timing and size of net cash flows during the period.<sup>18</sup>

- **Time-Weighted Rate of Return (TWR)**

This method is used by the market to measure the performance of funds invested in publicly-traded instruments. In the case of these instruments, fund managers tend not to control investors' cash flow because they are constantly buying and selling.

The TWR<sup>19</sup> is the rate of growth measured as a percentage of the change in the value of an asset over a given period without considering the effect of cash flows. In order to obtain the TWR for the period, the

<sup>18</sup> Alternatively, the IRR can be calculated using the Modified Dietz Method (MDM):

$$MDM \text{ Return} = \frac{EMV - BMV - CF}{BMV + \text{Net Adjusted Cash Flow}}$$

where:

- *EMV* is the market value at the end of the period plus accrued interest
- *BMV* is the market value at the beginning of the period plus accrued interest
- *CF* is net cash flow during the period.

*Adjusted Net Cash Flow* is the average of each individual cash flow weighted by the length of time (as a percentage of the total period) during which the flow affected the portfolio.

<sup>19</sup> Fabozzi and Frank, *Investment Management*, © 1995, pgs. 611-618.

daily net returns of contributions and withdrawals are calculated as well as costs<sup>20</sup> and income from securities lending.

$$TWR_{period} = \prod_i^{period} (1 + r_i) - 1$$

where:

$$r_i = \frac{value\_assets_i - contributions + withdrawals + costs - securities\_lending}{value\_assets_{i-1}}$$

The TWR measures the ability of a fund manager to generate value through a defined investment policy, independently of the contributions and/or withdrawals made during the period being analyzed.

In the case of Chile's sovereign wealth funds, it allows their performance to be compared with the benchmark. This is achieved by converting daily returns (measured as the difference in market value from one day to another, excluding cash flows during the latter) into an index.

- **TWR vs. IRR**

The TWR is used to measure the performance of a fund manager or managers against the chosen benchmark. An alternative method of measurement is to assume that the resources are permanently invested in a portfolio that generates the same daily return as the benchmark and to compare the value of this hypothetical portfolio with that of the actual portfolio. However, under this latter method, it is more difficult to devise a benchmark and verify the results. The usual practice in financial markets is, therefore, to use the TWR to measure a fund manager's performance and to be able to compare this with a benchmark that can easily be constructed by an external party.

The IRR, on the other hand, serves to measure the fund's performance from the point of view of the State of Chile as an investor.

Although the two indicators measure different aspects of an investment, both are considered necessary in order to properly evaluate performance.

#### VIII.4. Calculation of the Benchmark

A new reference portfolio (benchmark) was introduced on September 1, 2009. However, it maintains the structure of the previous benchmark:

- ✓ **Short-term money market instruments:** The Merrill Lynch LIBID Index and 6-month T-bill rates in dollars, euros and yens are used to simulate a portfolio of 3-month deposits.

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<sup>20</sup> Only includes custody and advisory costs.

- ✓ **Nominal bonds:** Barclays indexes for sovereign bonds of 1-3 years, 3-5 years, 5-7 years and 7-10 years in the three currencies are used.
- ✓ **Inflation-linked bonds:** Barclays US Government Inflation-Linked Bond Index (US TIPS) is used. This index monitors sovereign bonds with a duration of between 1 and 10 years.

The weight of each of these components is as follows:

Structure	USD	EUR	JPY	Total
<b>Money market (*)</b>	<b>15.00%</b>	<b>12.00%</b>	<b>3.00%</b>	<b>30.00%</b>
Merrill Lynch LIBID 6-Month Average	7.50%	6.00%	1.50%	15.00%
Merrill Lynch Treasury Bill Index	7.50%	6.00%	1.50%	15.00%
<b>Nominal sovereign bonds</b>	<b>31.50%</b>	<b>28.00%</b>	<b>7.00%</b>	<b>66.50%</b>
Barclays Capital Global Treasury Bond Index 1-3 years	14.18%	12.60%	3.15%	29.93%
Barclays Capital Global Treasury Bond Index 3-5 years	9.45%	8.40%	2.10%	19.95%
Barclays Capital Global Treasury Bond Index 5-7 years	3.94%	3.50%	0.88%	8.31%
Barclays Capital Global Treasury Bond Index 7-10 years	3.94%	3.50%	0.88%	8.31%
<b>Inflation-linked sovereign bonds</b>	<b>3.50%</b>			<b>3.50%</b>
Barclays Capital Global Inflation-Linked US TIPS Index 1-10 years	3.50%			
<b>Total</b>	<b>50.00%</b>	<b>40.00%</b>	<b>10.00%</b>	<b>100.00%</b>

#### • Calculation of LIBID and T-Bill Benchmark

The benchmark for money market investments is calculated using the Merrill Lynch indexes for LIBID rates<sup>21</sup> and 6-month Treasury bills for the three currencies included in the PRF's portfolio. Daily returns are calculated as the variation in the dollar-denominated index in period  $t$  as compared to its value in  $t_{-1}$ :

$$Ret_{Libid_t} = 7.5\% \cdot \left( \frac{ML\_Libid_t^{USD}}{ML\_Libid_{t-1}^{USD}} - 1 \right) + 6.0\% \cdot \left( \frac{ML\_Libid_t^{EUR}}{ML\_Libid_{t-1}^{EUR}} - 1 \right) + 1.5\% \cdot \left( \frac{ML\_Libid_t^{JPY}}{ML\_Libid_{t-1}^{JPY}} - 1 \right)$$

Similarly, for T-bills, the daily return on each index is:

$$Ret_{TBill_t} = 7.5\% \cdot \left( \frac{ML\_TBill_t^{USD}}{ML\_TBill_{t-1}^{USD}} - 1 \right) + 6.0\% \cdot \left( \frac{ML\_TBill_t^{EUR}}{ML\_TBill_{t-1}^{EUR}} - 1 \right) + 1.5\% \cdot \left( \frac{ML\_TBill_t^{JPY}}{ML\_TBill_{t-1}^{JPY}} - 1 \right)$$

<sup>21</sup> According to convention, the LIBID rate is equal to LIBOR less 1/8 or 0.125.

- **Calculation of the Nominal Bond Benchmark**

The benchmark for sovereign bonds is calculated using the different Barclays Capital Global Treasury Bond indexes with durations of 1-3 years, 3-5 years, 5-7 years and 7-10 years for the United States (USD), Germany (EUR) and Japan (JPY). The daily return of each index in its local currency is:

$$Ret\_BNom \text{ or } Ret\_Bcls_t = \frac{Idx\_Bcls_t}{Idx\_Bcls_{t-1}} - 1$$

The benchmark's daily return in dollars for each country is:

$$Ret\_BNom\_USD_t = \sum_{duration} Ret\_Idx\_USD_t^{duration} \cdot \omega_{JPY}^{duration}$$

$$Ret\_BNom\_EUR_t = \sum_{duration} \left[ Ret\_Idx\_EUR_t^{duration} + 1 \cdot \frac{EUR_t}{EUR_{t-1}} - 1 \right] \cdot \omega_{EUR}^{duration}$$

$$Ret\_BNom\_JPY_t = \sum_{duration} \left[ Ret\_Idx\_JPY_t^{duration} + 1 \cdot \frac{JPY_t}{JPY_{t-1}} - 1 \right] \cdot \omega_{JPY}^{duration}$$

where:

$$\omega_{USD} = \begin{cases} duration \ 1-3 \text{ years} = 14.1750\% \\ duration \ 3-5 \text{ years} = 9.4500\% \\ duration \ 5-7 \text{ years} = 3.9375\% \\ duration \ 7-10 \text{ years} = 3.9375\% \end{cases} \quad \omega_{EUR} = \begin{cases} duration \ 1-3 \text{ years} = 12.6000\% \\ duration \ 3-5 \text{ years} = 8.4000\% \\ duration \ 5-7 \text{ years} = 3.5000\% \\ duration \ 7-10 \text{ years} = 3.5000\% \end{cases}$$

$$\omega_{JPY} = \begin{cases} duration \ 1-3 \text{ years} = 3.1500\% \\ duration \ 3-5 \text{ years} = 2.1000\% \\ duration \ 5-7 \text{ years} = 0.8750\% \\ duration \ 7-10 \text{ years} = 0.8750\% \end{cases}$$

The indexes are expressed in their local currency and adjusted by the exchange rate to obtain the return in dollars.

Finally, the benchmark for nominal bonds in USD is:

$$Ret\_BNom_t \text{ or } Ret\_Bcls_t = Ret\_BNom\_USD_t + Ret\_BNom\_EUR_t + Ret\_BNom\_JPY_t$$

- **Calculation of Inflation-Linked Bond Benchmark**

The benchmark for inflation-linked bonds is simply:

$$Ret\_TIPS_t = 3.5\% \cdot \left( \frac{Idx\_TIPS_t}{Idx\_TIPS_{t-1}} - 1 \right)$$

- **Calculation of Fund Benchmark**

The daily return on the benchmark for the funds is:

$$Ret\_Libid_t + Ret\_TBill_t + Ret\_BNom_t + Ret\_TIPS_t$$

- **Formula for Exchange-Rate Adjustment**

Exchange-rate adjustment follows from:

$$asset\_return_t^{EUR}[EUR] = \frac{asset\_price_t^{EUR}}{asset\_price_{t-1}^{EUR}} - 1 \quad (1)$$

$$EUR\_return_t = \frac{EUR_t}{EUR_{t-1}} - 1 \quad (2)$$

$$asset\_return_t^{EUR}[USD] = \frac{asset\_price_t^{EUR} \cdot EUR_t}{asset\_price_{t-1}^{EUR} \cdot EUR_{t-1}} - 1 = \frac{asset\_price_t^{EUR}}{asset\_price_{t-1}^{EUR}} \cdot \frac{EUR_t}{EUR_{t-1}} - 1 \quad (3)$$

Replacing (1) in (3):

$$asset\_return_t^{EUR}[USD] = \left( + asset\_return_t^{EUR}[EUR] \right) \cdot \frac{EUR_t}{EUR_{t-1}} - 1 \quad (4)$$

And, finally, replacing (2) in (4):

$$asset\_return_t^{EUR}[USD] = \left( + asset\_return_t^{EUR}[EUR] \right) \cdot \left( + EUR\_return_t \right) - 1 \quad (5)$$

## IX. GLOSSARY<sup>22</sup>

**Accrued interest:** Interest earned in a given period that has yet to be withdrawn or paid.

**Bank risk:** The risk associated to an investment in bank financial instruments; refers to the different risks faced by banking institutions in the course of their activities. This normally varies in line with the institution's line of business. These risks include credit, liquidity, exchange-rate and interest-rate risk.

**Basis point:** One hundredth of a percentage point; the smallest unit for measuring the return on a bond or a change in interest rates.

**Benchmark:** A portfolio used for the purposes of comparison; permits evaluation of a fund manager's performance. For an investor in fixed-income assets, benchmarks are, in general, optimum portfolios with clearly defined investment parameters such as the relative weight of the portfolio's components, currency allocation and credit risk.

**Carry trade:** A financial strategy that consists in borrowing in one currency in order to invest in instruments denominated in another currency with an expected rate of return that is relatively higher than the cost of borrowing in the first currency. Under this strategy, there is no coverage against exchange-rate risk.

**Counterpart risk:** The risk arising from the possibility of default on the financial obligations of the counterpart in a financial operation.

**Credit risk:** The risk that an issuer may not fully comply with a financial liability either at the time it falls due or at some subsequent time. In systems for the exchange of securities, this definition in general includes replacement and principal risks.

**Currency basket:** A measure of the value of a group of currencies in which each individual currency has a defined weight.

**Duration:** A measure of exposure to interest-rate risk that measures the sensitivity of the price of a fixed-income instrument (bond) to changes in interest rates or, in other words, how much the instrument's price changes in response to a change in interest rates.

**Financial agencies in the US:** Mortgage lenders in the United States with explicit or implicit government backing.

**Flight to quality:** Investors' movement of funds to assets of better credit quality and, therefore, lower risk during periods of uncertainty or great volatility.

**Inflation-linked bonds:** Bonds whose value is adjusted in accordance with an inflation index; in the US, these bonds are known as TIPS.

**Information ratio:** A measure of the risk-adjusted return on financial securities or a portfolio; defined as the difference between the return on the security or portfolio and the benchmark divided by the TE. It can be interpreted as the ability of the manager to generate returns in excess of the benchmark for each unit of relative risk.

**Internal Rate of Return (IRR):** The rate of return actually perceived by an investor; corresponds to the internal rate of return on net flows during a given period.

**Investment guidelines:** Criteria under which investments are managed.

**LIBID:** London Interbank Bid Rate, the interest rate paid on interbank deposits; by definition, it is equal to LIBOR (offered rate) minus 0.00125 or 0.125%.

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<sup>22</sup> Sources: Central Bank of Chile (CBC) and Bloomberg.

**LIBOR:** London Interbank Offered Rate, the interest rate charged on interbank borrowing.

**Liquidity risk:** The risk arising from the possibility that a counterpart (or participant in a clearing system) does not clear a liability for its total value when it falls due. This does not imply that a counterpart or participant is insolvent, given the possibility of clearing the liability at an unspecified subsequent date.

**Market risk:** The risk that the value of an investment may be reduced by changes in market factors.

**Money market instruments:** Tradable instruments with a maturity of up to a year.

**Multilateral risk:** The risk of default by an official multilateral issuer.

**Operational risk:** The risk that deficiencies in internal information systems or controls may result in unexpected losses.

**Overnight deposits:** Deposits with a maturity of one day.

**Portfolio:** A combination of investment instruments held by an individual or institutional investor.

**Reference duration:** An index of duration devised to guide and evaluate the duration of investments.

**Reference structure:** A reference portfolio used to guide and evaluate portfolio management.

**Return differential:** A measure of the performance of a portfolio compared to its benchmark.

**Risk:** The possibility of suffering damage or losses; the variability of the return on an investment.

**Risk classification:** The level of credit risk associated with a financial instrument, institution or country as defined by a risk rating agency.

**Secondary market:** The market in which financial assets that have already been issued are traded. Each transaction involves a sale/purchase between investors.

**Sovereign risk:** The risk arising from investment in sovereign instruments; generally used to refer to the risk classification of a sovereign state. This classification corresponds to the opinion issued by bodies specialized in risk evaluation as to the possibility that a state will properly comply with its financial obligations, taking into account factors that include its payment record, political stability, economic situation and willingness to repay borrowing.

**Spread:** The difference between yield-to-maturity on fixed-income securities; used to evaluate the relative performance of different assets.

**Subprime mortgages:** Loans for house purchase granted to persons whose credit profile excludes them from access to standard financing. These mortgages are relatively more expensive and risky.

**Time-Weighted Rate of Return (TWR):** Rate of growth measured as a percentage of the change in an asset's value over a period of time without taking account of the effect of cash flows.

**Total return:** Annualized rate of growth of the economic value of an instrument or portfolio considering all the potential sources of income such as capital gains or losses, coupons and their reinvestment.

**Tracking Error (TE):** An indicator of the risk arising from active positions taken by a portfolio manager as compared to its benchmark.

**Trade bill:** A debt security in local or foreign currency, with a maturity of between 90 days and 1 year, issued by governments, financial institutions and large companies to cover short-

term financing needs. A trade bill's yield depends on the issuer's risk rating; maturities, interest rates, repayment terms, currency and expiry vary.

**Value at risk (VaR):** An indicator of the risk of a portfolio that provides an estimate of the amount that could be lost over a given period of time with a given level of probability.

**Volatility:** A measure of an asset's risk, representing the variation in its price over a period of time. Values can fluctuate with market swings due to events such as variations in interest rates, unemployment and economic changes in general.

**Waiver:** Explicit and voluntary authorization for non-compliance during a certain period of time with certain rules, parameters and/or procedures established in specific investment guidelines.

**Weekend deposits:** Deposits with a maturity of a weekend.