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Pension funds: lates developments on the financial markets of OECD countries, with a particular focus on Chile and Japan

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PENSION FUNDS: LATEST DEVELOPMENTS ON THE FINANCIAL MARKETS OF OECD COUNTRIES, WITH A PARTICULAR FOCUS ON CHILE AND JAPAN

Liliana Cavieres, Belén Zinni and Satoru Hagino, OECD Statistic Directorate[1]

Introduction

An important component of households' wealth is the value of reserves in pension funds, which represent an average of 30% for all OECD countries in 2010, and more than 50% for nearly one third of these countries. The value of reserves in pension funds, however, can be affected by asset price fluctuations in the financial markets, thereby affecting the savings accumulated by households. This impact can be of significant importance, in particular for defined contribution (DC) pension plans, since in this case the amount for the retirement benefits is directly determined by the investment policy of the administrator. In defined benefits (DB) pension plans, on the other side, the amount of retirement benefits is largely determined by the years of service and the earnings during the working life. However, investment performance will affect the benefits in the long run. Policy issues, no matter the type of plan, should then be addressed in order to minimize potential losses on pension funds, and to contribute to economic well being by helping households to manage and absorb financial shocks.

Changes in the market value of the pension funds reserves during the 2007-2008 financial and economic crisis highlighted the importance of managing risks derived from fluctuations in financial assets' prices. The design of investment strategies oriented to limit potential risks and losses has become important, in particular for DC pension plans, where the risks are mainly borne by members. Policy makers and individuals can control some variables that affect the retirement income, for example, the length of the contribution period and the amount of contributions themselves. However, they cannot control the financial risks caused by the movements in the financial assets' prices or defaults of debtors. Antolin and Payet (2010) assess three kinds of risks on retirement income derived from (DC) pension plans: the *financial-market risk*, associated with the uncertainty about returns on investment, inflation and interest rates; the *labour-market risk*, linked to the uncertainty of employment prospects and real wage career paths; and the *demographic risk*, related to life expectancy after retiring. Their analysis highlights that labour-market risks as well as financial risks, which have been emphasized by the economic and financial crisis, have the largest impact on retirement income from DC pension plans.

Section 1 of this paper assesses the financial risk of pension funds investments in OECD countries by analysing the allocation and re-allocation of assets during a period of high volatility in financial market prices on the basis of the SNA-related databases available on OECD.Stat. Normally, periods of uncertainty about the performance of the economy lead investors to re-allocate their portfolios towards less risky instruments. Investment guidelines and default investments strategies are generally defined by regulators, especially in countries where DC schemes are mandatory, although they may envisage a margin of actions to investment managers.

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Section 2 focuses on recent developments of pension funds in Chile and Japan. While in Chile most retirement savings are mandatory and accumulated in individual accounts of a DC type[2], in Japan almost all funds in the funded pension system (third pillar) follow a DB scheme. In addition to historic reasons and legal requirements, the choice of pension scheme and the portfolio of pension funds are related to the degree of households' risk preference as well as demographic developments (ageing society). Finally, section 3 presents the conclusions.

1. Recent developments on the financial markets[3]

Definitions and statistical concepts in OECD countries

Pension funds collect contributions from policy holders and households to provide, in return, retirement income. According to the 2008 SNA, pensions function as a form of redistribution of income or wealth mediated by these institutions (§ 11.103, 2008 SNA). This is an intertemporal distribution of resources as young workers make contributions in pension funds to assure a source of income when they retire. Pension managers pool the assets that households set aside for retirement purposes, invest them in financial markets following different investment strategies, and accumulate nominal holding gains or losses (in addition to property income received) on the invested funds. The future pension obligations are recognized as liabilities of the pension funds (technical reserves), which in turn are considered as assets of households.

The System of National Accounts (SNA) offers a framework to analyse the effects of the current financial crisis on the investment portfolio of pension funds and the risk borne by households derived from the investment strategies followed by these institutions.

The OECD, Eurostat and the ECB are the leading international organisations for the collection and publication of country data on insurance companies and pension funds. The OECD, in particular, has a long experience in the collection, analysis and dissemination of economic and financial data on insurance companies and pension funds of its member countries and, recently, of several non-member economies. The Statistics Directorate (STD), the Directorate for Financial and Enterprise Affairs (DAF) and the Directorate for Employment, Labour and Social Affairs (DELSA) contribute to the collection of various types of data in these fields. The OECD statistical data warehouse OECD.Stat contains, among a large list of domains, both national sector accounts data (SNA and more detailed SNA-related datasets) managed by STD, industry-based statistics for insurance companies and pension funds managed by DAF, and social-oriented information gathered by DELSA. The statistics on pension funds collected by STD are included in the annual and quarterly *Financial Accounts* and *Financial Balance Sheets* Databases, based on the SNA 1993 guidelines, and in the annual and quarterly SNA-related databases *Institutional Investors' Assets* as well as *Households' Assets and Liabilities*.

Financial Accounts record financial transactions within a certain accounting period, valued at the market prices prevailing at the time these transactions took place. Transactions are flows derived from the interaction between institutional units by mutual agreement or actions within an institutional unit that it is analytically useful to treat like a transaction. Other economic flows derived from the changes in the quantity or physical characteristics of the assets or changes in the level and structure of their prices are recorded in two additional flow accounts, the '*Other Changes in the Volume of Assets Account*' and the '*Revaluation Account*' (chapter 12, 2008 SNA).

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2 Public Pension Reserve Funds are not in the scope of this analysis.

3 Figures in this section are based on data available on OECD.Stat as of July 2012.

Financial Balance Sheets record the stock of financial assets and liabilities at their market value at a certain point in time. The opening and closing balance sheets are statements containing the value of assets and liabilities at the beginning and at the end of the accounting period, respectively. Both balance sheets are linked through a basic identity:

$$S_t = S_{t-1} + T_t + O_t + R_t \quad (1)$$

where S_t and S_{t-1} are the stock of a certain financial asset at the beginning and at the end of the accounting period t, T_t is the total value of the same asset acquired less the total value of the same type of asset disposed during the accounting period t, O_t corresponds to changes in the volume of assets due to flows other than transactions other than revaluations, and R_t equals the nominal holding gains or losses accruing during t due to changes in the price of the asset.

The SNA-related database *Institutional Investors' Assets* managed by the Statistics Directorate of the OECD, provides annual and quarterly data on the stock of assets held by pension funds, classified, to a great extent, as recommended by the SNA 1993, and further sub-divided according to the residence of the issuer. The value added of this database relative to what is included in the standard tables according to SNA 1993/ESA 1995, is that they record statistical information of financial and non-financial assets of insurance companies and pension funds separately.[4]

In accordance with the SNA 1993, household financial balance sheets record the net equity of households in pension funds reserves. These are *"reserves held by funds established by employers and/or employees to provide pensions for employees after retirement"* (§ 11.93, SNA 1993). These reserves are considered to be assets of the household sector. The nature and, in particular, the estimation of these reserves depend on the kind of pension plan: DB plan, DC plan or hybrid plan.

The SNA-related database *Households' Financial and Non-financial Assets and Liabilities*, also managed by the Statistics Directorate of the OECD, includes annual and quarterly data on the stock of financial assets held by households, with a more detailed breakdown consistent with the financial classification of the SNA. In particular, Net equity of households in pension funds (corresponding to the SNA code AF612) are split into three categories of pension plans classified according to their status, 'Pension plans managed by autonomous pension funds', 'Pension plans managed by non-autonomous pension funds', and 'Insured pension plans'. To get more precise information on the types of funds held by households, these three categories are further broken down into traditional 'Defined benefit plans (DB)', for which the risk is borne by the manager and not by the policyholder[5], 'Hybrid plans', where the risk is shared between the manager and the policyholder, and 'Defined contribution plans (DC)', where the worker bears the investment risk.

According to the SNA 1993, DB plans are "those in which the level of pension benefits promised to participating individuals is guaranteed; benefits are related by some formula to participants' length of service and salary and are not totally dependent on either the participants' contributions or the assets in the fund" (§ 13.78, SNA 1993). They include all plans in which the financial or longevity risks are borne by

[4] Recently, the 2008 SNA has included the distinction between insurance companies and pension funds in its core set of tables for institutional sector accounts.

[5] Note that in some countries the underfunding of DB plans is not the sole responsibility of the sponsor. Possible measures to address the underfunding may be the result of a negotiation between the sponsor, the employees and the retirees, and as such these measures may also affect the (future) contribution payments and pension entitlements of the relevant households.

the plan sponsor[6]. The liability of a DB plan and the concomitant claim of the household sector is equal to the present value of the promised benefits (§ 13.78, SNA 1993)[7].

DC plans, also known as money purchase plans, are "those for which the level of contributions to the fund is guaranteed, but benefits are directly dependent on the assets of the fund" (§ 13.79, SNA 1993). They correspond to "pension plans 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"[8]. Future benefits vary according to the fund's assets and the returns on the funds invested. This kind of plans is sensitive to economic fluctuations and subject to the manager's ability in managing the investments. The risk is, unlike that for the DB plans, mainly borne by individuals. The liability of a DC plan is equal to the current market value of the fund's assets (§ 13.79, SNA 1993).

The hybrid plans are retirement plans which have characteristics of both DB and DC plans. They include DB plans where the sponsor guarantees a rate of return, which is either specified in the plan rules, or calculated with reference to the actual return of a supporting asset and a minimum guaranteed rate of return.

Households' investments: the role of pension funds

Households hold, on average, 27% of the total economy's financial assets in selected OECD countries. In Italy and the United States, their financial assets represent more than one third and in Mexico, they account for almost the half of the total economy's financial assets. But more importantly, households represent the core of the society, for which policy decisions – in the context of pension funds systems – should improve household's ability to absorb financial shocks and guarantee their economic well being.

To this end, the allocation and risk management of household's financial assets deserves special attention. Figure 1 shows that households invest, on average, their financial assets predominantly in shares and other equity, currency and deposits and net equity in pension funds reserves[9]. It should be noted here that households also hold securities other than shares as well as shares and other equity indirectly, through their participation in pension schemes.

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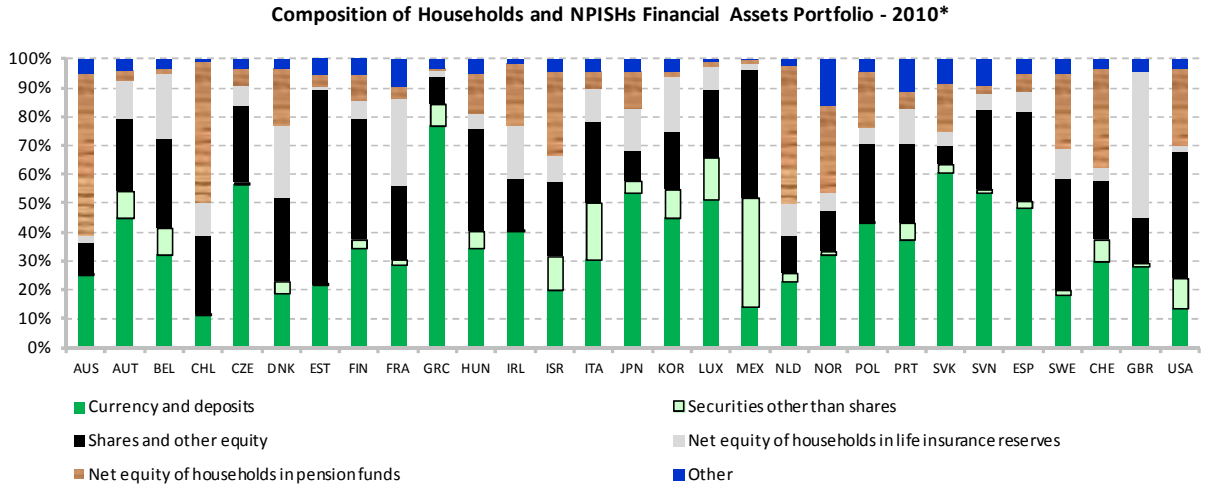
6 *Revised Taxonomy for pension plans, pension funds and pension entities*, DAFFE/AS/PEN/WD(2001)5/REV4, OECD, 2002. See also foot-note 5.

7 In this respect, it should be noted that pension obligations related to unfunded DB-plans, usually operated by government, are not recognized as liabilities of the sponsor and as assets of households.

8 op.cit.

9 As of 2010 this three items accounted for 78% of the total households assets in OECD selected countries.

Figure 1



** As a percentage of total households' financial assets, 2010 or latest available year.*
Source: Financial Balance Sheets and Financial Dashboard, OECD.Stat.
Note: 'Other' refers to Loans, Prepayments of premiums and reserves against outstanding claims and Other accounts receivable.

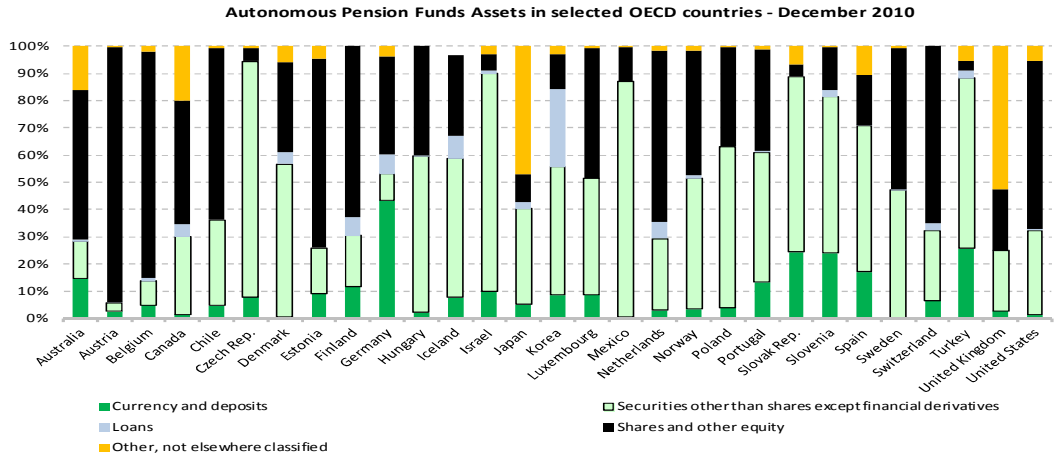
The structure of household financial assets varies across countries: for example, Greek households have a high percentage in currency and deposits. In Estonia households have more shares and other equity. In Australia, the Netherlands and Chile, households have the largest percentage in pension funds reserves.

Structure of assets in pension funds for OECD countries

Institutional Investors' Assets data show that as of 2010 autonomous pension funds have a substantial share of their assets invested in shares and other equity (AF5) as well as in securities other than shares, except financial derivatives (AF33); see figure 2. However, the composition of the relevant assets differs across OECD selected countries. Austria and Belgium have large amounts invested in shares[10] followed by Estonia, Switzerland, Chile, the Netherlands and the United States. In contrast, Czech Republic, Mexico and Israel hold a larger percentage in securities other than shares.

[10] For a few countries the percentage invested in shares may be over-estimated: indeed, autonomous pension funds may indirectly hold bonds and equities via investment fund shares. However, in the Institutional Investors'Assets dataset it is recorded the total amount of shares held by autonomous pension funds with no distinction between the percentage of directly held shares (AF51) and the percentage of shares in investments funds (AF52).

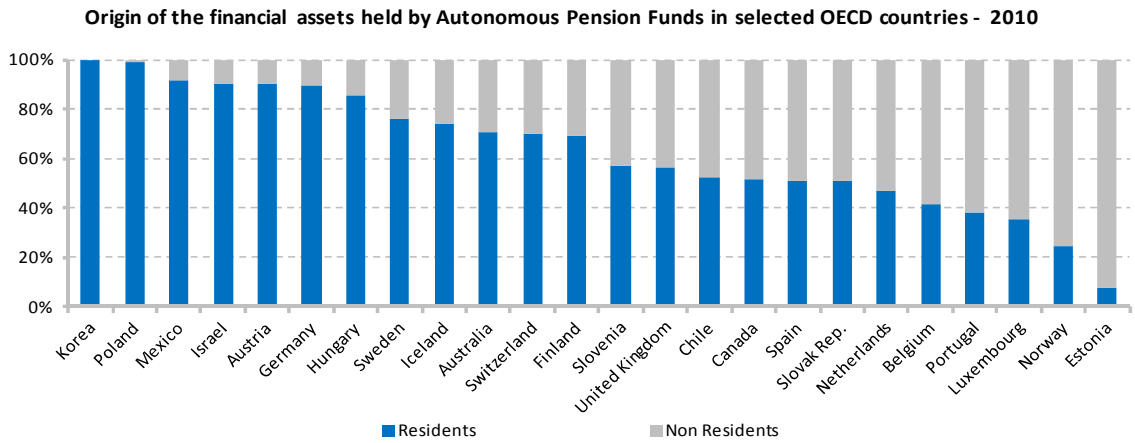
Figure 2



Source: Institutional Investors' Assets, OECD.Stat

Another important point to be observed for measuring the risk of the autonomous pension funds portfolios is the residency of the debtors. Figure 3 shows that most of the credit risks come from resident debtors. This includes the following assets, when available: securities other than shares except financial derivatives (AF33), loans (AF4) and shares (AF5)[11]. Korea and Poland are two extremes cases, where almost 100% of autonomous pension funds assets are invested in instruments issued by residents. On the other side, autonomous pension funds in Estonia, Norway and Luxembourg invest mostly in instruments issued by non-residents.

Figure 3

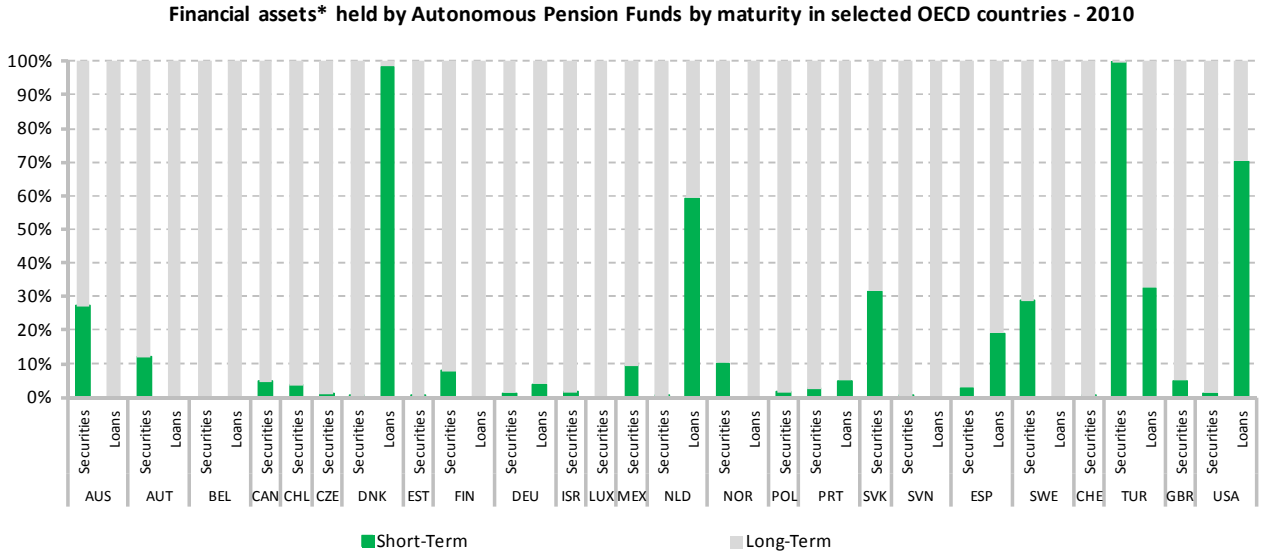


Source: Institutional Investors' Assets, OECD.Stat

Regarding the maturity structure of the financial assets, autonomous pension funds invest mainly in long-term instruments. The Institutional Investors' Assets data, which follows the SNA standards, only show a distinction between long-term and short-term for securities other than shares, except financial derivatives (AF33) and for loans (AF4); see figure 4. Deposits are usually considered as short-term instruments and shares reflect the stock market exposure without reference to the term-structure.

[11] Only few countries provide loans divided by residence and non-residence: Australia, Austria, Belgium, Finland, Germany, Iceland, Israel, Korea, the Netherlands, Portugal, Slovenia, Spain, Sweeden and Switzerland. Canada and Norway only provide shares.

Figure 4



Source: Institutional Investors' Assets, OECD.Stat
** Securities other than shares, except financial derivatives (AF33) and Loans (AF4).*

Markets performance in financial crisis

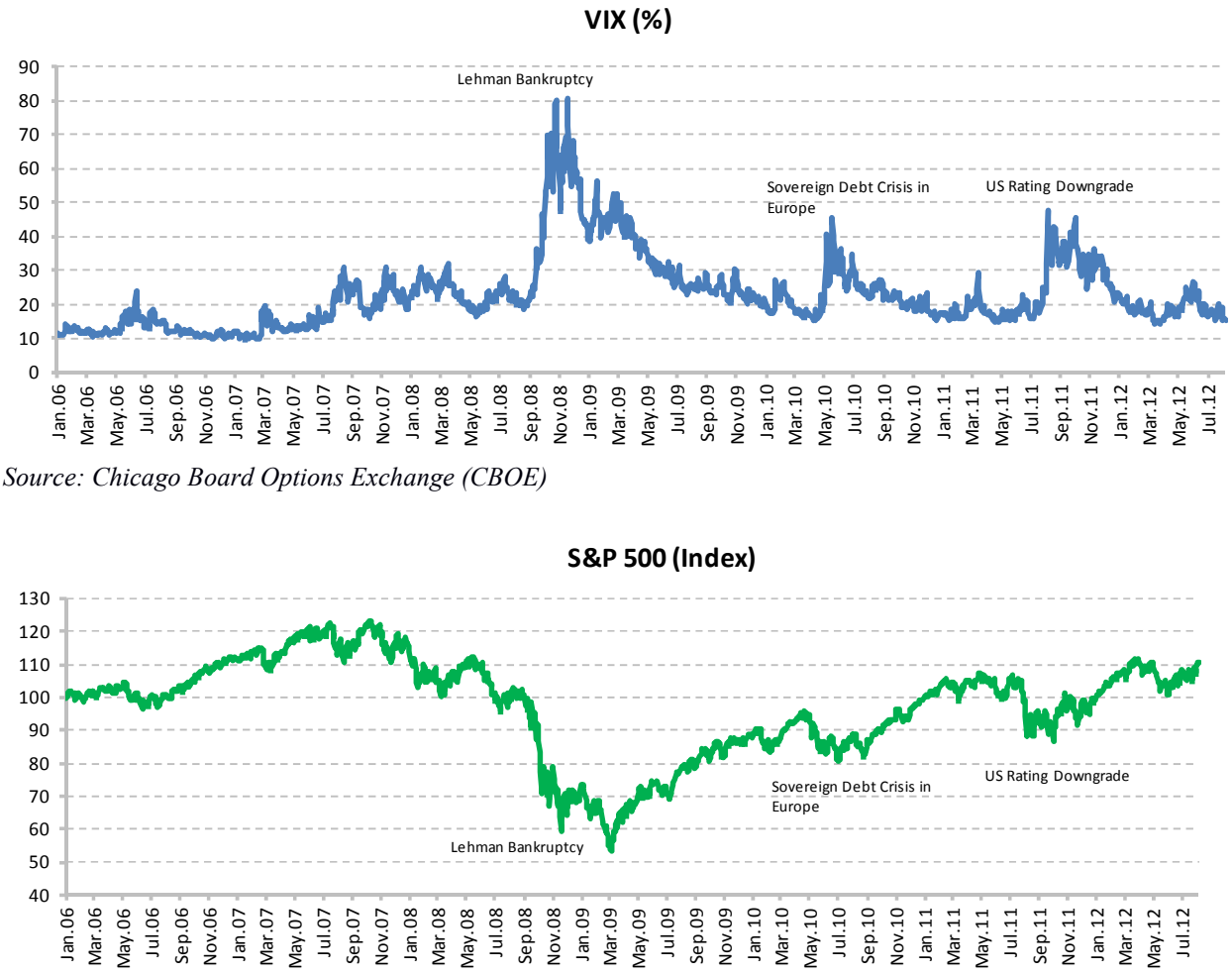
Periods of financial turmoil are characterised by a high volatility of financial asset prices and low (real) interest rates. An environment of uncertainty about the performance of the economy leads investors to re-allocate their portfolios towards less risky instruments, changing, for example, equity shares to fixed income securities, in particular to bonds issued by relatively high credit quality governments. As demand for fixed income instruments increases to the detriment of equity holdings, fixed income asset prices rise leading to positive returns and therefore, low interest rates. To the contrary, equity prices tend to fall, thus generating negative returns or mark-to-market losses.

This effect is called "flight to quality" and for institutional investors, like pension funds, the maturity structure of assets and liabilities is critical, since the mark-to-market impact on the balance sheet depends on the relative maturity structure of them. The effect will be negative for example, for investors with long-term liabilities and short-term assets. This could be the case for life insurance corporations and pension funds, where obligations are normally long-term, and less so non-life insurers where claims are normally short-term.

Under DC schemes, pension benefits predominantly depend on the assets allocation and the movement in the relevant asset prices. A fall of interest rates may generate gains on the asset side. Under DB pension plans, on the contrary, the liabilities are usually attached to a salary, years of contribution and life expectancy. This means that the maturity structure of their assets will generally match their long-term liabilities. Under DB schemes, benefits may be affected in the long run by the fluctuation of interest rates or more generally speaking, by economic fluctuations. Due to a long period of economic slowdown since 2008, interest rates remained low. This could have driven institutional investors to look for higher returns by investing in riskier instruments, as long as investment guidelines permit. This might have been a threatening factor for the financial stability.

To analyse the financial markets behaviour during the last 2007-2008 financial crisis, we consider two main indicators: the CBOE Volatility Index (VIX) and the S&P500 Index (S&P) [12]. VIX is a market estimate of expected volatility measured by S&P500 Index options and represents a measure of the agents' expectations of stock market volatility over the next 30 day period. Although a high VIX is not necessarily bearish for stocks, in the last 6 years a high VIX value has been associated with negative shocks in stock markets. This reflects the high level of investors activity in terms of portfolio re-allocation, in periods of financial turmoil, usually by buying fixed income instruments and selling shares (flight to quality effect). Figure 5 shows the high correlation between VIX and S&P500. When stock market prices – represented by the S&P500 – fell, or a financial turmoil was experienced, the VIX reached high levels. Examples are the Lehman Brothers bankruptcy (September 2008); the sovereign debt crisis in European countries (May 2010); and the downgrade of the US credit sovereign debt rating by Standard & Poor's from AAA to AA+ (August 2011).

Figure 5
Stock Markets Performance 2006-2012



Source: Chicago Board Options Exchange (CBOE)

Source: Bloomberg. Note: Index, base 01.03.2006.

[12] The index includes 500 leading companies in leading industries of the U.S. economy, capturing 75% coverage of U.S. equities. It has been widely regarded as the best single gauge of the large cap U.S. equities market. The index was first published in 1957.

Re-allocation of assets during periods of high volatility

During 2008, many investors decided to change their portfolios towards securities other than shares, at the detriment of shares and other equity. Figure 6 shows the percentage of variation in the stocks of the main portfolios of autonomous pension funds for selected OECD countries. This means, securities other than shares, except financial derivatives (AF33), and shares and other equity (AF5), for periods during and after the crisis obtained following this formula:

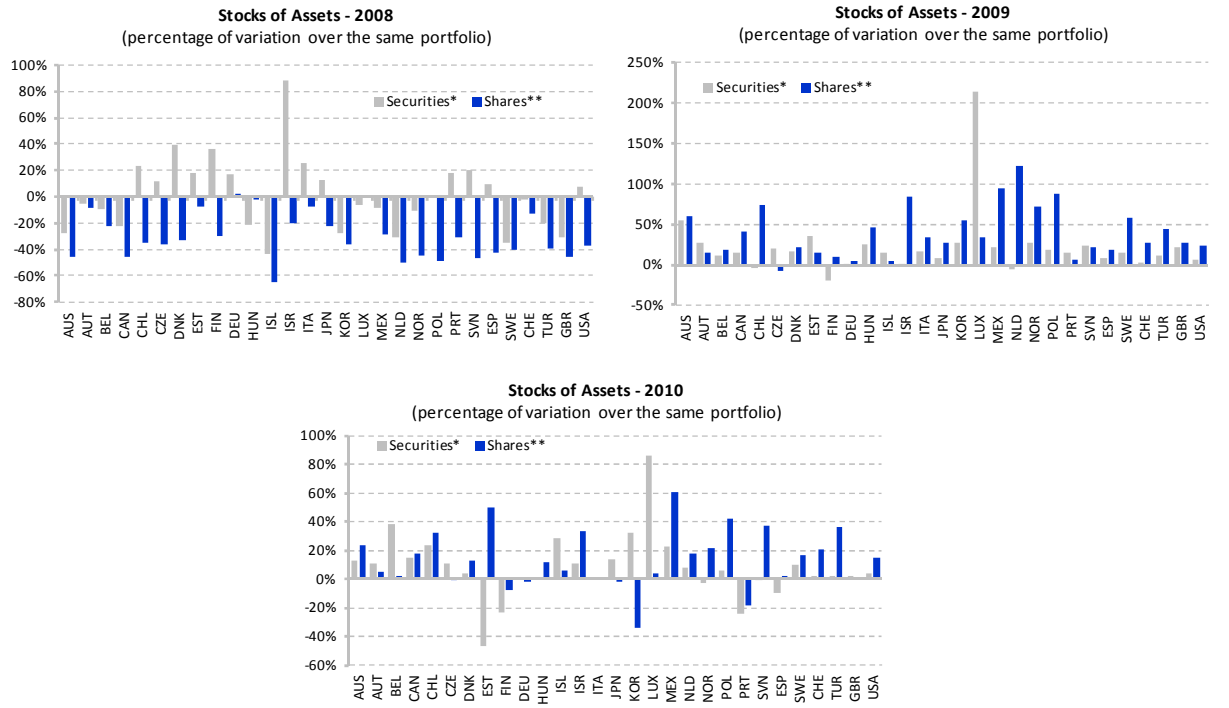
$$\frac{(S_t - S_{t-1})}{S_{t-1}} \qquad (2)$$

where S_t and S_{t-1} are the stocks of the relevant financial assets at the beginning and at the end of the accounting period t. The source is the Institutional Investors' Assets data collected by the OECD from its members countries. These data include financial stocks of autonomous pension funds in line with the SNA 1993 framework. The variations in stocks comprise transactions and other flows resulting from other changes in the volume of assets and nominal holding gains or losses accruing during the accounting period due to changes in the price of the assets.

In 2008, autonomous pensions funds in almost all the OECD selected countries showed a decrease in the stock of shares and other equities and some of them showed an increase in securities other than shares, as for example in Israel, Denmark, Finland, Italy and Chile. In accordance with the increase in equity prices during 2009 displayed in figure 5, where stock prices measured by the S&P 500 rose, autonomous pension funds in almost all countries showed also an increase in the stock of shares and other equity in their portfolio by the end of that year as shown in figure 6, chart "Stock of Assets – 2009".

Figure 6

Stocks of Assets in OECD countries' Pension Funds during 2008-2010



Source: Institutional Investors' Assets, OECD.Stat
** Securities other than shares, except financial derivatives. ** Shares and other equity.*

For a more specific analysis on asset re-allocation, a cross-country analysis of the nominal gains/losses obtained/incurred by pension funds in OECD countries based on national accounts statistics would require the availability of the Revaluation Accounts of this sector, to see different flows behind changes in stocks (transactions, revaluations and other changes in the volume of assets). At the time when this article is being written, Revaluation Accounts are not available on OECD.Stat. However, Financial Accounts and Financial Balance Sheets databases record financial transactions and financial stocks, for the joint sector insurance corporations and pension funds (sector S125 in the SNA 1993).[13] Revaluations (and changes in the volume of assets) noted as R_t below, can be inferred by taking the differences between stock and transactions. The following formula presents revaluations as a percentage of the initial stock, which is considered a proxy of the nominal returns:

$$\frac{R_t}{S_{t-1}} = \frac{(S_t - S_{t-1}) - T_t}{S_{t-1}} \qquad (3)$$

The change in the stock from one period to another has three components: financial transactions, other changes in the volume of assets and revaluations (corrections in prices)[14]. As regards the sector definition, total financial asstes held by pension funds represent, on average, according to the information available in the Institutional Investors' Assets database, one third of the total financial assets of the S125 sector as a whole, but in some countries like Chile and the Netherlands, this ratio reaches levels of 77% and 67%, respectively[15]. Moreover, the relative importance of insurance corporations or pension funds may be less relevant, as they may have quite similar investment portfolio compositions. According the Institutional Investors' Assets databes, both types of institutions invest the majority of their assets in securities other than shares, except financial derivatives and in shares and other equity (almost 80% of their whole portfolio is invested in these two types of assets), although pension funds tend to have a higher portion in shares and other equity[16].

Although the reduction in the amount of shares and other equity during 2008 appears to have been mainly caused by the fall in stock prices (see figure 7), transactions were smaller in comparison with the previous and the following years in most of the countries. Some countries however, showed increases in transactions in shares and other equity. This may have occurred because, in some countries, pension funds had to comply with new regulations restricting the sales of shares, or could have bought shares to maintain the relative structure of their portfolio.

[13] Unlike the SNA 1993, the 2008 SNA recommends to separate insurance corporations from pension funds for the compilation of national accounts (§ 4.98 to 4.116, 2008 SNA). It has to be noted, however, that the OECD Institutional Investors' Assets records separate information for insurance companies (and even for a breakdown between life and non-life companies) and for pension funds for the period 1980-2011.

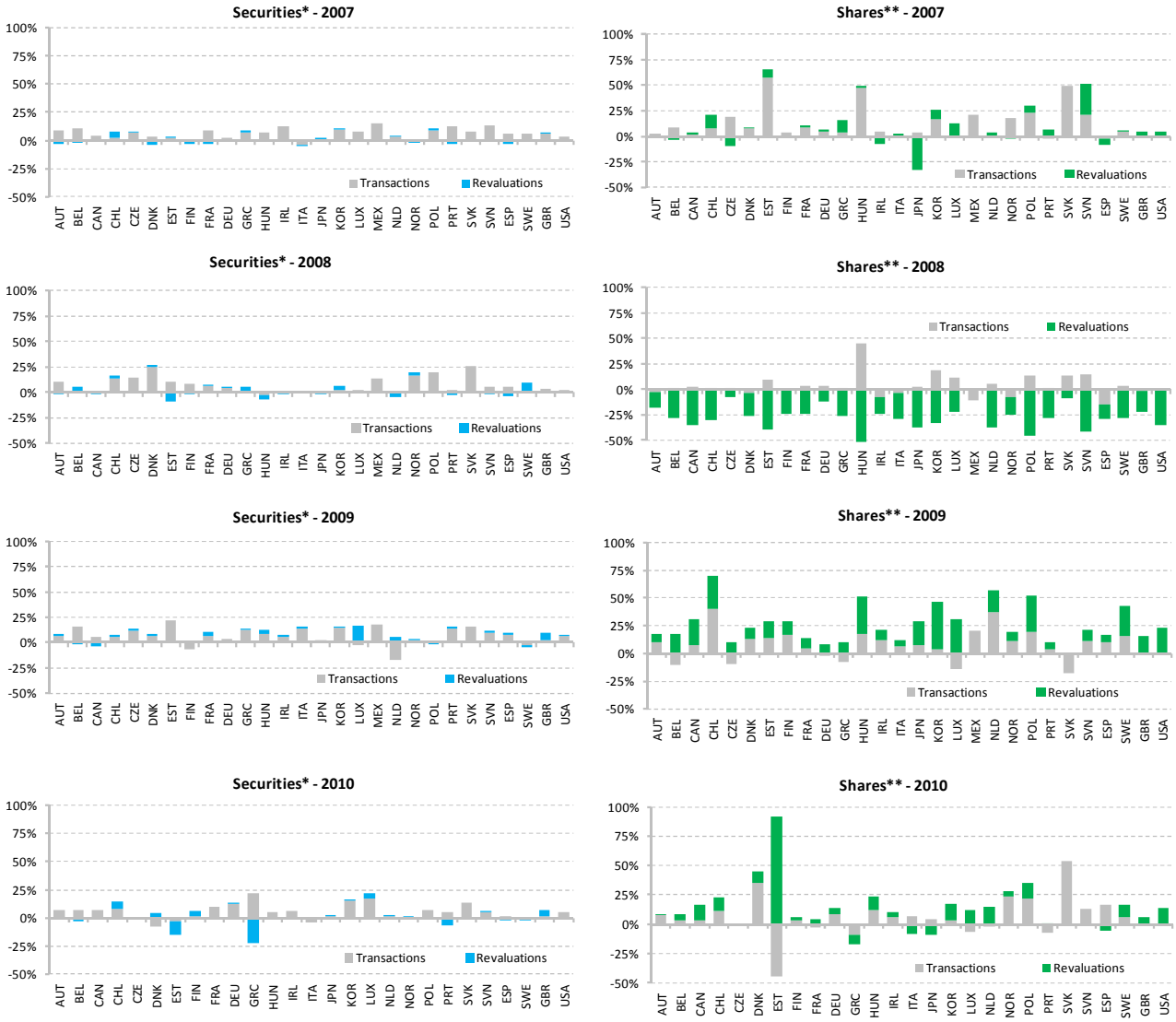
[14] Although this paper would benefit from the existency of information on price corrections and other changes in the volume of assets separately, these data are neither currently available on OECD.Stat nor on National Statistical Offices or Central Bank websites of many OECD countries. Therefore, assuming that in most cases other changes in the volume of assets are smaller than revaluations, this paper considers that any change in the stock other than transactions consists of price corrections.

[15] In some countries, the weight of autonomous pension funds assets on total assets of S125 is almost negligible as they have other forms of pension savings.or because there are no such financial corporations in their countries.

[16] See chart 12, Cavieres and Hagino (2012).

Figure 7

Transactions and Revaluations of Selected Assets - Insurance Corporations and Pension Funds



Source: Financial Accounts and Financial Balance Sheets, OECD.Stat
** Securities other than shares, except financial derivatives. ** Shares and other equity.*
Note: Percentage obtained following formula (3).

In 2009, with the recovery of stock markets, autonomous pension funds, in most of the OECD countries, acquired shares and other equity and benefited from nominal holding gains. The Netherlands and Chile showed relatively the largest transactions in shares. The countries that realised the best investment performance of pension funds among OECD countries in 2009 were Chile, with a real net investment return of 23%, followed by Hungary (17%) and the Netherlands (16%)[17]. Transactions and revaluations in 2010 were less even across countries and, overall, their absolute magnitudes were lower than in 2008 and 2009. This is in line with stock prices that moved in different directions, albeit in a narrow range in 2010 (S&P500 in figure 5).

[17] *Pensions at a Glance 2011: Retirement-income Systems in OECD and G20 countries,* 2011, OECD Publishing.

The analysis above is based on institutional sector accounts statistics available on OECD.Stat and managed by the Statistics Directorate (STD). The main goal is to assess financial risks in pension funds asset portfolios by reviewing the allocation and re-allocation of assets during periods of financial turmoil. It addresses the question of whether autonomous pension funds made changes in their portfolio allocations in order to minimise losses by increasing their holdings of fixed income instruments – measured by securities other than shares – at the detriment of those of shares and other equity.

Irrespectively of the initial allocation of assets and the type of pension plans in the country (DB or DC), almost all pension funds showed a decrease in the amount of shares and other equity in 2008. This was driven mostly by the fall in the market value of this kind of assets, but also by lower amounts of trading. It was evident that transactions increased again in 2009, and that also the market value of the shares portfolio rose, in line with a good performance that the stock markets experienced that year. At the same time, for most of the countries, looking at securities other than shares, neither a increase in 2008 nor a decrease in 2009 was observed, as a consequence of a flight to quality effect.

All these conclusions are based on the analysis of the sector S125 which, according to SNA 1993, includes both insurance corporations and pension funds. In order to have a better assessment of the impact of financial turmoil on pension funds portfolios, a future goal will be the collection of financial accounts, changes in the volume of asset accounts and revaluation accounts for these two sectors separately, as recommended in the 2008 SNA which will be implemented in OECD countries in the next couple of years. Data on flows resulting from transactions, changes in the volume of assets and changes in asset prices would be directly available for the monitoring and a more accurate analysis of these institutional investors' activities.

2. The cases of Chile and Japan

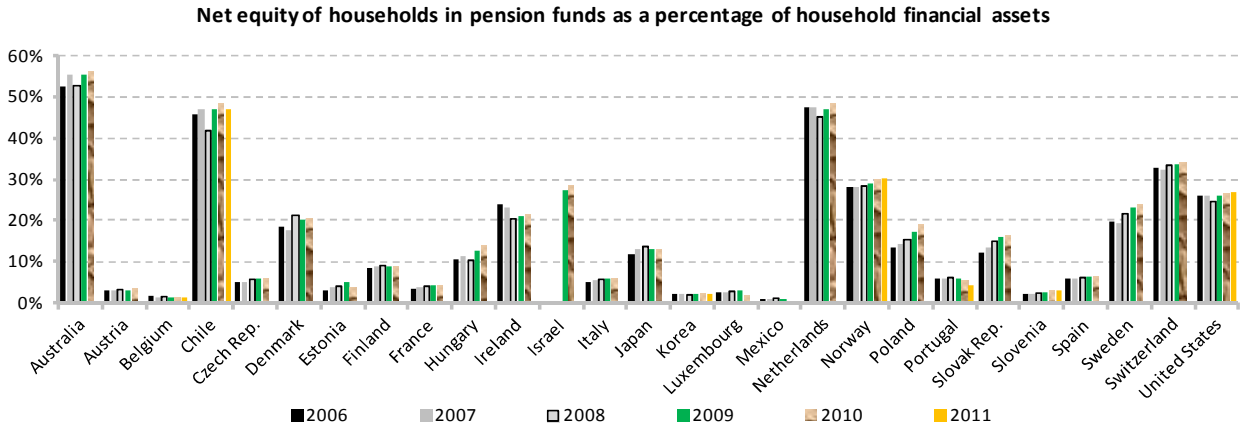
This section discusses recent financial developments of pension funds in Chile and Japan. While in Chile most retirement savings are mandatory and accumulated in individual accounts of a DC type, in Japan social security pension (first and second pillar of the pension system, which is explained below) is operated on a PAYG basis and autonomous pension funds (third pillar) used to completely follow a DB scheme. As funds in Chile are held in individual accounts of DC plans, whose reserves correspond to the current market value of the fund's assets, the investment (financial) and longevity risks are entirely assumed by the individuals[18]. In Japan, DC plans, were introduced in 2001 as an alternative option within the third pillar.

Pension funds reserves have become a very important part of households' financial wealth. Figure 8 represents the net equity of households in pension funds reserves as a percentage of total household financial assets. This ratio is high in countries where autonomous pension funds play an important role in the pension system. This is especially so in Chile, where pension funds reserves account for almost half of total household financial assets in 2010[19]. In Japan, this ratio is relatively low, mainly because social security pension systems, of which the pension liabilities are not recognized in the 1993 (and 2008) SNA, functions as an important player in the pension system. However, it is expected that the ratio will increase as autonomous pension funds become more important in the ageing society.

[18] The 2008 reform introduced a pension income-tested supplement that is payable to all individuals whose defined contribution pension is less than the Maximum Welfare Pension Threshold (Pension Máxima con Aporte Solidario, PMAS). Since July 1st 2012 the PMAS is equal to 261.758 Chilean pesos per month (around 600 US dollars).

[19] Net equity of households in pension funds reserves in 2010 was equal to 64% of the GDP.

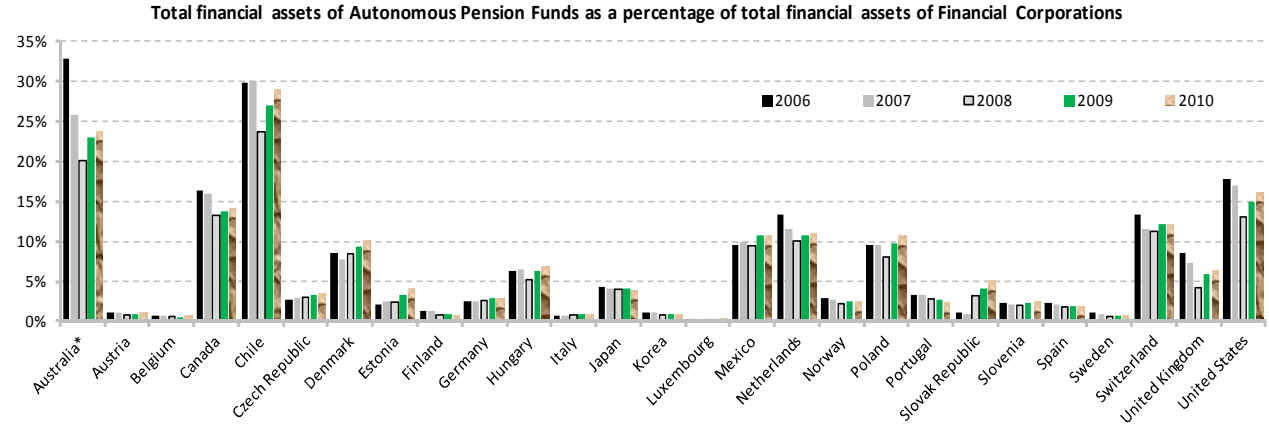
Figure 8



Source: OECD.Stat

Pension funds hold a significant proportion of countries' financial assets, and thus their investment behaviour may have impacts in the financial market. Figure 9 below shows the total financial assets of autonomous pension funds as a percentage of total financial assets of the whole financial corporations sector in OECD countries. Total financial assets of autonomous pension funds in Chile represented 30% of total financial assets of all financial corporations in 2010, the highest ratio among all OECD countries.

Figure 9



Source: Institutional Investors' Assets and Financial Balance Sheets, non-consolidated, OECD.Stat.
**Australian data are consolidated.*

2.1. Pension Funds in Chile

In 1981, Chile went through a major structural reform of its pension system that replaced the state managed pay-as-you-go (PAYG) system by a privately managed funded scheme. This reform closed the PAYG system for new entrances but allowed members of the PAYG system to choose between staying in the PAYG system or entering into the new funded scheme. As the number of beneficiaries in the PAYG system has declined over years, this system is expected to close by 2050[20]. The funded pension scheme is

[20] Kritzer (2008).

based on the accumulation of funds in individual accounts managed by private pension funds managers.[21] These financial institutions and the overall pension system are regulated and supervised by the "Superintendence of Pensions". The individual accounts are of a defined contribution type. The contribution rate is fixed at 10% of monthly earnings and is subject to a ceiling that from 2009 is indexed to average earnings[22].

In 2008, the Chilean pension system underwent its second major reform. This reform introduced several changes in all pillars of the pension system. Among other changes, it extended its coverage and increased basic benefits to a larger percentage of the population, ensured more gender equity, extended the mandatory defined contribution scheme to self-employed individuals, introduced subsidies to encourage both the participation and hiring of young workers, and encouraged greater competition in the pension fund industry.

The structure of the defined contribution scheme

Since August 2002 there have been five types of funds for capitalizing mandatory retirement savings. These funds are denominated as follows: i) Fund A: the riskiest; ii) Fund B: risky; iii) Fund C: intermediate[23]; iv) Fund D: conservative and v) Fund E: the most conservative.

The basic difference between these funds relies on the minimum and maximum limits for investment in equity instruments. Investment in equity instruments has a greater expected return but also a higher risk than investments in fixed-income instruments. The multi-fund scheme allows its members to achieve a portfolio in line with their preferences and needs in terms of risks and returns. Young members may prefer to allocate their contributions in a fund with higher expected returns, while older members, near to retirement, may prefer to allocate their retirement savings in a fund which entails minimum levels of risk. Table 1 below presents the maximum and minimum limits to investments in equity instruments established by the Chilean legislation.

Table 1
Limits to investment in equity instruments

Fund type	Maximum limit	Minimum limit
A – Riskiest	80%	40%
B – Risky	60%	25%
C – Intermediate	40%	15%
D – Conservative	20%	5%
E – Most conservative	5%	0%

Source: El Sistema de Pensiones Chileno VII Edición, Chilean Superintendence of Pensions, February 2010.

Members can choose to allocate their contributions in any of these funds as long as they are at least 10 years younger than the established pension age.[24] The retirement age in Chile is 65 years for men and 60

[21] Pension funds managers in Chile received the name of *Administradoras de Fondos de Pensiones* (AFPs).

[22] Pensions at a Glance (2011). For 2012, the Superintendence of Pensions informed this will be 1.502.617 Chilean pesos.

[23] This is the original fund, which has been maintained since the introduction of the funded scheme in 1981.

for woman. Men and women who are not retired and are older than 55 and 50 years old, respectively, may choose to allocate their mandatory contributions in any fund different from fund A. Likewise, members that already receive a pension may choose to allocate their saving in funds C, D or E.[25]

Whenever a member does not choose a fund type, he/she is allocated by default to funds B, C or D according to age, as follows:

- Men and women younger than 36 years old are allocated by default into fund B;
- Men between 36 and 55 years old and women between 36 and 50 years old are allocated by default in fund C;
- Men still not retired and older than 55 years old, women still not retired and older than 50 years old, and members already retired are allocated by default in fund D.

The allocation of retirement savings into the riskiest fund A and the most conservative fund E takes place only if the contributor exercises his/her right to choose this type of fund. If a contributor has its retirement savings in a fund that is not authorised for his age, for example, because he/she has recently changed of age range, his/her funds will start being transferred to the fund immediately below at a rate of 20% per year.

Thus, the multi-fund system shapes a default life-cycle investment strategy in which the exposure to equity decreases with age, seeking to increase the expected returns of younger members' pension savings and to avoid investment risks as members get close to retirement. This is in line with Antolin, Payet and Yermo (2010) who explains that life cycle strategies that maintain a constant exposure to equities during most of the accumulation period, switching swiftly to bonds in the last decade before retirement, seem to produce better performance reaching higher replacement rates than fixed portfolio strategies at a given level of risk.

Although under the current pension scheme all the investment risk is borne by members in Chile, it is important to mention that financial losses are limited: pension fund managers must keep a separate reserve fund called "Encaje" to guarantee a minimum return of these funds. If the annual real return of the funds managed by a pension fund manager over the last 36 months is lower than the average of the system[26], the pension fund manager must use the reserves to make up the difference. If these reserves are not sufficient, the government makes up the difference, dissolves the pension fund manager involved and transfers the accounts to another pension fund manager[27]. Moreover, as the defined contribution individual accounts constitute the main source of retirement income provided by the pension system, encouraging participation, regular contribution patterns and the adoption of a life cycle investment are some of the key policy concerns.[28]

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[24] Contributors are also free of transferring their balances between funds. When a member transfers his/her balance between funds more than twice a year, the pension fund manager has the right to charge extra fees for this operation.

[25] However, both groups may allocate the amount exceeding a certain level of saving that guarantees a minimum pension equal to 70% of average taxable income and that it is equal to or higher than the Maximum Welfare Pension Threshold (PMaS). See Berstein, Fuentes and Torrealba (2011).

[26] Minus fifty percent or 4 percentage points, in the case of fund A and B, or 2 percentage points in the case of funds C, D and E.

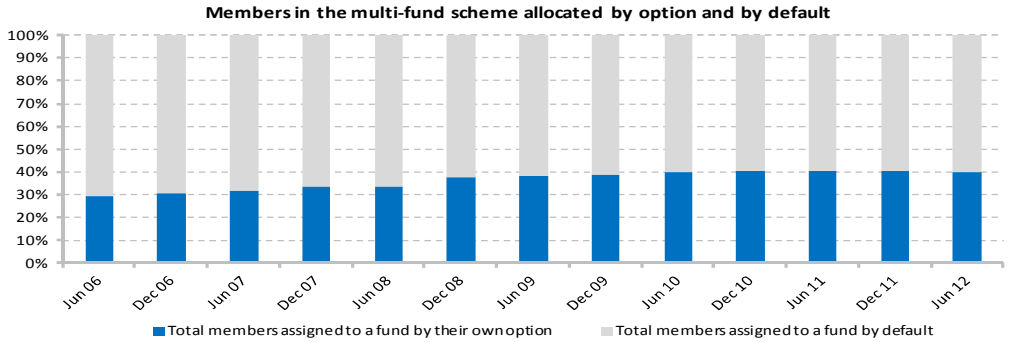
[27] See Bernstein, Fuentes and Torrealba (2010).

[28] Indeed, the 2008 reform was oriented to include self-employed individuals, young workers and workers that spent periods of time out the formal labor force.

Membership: default vs. option

The percentage of members who exercise their right to choose a fund has increased over the recent period of high volatility in financial markets (see figure 10). Between June 2007 and June 2009, the percentage of contributors that opted for a fund climbed from 32% to 38%. However, this percentage has remained stable around 40% since 2010. This shows that there is still a high degree of inertia in members' decisions about the investment of their pension savings.

Figure 10

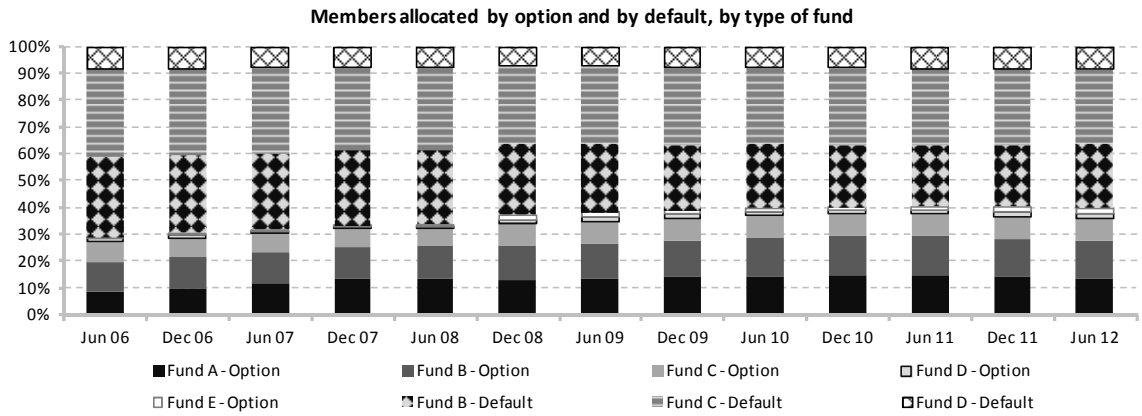


Source: Chilean Superintendence of Pensions.

When looking at the distribution of members by type of fund, the number of members that choose the conservative fund D and the most conservative fund E increased substantially between June and December 2008, decreased at the end of 2010 and increased again in December 2011. The number of members that selected the riskiest fund A increased until mid 2008 and reduced with the financial turmoil at the end of that year. It then increased in 2009 and remained stable in 2010 (Figure 11).

The performance of the financial markets, in particular stocks, during the second half of 2011 could have triggered members to change to conservative funds, as it is shown by the reduction of members in A-Option and the increase of those that chose the E-Option. However, there is still a great proportion of the members who do not follow the life cycle strategies by themselves.

Figure 11



Source: Chilean Superintendence of Pensions.

Pension funds investments

When the system was created in 1981, funds available in pension schemes could only be invested by law in domestic fixed-income securities. In 1985, as the funds accumulated increased, pension funds managers were authorized to invest up to 30% of the funds in domestic equity instruments. Participation in domestic investment funds and foreign fixed-income instruments was made possible in 1990. In the mid-1990s, pension funds managers were also allowed to invest up to 4.5% in foreign equity, with a limit of 9% for total foreign investments.

With the creation of the multi-funds in 2002, the type of instruments and the limits for investments abroad were changed again, in accordance with the type of fund. Currently, the limits are explicitly authorized by law and overseen by the Superintendence of Pensions, the regulatory authority of the pension system, with previous approval by the Central Bank. The maximum overall limit for investments in foreign securities by a single pension fund manager is fixed by the Central Bank between 30% and 80% of the value of the funds.[29] Likewise, the Central Bank fixes the maximum limits for investments in foreign securities by type of fund between the following ranges:

Table 2
Range to set the limits for investment in foreign instruments

Fund type	Minimum limit	Maximum limit
A – Riskiest	45%	100%
B – Risky	40%	90%
C – Intermediate	30%	75%
D – Conservative	20%	45%
E – Most conservative	15%	35%

Source: Régimen de Inversión de los Fondos de Pensiones, Chilean Superintendence of Pensions.

Given the nature of pension funds liabilities in Chile, i.e., long-term inflation-indexed claims (UF-denominated)[30], a big part of the fixed income portfolio is invested in inflation-linked government bonds with a maturity beyond 10 years[31]. Fixed income AFPs portfolio comprised also corporate bonds and time deposits.

As of December 2007, the total value of pension funds was USD 111,037 million, of which 21% was invested in domestic shares, 45% in domestic fixed income instruments, 35% in foreign shares and only 1% in foreign fixed income instruments (see figure 12). The value of the funds declined considerably after the Lehman Brothers' bankruptcy in September 2008. In particular, a substantial drop can be observed in the value of the funds invested in foreign shares, mainly due to the negative real returns on these instruments since June 2008.[32] The value of domestic shares also fell, and similar behaviour can be observed in fixed income instruments, given the rise in corporate interest rates, as a consequence of which prices and market value decreased.

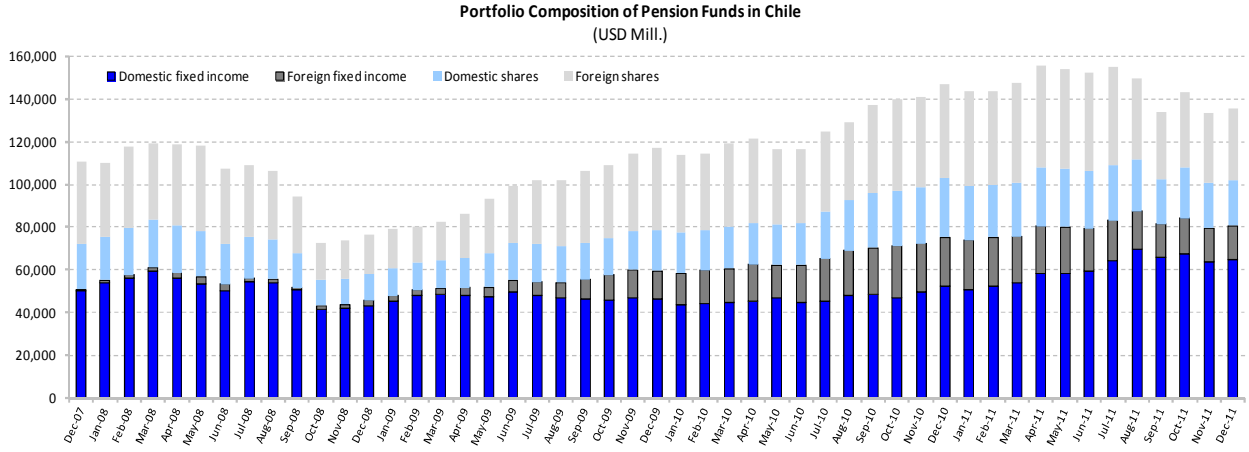
[29] Currently, this maximum overall limit stands at 60%. See Berstein, Fuentes and Torrealba (2011).

[30] The unit of account of the Chilean peso adjusted by inflation is the "Unidad de Fomento" (UF).

[31] In the statistics of the Superintendence of Pensions, government bonds in Chile include Central Bank debt as well as central government debt.

[32] See *Informe Inversiones y Rentabilidad de los Fondos de Pensiones*.

Figure 12



Source: Chilean Superintendence of Pensions.

In 2009 pension funds started to increase the investment in foreign shares as well as foreign fixed income instruments and domestic shares. This development continued in 2010. At the end of 2010, the value of the total portfolio was USD 148,437 million and the main change in the portfolio composition was the share of foreign fixed income instruments that reached 16% of the total. In the same year, the composition of the equities portfolio was 62% in foreign instruments while domestic shares represented 38%.

During the second part of 2011, the portfolio underwent important changes. The portfolio of domestic fixed income instruments increased. The same is true for fixed income instruments as a whole, while the portfolio of shares reduced, in particular that of foreign shares. All of this was in line with the fall of stock prices triggered by the deterioration of the credit rating of the United States government bonds and by increased uncertainties about the future of Euro. Pension Funds invested in domestic government bonds.

2.2. The pension system in Japan

The three pillars of the Japanese pension system

The current pension system in Japan is composed of three tiers. The first two tiers are operated by the government and considered as mandatory pension schemes. The third tier corresponds to pension funds, the participation to which is decided on a voluntary basis.

The first tier, known as the National Pension or Kokumin Nenkin (KN) or Basic Pension (Kiso Nenkin) has universal coverage and provides a flat-rate basic pension benefit to all sectors of the population. Participation in the first tier is mandatory for all residents aged 20 to 59. In principle, benefit payments begin at age 65. The KN operates as a partial PAYG program. Two-thirds of the benefits are paid out from the collected premium from the young and the remaining one third is financed from the central government budget. The portion of the central government budget was raised to 50% but the law has not yet been into practice.

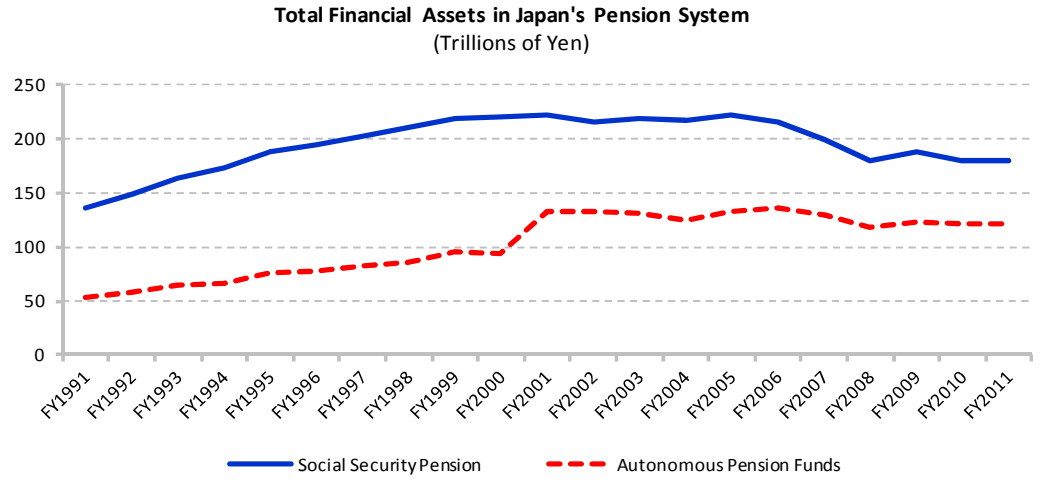
The second tier, a mandatory DB plan, consists of the Employees' Pension Insurance or Kosei Nenkin Hoken (KNH), and four types of Mutual Aid Pensions (Kyosai Nenkin). KNH provides benefits that are income-related and applies to employees of private companies, whereas the mutual aid pensions apply to civil servants. Both employers and employees annually contribute a fixed rate of the employees' salary to the KNH. Benefits are related to the employees' salary. The second tier largely operates as a PAYG defined benefit (DB) program. So far, KNH still holds accumulated assets. Unlike the KN, which operates

as a partial PAYG, KNH is financed entirely by contributions of current workers with no support from the central government.

The third tier, a kind of voluntary occupational plan, run by employers for the benefit of employees, consists of Welfare Pension Funds or Kosei Nenkin Kikin (KNK). For the management of these pension funds, an entity is established for each corporation of corporate group, as well as occupational funds added to the Mutual Aid Pension, which comprise the third pillar for civil servants. The decision of establishing KNK is made on a company by company basis. Both employers and employees contribute to the funds. The third tier operates under a funded scheme, and it used to completely consist of DB programmes. KNK entities can also manage the funds of KNH. This is called "contract out". The proportion of "contract out" is not segregated in the KNK accounts, but the part of social security funds is returned to the government accounts of KNH as DB, whenever KNK decides to convert their pension schemes from a DB program to a DC program, the latter having been introduced in 2001.

In Japan, social security pension (first and second pillars) is still important in the entire pension system, however, its accumulated financial assets have not increased since fiscal year 2000 mainly due to demographic changes. In contrast, accumulated financial assets of autonomous pension funds (third pillar) have increased and its role in the entire pension system has become more important than before (figure 13).

Figure 13

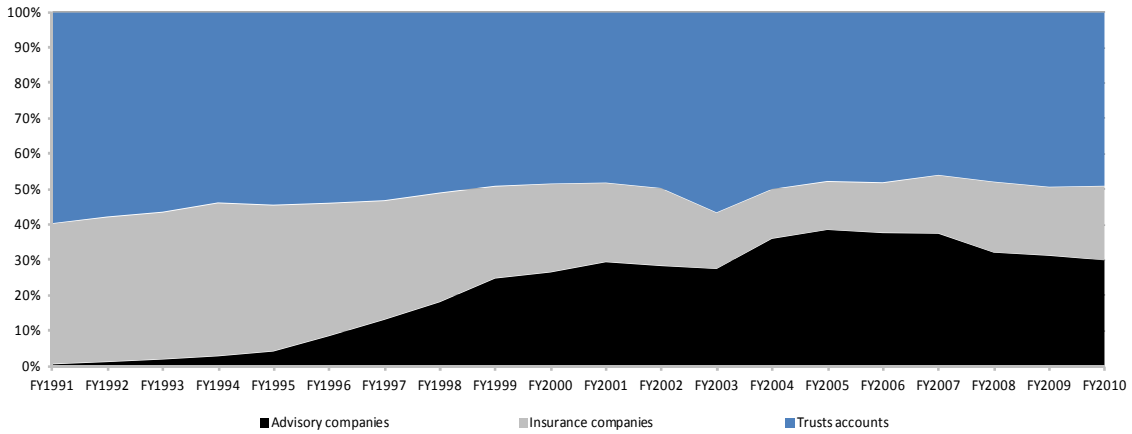


Source: Bank of Japan Flow of Funds Accounts.
FY: Fiscal Year.

Asset allocation of corporate pension funds under DB programmes

Until 1997, there was a so-called 5.3.3.2. regulation regarding the asset allocation of KNK, whereby the ceilings for the weight of four categories of assets were imposed; safe assets such as central government bonds and local government bonds, 50% or less; domestic equities, 30% or less; foreign-currency denominated assets such as foreign bonds and foreign equities, 30% or less; real estate, 20% or less. Japan's pension funds assets have been managed by trusted accounts of financial institutions, life insurance companies or investment advisory companies. The restriction of asset allocation was abolished in 1997, after the Japan-U.S. Structural Impediments Initiatives in the 1990's. As a consequence, each entity became able to determine its asset allocation strategy and select its asset management companies based on its fiduciary responsibility. As a result, as far as the DB pension plans are concerned, the weight of pension assets managed by investment advisory companies increased (see figure 14).

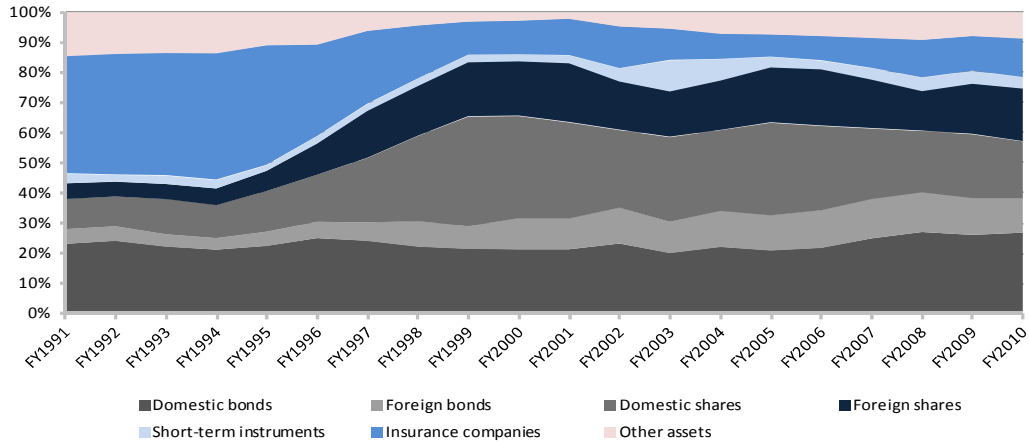
Figure 14
Pension funds assets by entrusted institutions



Source: Pension Fund Association of Japan.
FY: Fiscal Year.

Regarding the asset portfolio by financial instrument, the weight of domestic equities increased soon after the deregulation. However, the weight of domestic equities has declined and that of safe assets has increased since 2000. In 2010, the weights of domestic equities are, by coincidence, in conformity with the former limitation of the so-called 5.3.3.2 regulation[33] (see figure 15).

Figure 15
Pension funds assets by financial instruments[34]



Source: Pension Fund Association of Japan.
FY: Fiscal Year.

[33] At present, the necessity of new regulations regarding asset allocation of pension funds is being discussed after the AIJ scandal. In 2011, AIJ Investment Advisors revealed that it was unable to account for 90 percent of the pension fund assets it managed. AIJ is under investigation for falsifying performance records on roughly 200 billion yen in pension money. Nearly all of that is believed to have disappeared, dealing a blow to the 84 KNK entities representing 880,000 employees that entrusted it with funds. The regulatory authority started discussing regulatory reforms in response to accusations that deficiencies in Japan's corporate pension system and regulation of investment managers are partly to blame for the AIJ scandal.

[34] Pension funds managed in general accounts of insurance companies are not segregated from other assets, and thus, their portfolio by financial instrument is not specified.

Introduction of defined contribution pension plans

A third tier Defined Contribution (DC) scheme was introduced in 2001, to complement the defined benefit schemes. The relevant scheme is a funded DC plan for salaried workers whose pension benefits are based on the investment returns. This was called the Japanese version of the US 401 (k)[35], a type of retirement savings account which is a DC plan with limited annual contributions. Under DC schemes, investment risks are assumed by employees instead of pension funds and employers.

Two types of DC pension plans were implemented, namely, the employer-sponsored type and the individual personal type. Under the employer-sponsored DC plan, only employers pay contributions to the plan for workers under the age of 60, with no matching contributions from employees. Under the personal retirement accounts (PRA), each individual can deposit a certain percentage of his monthly earnings to the account; employers cannot make matching contributions. Participation in PRA, which aims at encouraging savings, can start at the age of 25 and continues until the age of 65.

The DC systems lack insurance elements and the accumulated pension assets depend on the contributions (and investment returns). Thus, the benefits may not be adequate. Households assume the investment risk. After the financial crisis, in particular, investment returns of DC plans were very low and many accounts suffered from negative returns[36]. For this reason, the share of the DC schemes in the total pension fund assets remained moderate, at 2% in 2011.

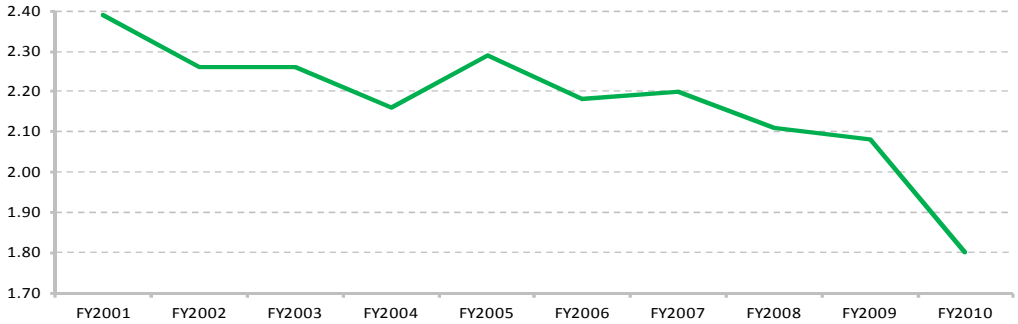
The asset portfolio of DC pension plans is more oriented to the safe assets. At the end of fiscal year 2010, the portfolio shares of major DC pension plans managed by entrusted financial institutions are as follows: banks (deposits), 41.6%; assets entrusted to life insurance companies, 20.9%; investment funds, 37.1%; and others, 0.3%. The portfolio composition of the investment funds is as follows: domestic bonds, 5.0%; foreign bonds, 3.8%; domestic shares, 10.7%; foreign shares, 5.4%; diversified type (including domestic/foreign bonds and shares), 11.3%; and money market funds, 0.9%.The DC pension plans established in recent years tend to set lower expected investment returns than those established in the early 2000's (see figure 16) against the background of low interest rates and sluggish share prices in Japan[37]. As a result, there has been little motivation among contribuitors to raise the weight of shares in their DC plan portfolio and a large portion of funds has remained in bank deposits.

[35] The US 401(k) takes its name from subsection 401(k) of the Internal Revenue Code (Title 26 of the United States Code).

[36] A survey was conducted by Rating and Investment information Inc. for 1.1 million participants of DC plans administered by three large financial institutions in Japan. As of the end of March 2009, the amount of about 60% of DC accounts is less than the amount of principal, i.e., accumulated contributions. The number of such negative return accounts is around 690.000. Although the remaining 40% accounts have avoided such negative returns, the average return is very low because the account holders invest in risk free products such as deposits.

[37] A survey was conducted on DC pension plans by the Pension Funds Association in 2010.

Figure 16
Average expected investment returns of DC Pension Plans (%)



Source: Pension Fund Association of Japan
FY: Fiscal Year.

3. Conclusions

One of the main objectives of this study was to assess the financial risks in the asset portfolios of pension funds, by reviewing the re-allocation and the revaluation of assets during and after de 2007-2008 financial crisis. It addressed the question of whether autonomous pension funds made changes in their portfolio allocations in order to minimize losses by increasing their holdings of fixed income instruments – measured by securities other than shares – at the detriment of the holdings of shares and other equity. The analysis reveals that, irrespectively of the initial allocation of assets and the type of pension plans in the country, almost all showed a decrease in the amount of shares and other equity in 2008, driven mostly by the fall in their market value, but also by lower amounts of net purchases. It was evident that transactions increased again in 2009, and also the market value of shares portfolio raised, in line with the good performance the stock markets. However, for most countries, neither an increase in securities other than shares in 2008 nor a decrease of these relevant instruments in 2009 was observed due to a flight to quality effect.

The second part of the paper discussed pension funds in two different countries: Chile and Japan. While in Chile most retirement savings are mandatory and accumulated in individual accounts of a DC type, in Japan a majority of the pension systems follow DB-type of schemes.

The pension system in Chile follows a life cycle strategy through a multi-fund scheme, of which main differences between the relevant funds concerns the exposure to shares. Members can choose a fund according to their preferences; otherwise they are assigned to one of them by default according to age. Although with the financial crisis the percentage of contributors that opted for a fund increased, evidence shows that 60% of them are still assigned by default. Pension funds assets decreased substantially after Lehman Brothers' bankruptcy, driven mainly by a drop in the market value of foreign shares portfolio. Since then, investments in fixed income instruments, foreign as well as domestic, gradually increased, especially in the second half of 2011. Such a tendency was also observed in Japan's DB pension funds.

In Chile, financing of pensions on a PAYG basis is becoming smaller and expected to end by 2050. In Japan, the PAYG-system still plays an important role, but as the society ages, the financial basis of pensions on a PAYG-basis tends to become fragile. In this context, the role of private pension funds becomes more important. However, after the recent financial crisis, pension funds' investments are more oriented to safe assets, which do not necessarily generate enough investment returns for pensioners' needs.

In Japan, the 2001 pension reform, which introduced DC pension plans, has not been implemented in a way that can resolve the potential problems arising from demographic changes. So far, their portfolio is

much more oriented to safer assets, against the background that the financial risks are assumed entirely by households.

Conclusions concerning the first part of the paper are mainly based on the analysis of the sector S125 which, according to SNA 1993, includes both insurance corporations and pension funds. In order to have a better assessment of the impact of financial turmoil on pension funds portfolios, a future goal will be the collection of financial accounts, changes in the volume of asset accounts and revaluation accounts for these two sectors separately, as recommended in the 2008 SNA. Moreover, the paper has focused on the effects of financial turmoil on the asset side of the pension funds balance sheet. For a better analysis of these effects, it is important to review also the liability side. Therefore, it would be desirable either to extend the Institutional Investors Assets database by including information on liabilities or to separate insurance corporations from pension funds in future collections of financial balance sheets of sector S125. The second part reveals the relevance of splitting DC and DB plans as seen in the Chilean and the Japanese case. It would be desirable that the Institutional Investors' Assets database provide the portfolio of DC and DB plans separately for a more complete analysis of the impacts of financial turmoil and the role of pension funds in the ageing society. Various national data sources existing in OECD countries could be used by Delegates to provide the Secretariat with this information.

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