Capital Controls, Pension Funds, and Foreign Assets Evidence From Iceland

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Abstract

Capital controls in Iceland were implemented in 2008, following the collapse of the three largest Icelandic banks and the systematic crisis that subsequently followed. The controls on outflow of capital affect various entities within the economy, one of them being pension funds. This paper examines the cost of capital controls to pension funds due to foreign investment prohibition. Cost factors regarding decreased returns and increased volatility in a period of capital controls are investigated using a panel fixed effects model. The results from the empirical analysis indicate that in a period of capital controls, Icelandic pension funds experience higher returns by having lower fraction of foreign assets out of total assets. Furthermore, relative volatility seems to increase as the fraction of foreign assets grows. Despite the finding that Icelandic pension funds do not seem to bear direct costs of capital controls the pension funds hold onto their foreign assets. In conclusion, gains from retaining foreign assets are merely considered to be in terms of increased risk diversification and hedging against macroeconomic uncertainty once lifting of capital controls will take place.

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List of abbreviations

BOY	Beginning of Year
CBI	Central Bank of Iceland
CC	Capital controls
EEA	European Economic Area
EOY	End of year
FSA	The Financial Supervisory Authority
ISK	The Icelandic Krona
IPF	Icelandic pension funds
IMF	International Monetary Fund
OLS	Ordinary Least Squares
OMXI	Option Market Index for Iceland
PP	Percentage Points

1. Introduction

Iceland has a history of capital controls dating back to 1931, when capital controls were implemented to protect the currency reserves of the Central Bank of Iceland (CBI) and maintaining a greater control over the exchange rate of the Icelandic krona (ISK).[1] The controls were abandoned in 1994 when Iceland joined the European Economic Area (EEA). Subsequently, Iceland experienced greater inflow of capital, strengthening the ISK (Iceland Chamber of Commerce 2011).

Capital controls were again introduced in Iceland in the midst of the financial turbulence in 2008. Their implementation took place as result of a threat of a sudden capital flight, which would have had unforeseeable economic consequences and could have caused a vicious cycle of exchange rate depreciation, bankruptcies, rise in inflation, and an augmented risk premium. The capital controls still remain in place today without a clear-cut plan of their dismantling, affecting every aspect of the economy.

Pension funds are one of parties greatly affected by this foreign investment prohibition since they need to invest 150 billion ISK or the equivalent to 8.4% of GDP annually, which currently is entirely invested within the economy of Iceland (Möller 2013).[2] The inability to further invest abroad will cause the pension funds to become increasingly dependent and influential within the Icelandic economy. As a proof of this development, it is important to note that the Icelandic pension funds already possess 33% of all registered stocks, 30% of all governmental bonds, and 65% of bonds denominated by the Housing Financing Fund (FSA and CBI data).

The aim of this thesis is to investigate the effects capital controls existent in Iceland have on Icelandic pension funds. The purpose of investing in other economies is twofold: to raise mean returns of investments and to decrease variance in returns by allocating risk to other economies (Bodie, Kane and Marcus 2011). As controls on capital outflows prohibit the Icelandic pension funds (IPF) to make new investments abroad, and, thereby, seizing profitable investment opportunities and further diversify country-specific risk, the effect of proportion of foreign assets on the IPF' return and volatility in returns is specifically examined. Precisely, the question whether or not the IPF are really better off having higher levels of foreign assets and, therefore, which specific, quantified, cost this investment limitation causes them will be answered. It should

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[1] At that time Landsbanki served the role of a central bank.

[2] A conservative estimation shows 110 billion ISK annually and broader estimation show around 190 billion ISK. The amount is estimated by taking the difference between payments in and out of pension funds as well as securities repayments.

additionally be mentioned as the research is relatively case-specific it is unlikely to provide policy implications for other countries, that is external validity might be limited.

Motivation for the study originates in a comparison between the returns of the IPF and the 14 biggest pension funds in the other Nordic countries (see Table 1 and Appendix E). Icelandic pension funds had returns on-par with their Nordic peers prior to the 2008 crisis with their difference of returns 0.4 percentage point. They perform, however, considerably worse in a post-crisis period with a difference of 4.2 percentage points.[3]

Table 1: Comparison of returns of Icelandic and Nordic pension funds
Source: Annual reports of included pension funds

	Whole period 2001-2012	Before crisis 2001-2007	Crisis 2008-2009	Post-crisis 2010-2012
Icelandic Funds	2.63%	5.81%	-10.81	4.14%
Nordic Funds	5.46%	5.41%	1.20%	8.38%
Difference in pp	-2.83	0.40	-12.01	-4.24

If the Icelandic pension funds continue to persistently obtain lower returns on their investments than their Nordic peers, Icelandic pensioners will eventually receive lower pension payments, despite having worked an equivalent amount of time. Returns falling short of their potential will lead to reduction in welfare relative to their Nordic peers, making this difference in returns a relevant policy issue. It is of interest, therefore, to investigate what can cause this difference in returns and if it can be attributed to the existence of capital controls in place in Iceland, which prevent the IPF from increasing their assets denominated in foreign currencies.

The inability to make new foreign investments has two main effects – firstly, the IPF cannot increase their participation in profitable investment opportunities in foreign markets, and secondly, they cannot further diversify risk by investing in other economies, thereby decreasing country-specific risk. This limitation does imply the two main costs of smaller returns if returns in foreign markets are greater than domestic returns and increased volatility of returns due to less country-diversified assets. *This paper contributes to the current state of research by investigating the costs that Icelandic pension funds bear as a result of foreign investment limitation caused by capital controls.*

The remainder of the thesis is structured as follows. Section two reviews previous literature on capital controls as a policy tool, its costs, and its benefits. Section three discusses capital controls

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[3] Proportion of foreign assets out of total assets are not compared as the Nordic funds do not always explicitly report those figures in their annual reports.

in Iceland, the prelude to their implementation, how they are impactful and necessary steps for their lifting. Section four describes the Icelandic pension fund system, the structure of their assets, and foreign assets. Section five includes the research hypothesis, and the data is presented in section six. Empirical models applied to address the research question are described and motivated in section seven. In section eight the results and their analysis are presented. Finally, discussion and conclusions are provided in section nine and ten.

2. Literature Review

Flow of capital has increased largely in the last decades as a result of globalization. The increased access to capital was followed by higher levels of investment, subsequently increasing growth, the main driver for this development. Magud and Reinhart (2006) discuss in their overview paper the four fears underlying imposition of capital controls throughout history. They claim that fear of appreciation, "hot money," large inflows, and loss of monetary autonomy are the fundamental motives leading to imposition of capital controls.[4] To withstand and benefit from increased capital flows, and in particular short-term flows, a few conditions should essentially hold. The financial system should be adequately capitalized and efficient, regulation and surveillance should be sufficient, and the government has to conduct sound fiscal and monetary macroeconomic policies (Kaplan and Rodrik 2001). There exist capital controls on in- and outflow of capital, leading to different impacts for the country at stake. Furthermore, capital controls can vary in their restrictiveness from being for example tax on foreign denominated transactions to outright prohibition of transferring foreign denominated currencies across the border.

Emerging markets have proven especially susceptible to large and volatile inflows of capital, and capital controls on inflows have been implemented as a policy tool to reduce such effects. Controls on inflows are considered to be a "prudential" measure as they are usually introduced in a calm period. Reinhart and Montiel (1999) investigate a number of countries in Asia and Latin America in the early 1900s. They provide evidence "that capital controls influence the composition of flows, not their volume while sterilized intervention influences volume and composition, skewing flows to short maturities" (p.619). Chile, Brazil, Malaysia, and Thailand have all implemented controls on inflows. Edwards (1999) found that capital controls in Chile were not effective in increasing monetary policy autonomy. Edison and Reinhart (2001) found mixed evidence stating that controls on inflow in Brazil and Thailand did not meet their objectives of increasing monetary autonomy or on stabilizing interest rates and exchange rate. They, however, found evidence that the controls in Malaysia were successful in meeting their objectives.

Controls on outflow of capital are usually interpreted as a "desperate" measure. The imposition of capital controls by the Malaysian government in the midst of the Asian crisis in 1998 has, for example, obtained widespread attention amongst researchers. In contrast to its neighbors, Thailand, South Korea, and Indonesia who all resorted to IMF designed programs, Malaysia introduced extensive capital controls. The Malaysian controls are considered to have been successful in achieving the goals that motivated their imposition such as to maintain more stable

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[4] Hot money: short-term investments made in order to profit from differencies in interest rates or exchange rate changes. If these transaction are substantial they can affect the exchange rate and balance of payments.

and lower interest rates while keeping the exchange rate fixed, although the effectiveness might also simply be a result of generally improving economic conditions as the controls were implemented after the peak of the crisis (Edison and Reinhart 2001).[5] Krugman (2008) captures the essence of how sensitive the imposition of capital controls was at the time. His article is published shortly after the imposition of Malaysian capital controls and states that the Asian economies are stuck as "hostages to skittish investors" and the solution, capital controls, is "so unfashionable, so stigmatized, that hardly anyone has dared suggest it. The unsayable words are "exchange controls"" (n.p.).

Researchers and institutions have not reached a consensus on the use of capital controls as a policy tool. The Bretton Woods system, founded in 1944, favored the use of capital controls. IMF has, however, since the 1970s been considered an advocate of free capital movements. Recently, the policy tone has implied that capital controls can be useful under several circumstances (Gallagher and Ocampo 2013). A policy of free capital movements should foster economic development and increase international trade. However, greatly increased global movement of capital also imposes risks in the form of increased country imbalances such as a sharp inflow of capital (IMF 2013). Malaysia was able to lift capital controls relatively quickly without threatening domestic financial stability and the imposition of capital controls has afterwards been regarded as case of success while the timing of imposition could also have played a role in accomplishing greater stability. In the case of Iceland, where sudden danger of massive outflow of capital lead to the imposition of capital controls, IMF supported their imposition. At the time, it was regarded as a 'second-best' solution as it would impose greater exchange rate stability in order to limit macroeconomic and financial instability, as well as ensure a fair treatment of both domestic and foreign entities (CBI 2010). The imposition of capital controls in Iceland proves that trying to regain confidence of investors was considered as a battle too large to win and, therefore, the unpopular, but viable, solution was to resort to capital controls, as it would create space to improve policy making in a turbulent market environment.

The effectiveness of the Icelandic capital controls has been investigated by Gunnarsdottir and Reinholm (2012). They found that capital controls were effective in reducing outflow of capital and exchange rate volatility but that they did not enhance monetary policy autonomy. Furthermore, IMF (2012) states that only the capital controls in Iceland among countries which introduced extensive capital controls following the 2008 crisis seem to have been effective. The effectiveness of capital controls in Iceland might be due to sufficiently developed institutions

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[5] The motives of the controls aim to include two parts of the "impossible trinity" as limiting capital flows should increase monetary policy and exchange rate autonomy.

which are able to conduct more effective enforcement and offer more transparent practices (IMF 2013). Ariyoshi, et al. (2000) consider capital controls on outflow in Malaysia, Spain, and Thailand and state that the downside of effective controls is greater distortion and more cost as the controls are likely to remain longer in place.

Costs of capital controls have not been researched largely due to the difficulties of measuring many of the impacts of capital controls. The direct consequences are obvious – locking in a large amount of capital that imposes the threat of an abrupt exit from the economy once controls are lifted. The indirect costs are harder to measure but foregone opportunities and the cost of rent seeking are examples illustrating these hindrances. Iceland Chamber of Commerce (2011) has provided descriptive estimation of the costs. They consider the main costs to be in form of decreased effectiveness of the financial sector, incentives for companies and start-ups to move their operations abroad, less attraction of foreign investment, rent seeking, and the potential creation of an asset bubble. No quantitative evidence has been provided so far, not for the economy as a whole, nor for specific interest groups, and it is this gap in the literature that this thesis contributes towards filling.

3. Capital Controls in Iceland

Kaminsky and Reinhart (1999) discuss the essence of the Icelandic banking crisis in their paper, which analyses the links between banking and currency crisis:

> We find that: problems in the banking sector typically precede a currency crisis - the currency crisis deepens the banking crisis, activating a vicious spiral; financial liberalization often precedes banking crises. The anatomy of these episodes suggests that crises occur as the economy enters a recession, following a prolonged boom in economic activity that was fueled by credit, capital inflows, and accompanied by an overvalued currency. (p. 473)

The case of Iceland follows this pattern in detail with the crisis itself triggered by international events, starting by the fall of Lehman Brothers on September 15th 2008. Macroeconomic imbalances within the Icelandic economy had built up over time. The banking system had grown to ten times the GDP as a result of wide access to international capital markets, high credit ratings, too little and inefficient supervisory, and government eagerness to support the banking sector. The Icelandic krona (ISK) had appreciated to unsustainable levels as a consequence of dramatically increased inflow of capital from carry traders, who exploited differences in interest rates between Iceland and international markets (see Appendix B for macroeconomic evolvements). The appreciated currency led to augmented asset prices, increased private consumption, and accumulation of debt. Money supply (M3) had increased by 200% from beginning of year 2004 to mid-year 2008. Current account deficit amounted to 20% of GDP in the years leading up to the crisis, gross external debt reached 300% of GDP, and short-term debt 55% of GDP (CBI 2009).

Following the fall of Lehman Brothers, trust in the Icelandic market disappeared almost overnight and the threat of a massive capital flight became evident. The Financial Supervisory Authority (FSA) appointed a resolution committees for the three biggest banks, Glitnir, Landsbanki and Kaupthing, over the course of 7th – 9th October. Subsequently, the government approached the International Monetary Fund (IMF) for assistance and on November 19th IMF approved a US$ 2.1 Billion Stand-by arrangement for Iceland.[6] The ISK fell by 40% in 2008 and the CBI has estimated that it could have depreciated by as much as 300% as a result of the vicious cycle of exchange rate depreciation and augmented risk premium. Such a scenario could have led to high level of bankruptcies, unemployment, inflation, and even shortages of common goods and services (CBI 2010).

Danielson and Arnason (2011) argue that the government had three choices under these circumstances: let market powers act freely, manage the exchange rate by an exit tax, or impose capital controls. On October 10th 2008 guidelines for financial institutions were issued, completely limiting the sale of foreign currency. Assets of foreign entities were at the time

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[6] 2.1 Billion Loan makes a commitment of 7,000 USD per capita in Iceland, not counting loans from other countries.

estimated to be 680 billion ISK, of which 330 billion ISK were short term positions, or 46% and 22% of GDP 2008 respectively (CBI 2009).

The capital controls have been amended several times to prevent loopholes in their functioning. Minor modifications such as specific exemptions or limits to foreign exchange purchasing for travel purposes are not discussed here. The first amendment stating that trade of goods and services should take place in foreign currencies took place on March 31st 2009. The second amendment on October 31st 2009 included the first step towards liberalization by allowing the inflow of capital, but also prohibiting the unilateral import of offshore ISK. On March 13th 2012 principal payments of bonds were no longer exempted from capital controls. These amendments should not affect the pension funds, as the changes do not alter the foreign investment prohibition.

3.1. Effects of Capital Controls

The currency market in Iceland was liberalized in 1994 following the establishment of the EEA. Previously, Iceland had been subjected to capital controls, mainly impacting capital inflows, since 1931; however it would not be long before Iceland would be back on a trajectory of capital controls.

The capital controls currently in place prohibit all cross-border movements of foreign-denominated capital, except for the purchase of goods or services or particular transactions exempted by the rules of foreign exchange (Rules no. 200, 2013). In practice, the capital control law prohibits outflow of capital unrelated to current account transactions. Inflow of capital related to new investment is allowed, non-residents can transfer money in order to cover living expenses, and residents can purchase a limited amount of foreign exchange by showing a valid airplane ticket.

The capital controls affects households, companies, the public sector, domestic and foreign investors, and foreign entities holding assets in Iceland in various ways. In short, all aspects of the economy are affected, but the general public is not greatly disturbed in their every-day business. One of the consequences of having capital controls in place is that they increase uncertainty, especially concerning evolvement of several macroeconomic factors following their dismantling, including evolvement of the exchange rate and asset prices.[7] Capital controls are also likely to be more effective initially because the costs related to the enforcement and bypassing of the controls tends to increase over time. This increased cost is hard to measure since it includes what-if

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[7] The discussion of the formation of an asset bubble rises occasionally as if supply of capital is greater than investment opportunities in a closed economy, then those existing assets should simply be bought for a higher price.

scenarios and foregone opportunities. It is, however, despite being less measurable, just as real and will decrease living-standards in the long term (CBI 2010).

3.2. Current Situation

At the time of implementation, capital controls were considered a temporary policy tool to create space for better decision making after the economic storm settled. Initially, they were to be removed before the end of the IMF program. By the end of the program in 2011, they were declared to be removed by the end of year (EOY) 2013, and currently, they are to remain in place "until conditions allow" (CBI 2011). This delay has been caused by the Icesave dispute which deferred financing from external sources such as the Nordics, as well as other factors.[8] Restructuring the old banks has taken longer than was initially expected, and the actions to support debt-burdened households have also prolonged more than initially anticipated (CBI 2011). The capital controls as a response to the crisis are not a violation of the EEA contract as long as they provide protection from threats to macroeconomic stability. However, in the long term, pressures to lift the controls in order to fulfill obligations of the EEA contract are likely to increase.

The main factors contributing to the continued existence of capital controls of threatening to put downward pressures on the exchange rate is first, and foremost, what has been dubbed 'The overhang,' or a large volume of ISK owned by foreigners. It consists of four main parts: Glacier bonds, estates of the failed banks held by their creditors, claims of the old banks on domestic entities, and the Landsbanki bond.[9] Furthermore, due to accumulated foreign investment needed by pension funds, companies and the general public they are likely to pressure the exchange rate when capital controls have been lifted.

In relation to the "until conditions allow," there are several factors that need to be in place for capital controls to be lifted. The first condition is that trust towards the economy, as well as in the currency and domestic financial market, is prevailing. Currency reserves have to be sufficient, the Icelandic state has to have ensured access to foreign capital markets, and general beliefs in place that the state can fulfill its commitments towards creditors (CBI 2011).

The current official plan regarding lifting includes two steps. The first phase revolves around limiting pressures on the exchange rate when capital controls are lifted. That step includes moving capital out of the hands of impatient investors who want to leave the ISK at a first chance towards

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[8] The Icesave dispute is a dispute between Iceland, UK and the Netherlands concerning the collapse of the online lender Icesave, subsidary of Landsbanki, at the height of the financial crisis in 2008.
[9] Glacier bonds are Eurobond issued in ISK, which is issued in Europe but denominated in ISK.
The Landabanki bond was established to pay for assets of the New Landsbanki from the Old Landsbanki.

more patient investors who are willing to place their money into long-term investment within the economy. The second step includes gradual dismantling of capital controls, potentially supported by an exit tax (CBI 2011). When the current strategy to lift capital controls was presented in March 2011, ISK assets of foreign entities were estimated 465 billion ISK or nearly 30% of GDP and consist mainly of commercial and central bank deposits and bonds.

4. The Icelandic Pension Fund System

The Icelandic pension system has a mandatory participation with defined contribution rates.[10] The contribution based charge is 12% with the employee paying 4% and the employer 8%. The replacement rate, the level of salaries kept when retired, is 56% for 40 years of contribution. All pensions are indexed according to CPI and future pension liabilities are discounted at a 3.5% rate, imposing a lower bound on the returns pension funds are expected to yield.[11] When the system was established in the 1970s, the number of funds was much greater than today with 96 in comparison to the 32 currently. Merger of pension funds has resulted in greater economies of scale and in 2012 operation costs were 0.1% of total assets (FSA 2012).

The system is a three-pillar system as proposed by the World Bank, with a redistributive scheme that should ensure a minimum pension for everyone, funded by taxes, a mandatory scheme which constitutes for the general pension system, and private pension savings which have the aim to provide flexibility on retirement dates (Pordes 1994). In comparison to other countries, the Icelandic pension system is most similar to the Dutch one which also possesses assets well over 100% of GDP and uses a three pillar foundation. Participation is also widespread at over 90% for both countries and is often related to sectors as in Iceland. Pension age in Iceland is the highest within the OECD at 67 for both men and women, which reflects the high life expectancy at birth or on average 82 for women and 80 years for men (OECD 2013).

4.1. Asset Structure

The IPF possess total assets worth 149% of GDP and grow continually every year. The evolvement of total assets as well as asset classes can be found in Appendix D. As previously mentioned, the IPF need to invest the annual pension provisions and to reinvest other investments amounting to 150 billion ISK or 8.4% of GDP. Annually, they need to acquire new assets for this same amount and consequently own a greater proportion of the domestic economy with continued restrictions to foreign investments. Currently, the IPF possess 33% of all registered stocks, 30% of all governmental bonds, and 65% of bonds denominated by the Housing Financing Fund, as previously mentioned. These proportions will continue to grow leading to the IPF to become increasingly domestic dependent.

Law on pension funds imposes several restrictions on investment choices of IPF. For example, they are allowed to hold assets in foreign currencies up to 50% of total assets. Stocks can account for a maximum 60% of total assets, but government bonds have no limits. Securities should also

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[10] However a fraction of the system has *defined benefits*. Those funds are in all cases guaranteed by the state or municipalities and in all cases have a negative actuarial position.

[11] CPI indexing is widespread in Iceland, for example majority of mortgages are CPI indexed.

be listed on an approved stock exchange within OECD countries or that the FSA has approved the market (Act no. 129/1997).

The IPF have historically maintained the greatest proportion of their assets in domestic bonds, which is consistent with their tendency for relatively low risk. Furthermore, the bonds of the domestic housing fund provide indexation, and as pension commitments are indexed, this investments creates greater balance between assets and future commitments. Table 2 illustrates the composition of assets of the IPF. It shows that fixed income securities have in the period 2000 – 2012 on average accounted for 56.4% of total assets, variable income securities 39.4%, and cash & deposits 4.3%. Foreign bonds are only a small fraction of bonds, total and foreign assets or 1.6%, 0.9% and 3.5% respectively and should not affect returns significantly. Therefore, in Sections 6 and 7, it is assumed that all foreign assets are stocks. That assumption enables a split of assets into three categories, domestic bonds, domestic stocks, and foreign assets, which will be used in the model setup. Cash and deposits are also expected to only negligibly affect returns.

Table 2: Asset composition of Icelandic pension funds
Source: Central Bank of Iceland

	EOY 2012	**Average 2000 - 2012**
Cash and deposits	6.1%	4.3%
Fixed income securities	56.6%	56.4%
-Thereof domestic	99.7%	98.4%
-Thereof foreign	0.3%	1.6%
Variable income securities	37.4%	39.4%
-Thereof domestic	40.9%	40.8%
-Thereof foreign	59.1%	59.2%
Foreign assets	22.4%	23.9%
-Thereof stocks	99.2%	96.5%
-Thereof bonds	0.8%	3.5%

By the end of year 2012, foreign assets accounted for 22.4% of the total assets of the IPF. Liberalization of foreign investments followed the establishment of the European Economic Area in 1994, and the IPF subsequently started acquiring foreign assets. They have slowly increased the proportion of foreign assets over time and the evolvement can be found in Appendix D.

4.2. Effects of Capital Controls on Foreign Assets

A primary assumption when investigating how capital controls affect the IPF is that the capital controls are in fact binding for the IPF. From the funds examined in this study, ten out of fifteen funds state in their annual reports published in 2012 that they find themselves limited in terms of

investment choices as a result of the capital controls. Those who do not report limitations only report figures and no text in their reports (FSA 2012). Möller (2013) conducted a survey in 2012 where executives of the 12 biggest IPF were asked what proportion of foreign assets they wished to hold currently and then again in ten years. The average response was 33% and 40% respectively, while the ratio today is 22.4%. The IPF have two main reasons to hold on to their foreign assets. The first one is to capture higher returns of foreign stocks and the second one to distribute country-specific risk. With capital controls in place the argument for distributing risk for risk-intolerant pensioners grows even stronger. This is due to the uncertainty regarding the evolvement of several macroeconomic factors, such as exchange rate and assets price evolvements, following their lifting. In any case, since the IPF hold on to their foreign assets it is evident that they bring some kind of a benefit.

Figure 1 depicts the evolvement of proportion of foreign assets out of total assets during the time period 2000 – 2013.[12] The ratio of foreign assets for all the IPF increased at first from 2000 – 2001, as foreign stocks markets still enjoyed rising stock prices from the 2000 Tech bubble. When the Tech bubble burst in late 2000, stock prices plunged subsequently. Contemporaneously, the ISK appreciated against the euro and dollar, depreciating the value of foreign assets further. Currency hedging helped limiting fluctuation in asset prices stemming from foreign assets, when the ISK appreciated in 2002 – 2005. The hedging was, however, one of the contributing factors towards losses in 2006 – 2008. International markets rose continually until 2006, when the growth slows down, reaching its optimum in early 2008.
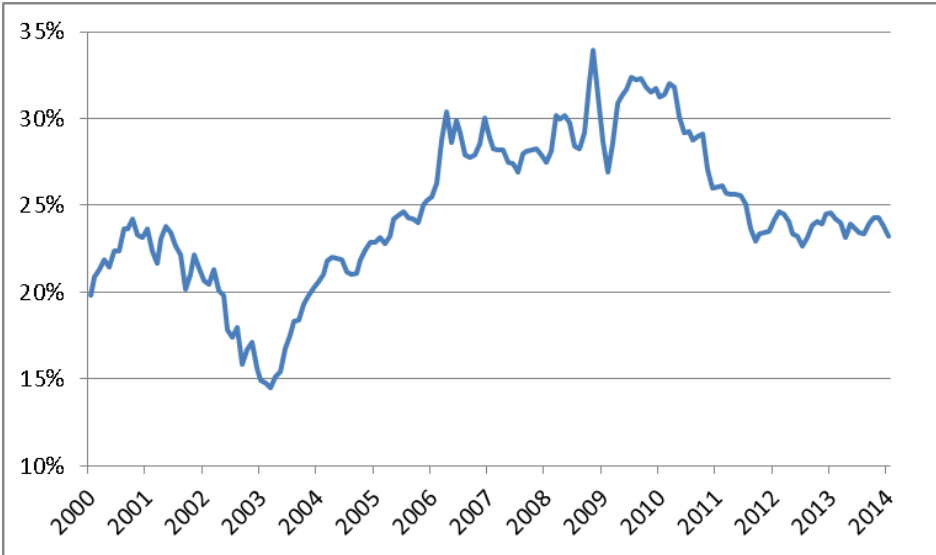

Figure 1: Proportion of Foreign Assets Over Total assets. Source: Central Bank of Iceland (CBI)

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[12] See evolvements of foreign assets in Figure D3.

The IPF are allowed to hold on to the foreign assets they possessed prior to the imposition of capital controls in 2008, as well as to fulfill obligations in foreign currencies which they had established before the implementation of capital controls, towards private equity funds. Furthermore, for assets sold abroad, they are allowed to reinvest the proceeds abroad within six months, otherwise the proceeds must be repatriated (Act no. 87/1992). Assets in foreign currencies have only been repatriated to a little extent, for example in 2010 as a part of the Avens-deal.[13] There the IPF sold foreign assets and instead bought Icelandic housing-bonds with considerably higher yields than the market yield at the time. They have, additionally, participated in foreign exchange auctions of the CBI, particularly in February 2012, as a compromise against authorities to abandon plans of imposing a 0.0814% tax on total assets of pension funds in 2012 and 2013 (LL 2011). The tax payments would have accounted for approximately 20 billion ISK in each year. Considering exchange rate movements against dollar and euro, the exchange rate has been kept relatively stable over the time period 2009 – 2013, even though the exchange rate fluctuated within each year. Therefore, the exchange rate should not have had considerable influence of ISK value of foreign assets in this time period (see Figure C2). It is relevant to consider how movements in the exchange rate affect asset prices, as the IPF are currently unable to purchase financial instruments to hedge against currency risk. As a consequence, they are exposed to both full currency risk as well as market risk. According to the MSCI World and Europe index (see Figure 2), foreign stock markets rose in 2012 and 2013 which is the most probable explanation for increased value of foreign assets in the period (see Figure D3). The amount of foreign assets is currently kept relatively stable as little amounts are converted to ISK.
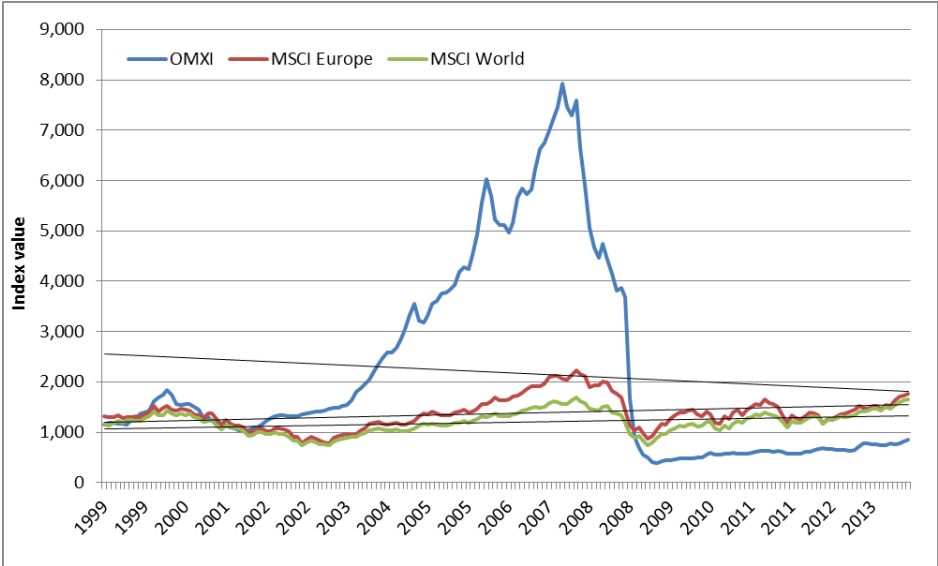

Figure 2: Comparison of the OMXI, MSCI World and Europe Indexes.
Source: OMX and MSCI index.

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[13] The Avens deal: a deal where the Icelandic central bank bought nearly all outstanding bonds pledged by Avens B.V., a Dutch subsidary of Landsbanki to secure funds from Luxembourg central bank.

5. Research Hypothesis

The fundamental question of this thesis, of how capital controls impose costs on the IPF by preventing them to further invest abroad, is the center of attention in the following sections presenting the empirical analysis. The reasons for holding on to foreign assets, as previously mentioned, relate to exploiting interest rates in foreign markets and to diversify risk by allocating assets to other economies. The method applied to assess the cost that the investment limitation imposes on pension funds is to evaluate with historical data how pension funds have beneffitted until this date from possessing foreign assets. The proportion of foreign assets varies for each fund and is likely to be one of the factors that contribute to how much return a particular pension fund yields. Furthermore, proportion of foreign assets is likely to influence the volatility of returns compared to his Icelandic peers. To evaluate the question of how proportion of foreign assets impacts the performance of the IPF the focus will be on testing two main hypotheses:

Hypothesis 1: Funds with greater proportion of foreign assets experience higher returns compared to funds with a lower fraction in a period of capital controls.

By investing abroad, a pension fund should be able to seize profitable investment opportunities and potentially yield higher returns. If having foreign assets yields higher returns, then being unable to invest abroad can be regarded as a cost. However, if interest rate level or rate of returns is lower in foreign markets the inference of higher returns will not necessarily hold true.

Hypothesis 2: Funds with greater proportion of foreign assets experience less volatility of returns compared to funds with a lower fraction in a period of capital controls.

Allocating assets to other market areas should decrease fluctuation in returns as markets might not be perfectly correlated. If the IPF are unable to decrease country-specific risk where it would cause less fluctuation to be able to do so, the inability to invest abroad can be regarded as a cost.

6. Data

The data set used to conduct the empirical testing includes the time period 2000 – 2012, 8 years prior to and 4 years post implementation of capital controls. The data is obtained from the FSA, to which the IPF are required to report their annual accounts data, and is considered to be of good accuracy. The official data per pension fund is available from 1997 and on aggregate level from 1980. However, the data per fund includes information on foreign assets and proportion of variable income securities from 1999. Altogether data from fifteen pension funds is included in the data set (see Appendix E). Those pension funds are in 2012 the biggest ones and altogether constitute for 82% of the total assets of the Icelandic pension system. Several mergers of pension funds took place during the period 2000 – 2012. In those cases, data is taken from the pension fund that was bigger in terms of total assets and number of pension fund members, and is not expected to affect the results.

Variation within the data is substantial as the difference between the funds with the greatest and smallest annual return is on average 9 percentage points, minimum 4.7 percentage points, and maximum 21 percentage points. The difference between the funds with the highest and lowest proportion of foreign assets is on average 23.9 percentage points, minimum 16.5 percentage points, and maximum 30.8 percentage points. Further plots of the data and summary statistics are included in Appendix A.

Foreign assets:

The motivation for using foreign assets as a measure for cost of capital controls, due to its impact on returns, comes from the relationship between the two factors.[14] The limitation on outflow of capital has direct impact on how the proportion of foreign assets of the pension funds evolves. The inability to further invest abroad, therefore, potentially affects the level of foreign assets more than any other influential effect. The figures for foreign assets are measured at the end of year and have already been converted to ISK in the reported data. The proportion of foreign assets is measured as the ratio between foreign and total assets (see Equation 1). Proportion of foreign assets typically varies from 11 – 35% or 13 – 36% before capital controls and 9 – 34% after.

$$\%Foreign\ assets_{i,t} = \frac{Total\ foreign\ assets_{i,t}}{Total\ assets_{i,t}} \tag{1}$$

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[14] Data on returns of foreign assets per pension fund are not publicly available from the FSA as they are by law not permitted to deliver information which can be identified to a specific fund other than officially required (Act no. 87/1998). The benefits from including returns of foreign assets would be to directly specify the contribution of foreign assets.

Cumulative annual returns:

Annual return is measured as real return, net of operational expenses. Net real annual return therefore measures by how much investments grew from beginning of the year to the end of year, taking into account both inflation and operating expenses. In order to allow comparison of how much funds have grown during the time period examined, returns are indexed. This method permits looking at a certain year within the time frame used, 2000 – 2012, to see by how much a pension fund, i, has grown since the benchmark year. The year 1999 is the first year when data is available per fund and is therefore used as the benchmark year. First the benchmark is set equal to one ($X_{i,1999} = 1$). Thereafter, a series is generated according to Equation (2) which accumulates growth over the time period. For example the average indexed growth in 2012 was 24.4%. Then if we started out at 1 in 1999 the fund has grown to 1.24 in 2012.

$$X_{i,t} = \prod_{s=2000}^{t} \left(1 + r_{i,s}\right) \qquad t = 2000, 2001, \dots, 2012 \quad (2)$$

Subsequently applying Equation (3) demonstrates how much a fund grew in each year.

$$R_{i,t} = \frac{\prod_{s=2000}^{t}(1+r_{i,s})-1}{t-1999} \qquad t = 2000, 2001, \dots, 2012 \quad (3)$$

Therefore, if average indexed growth was 24.4% in 2012, it resulted in a growth of 2.04% annually during the period, as in Equation (3) it is divided by number of years that have passed. Using the *accumulated annual return*s enables comparison according to a certain benchmark, here year 1999.[15] In terms of terminology, in the following chapters when discussing *returns* it refers to the *cumulative annual return*.

Relative volatility:

Relative volatility measures by how much a pension fund oscillates around annual returns of all pension funds in a particular year. In particular, the deviation from average return is measured by the absolute value of the difference between annual net real return of a pension fund in a specific year, in excess of average return of all pension funds in that same year (see Equation 4). This

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[15] Using the net real annual returns instead compares between two specific years, for example 2003 and 2004, but not according to a benchmark.

calculation enables an investigation of fluctuation from the mean market return over time. It is then used when running the regression model presented in Section 7.2.[16]

$$Volatility_{i,t} = \left| Annual\ return_{i,t} - Average\ annual\ return\ _t \right| \qquad (4)$$

Bonds:

Bonds are measured as the proportion between total fixed income securities and total assets (see Equation 5). Bonds serve as a proxy for risk tolerance in an investment policy of a fund, the more bonds a pension fund possesses, the less risk-tolerant it is. However it should be noted that figures of total fixed income securities include foreign bonds, however their fraction is shown in Table 2 and is considered negligible (see Table 2).

$$\%Bonds_{i,t} = \frac{Total\ fixed\ income\ securities_{i,t}}{Total\ assets_{i,t}} \qquad (5)$$

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[16] Another measure considered for inclusion was to deduct a particular pension fund's average return over the whole time period ($Average\ return\ _i$) instead of the average return of all pension funds in that same year ($Average\ return\ _t$). However, deducting the markets performance instead of an individual fund does better capture the effect of how different portfolio allocation affects volatility of returns for the funds included.

7. Empirical Models

This section presents, describes, and motivates the empirical models used for assessing the research question at stake. The general idea is to test weather having higher proportion of foreign assets results in higher returns and/or less fluctuation of returns, and to investigate if this impact is different during the capital control period.

7.1. Model 1: Returns

An essential assumption is that external factors should affect all pension funds equally, i.e. they experience the same exchange rate changes, inflation, interest rate level etc. What causes different return outcomes of the funds should, therefore, be fund-specific factors, e.g. their proportion of foreign assets, proportion of stocks or bonds, size, ability of pension fund managers etc. The panel fixed effects model applied does allow an examination of how the included controls affect returns. The model is estimated for the period 2000 – 2012 and is presented in Equation (6).

$$Return_{i,t} = \beta_0 + \beta_1 Foreign_{i,t} + \beta_2 Bonds_{i,t} + \beta_3 CC_{i,t} + \beta_4 For * CC_{i,t} + \beta_5 Fund_i + \beta_6 Year_t + \varepsilon_t \qquad (6)$$

$Return_{i,t}$ is the cumulative annual return of a pension fund, with index base in 1999; $Foreign_{i,t}$ is the proportion of foreign assets as a percentage of total assets; $Bonds_{i,t}$ is the proportion of bonds as a percentage of total assets; $CC_{i,t}$ is a binary dummy variable for period of capital controls; $For * CC_{i,t}$ is an interaction variable between $Foreign_{i,t}$ and $CC_{i,t}$; $Year_t$ is a year specific fixed effects dummy; $Fund_i$ is a pension fund specific fixed effects; β_n is a vector of unknown coefficients; ε_t is a normally distributed error term; i and t denote pension fund and year respectively.

Concerning the controls included, the proportion of foreign assets is included in order to show the impact of different levels of foreign assets and how it impacts return of pension funds. The Bonds variable is included as a proxy for risk as it can be considered less risky to possess bonds than stocks. Furthermore it is included to control for a potential omitted variable bias (OVB). The capital controls dummy takes a value of one while capital controls are present and zero otherwise.[17] The interaction dummy between capital controls and proportions of foreign assets is included in order to capture the effect of foreign assets during the period when restrictions on outflow of capital are in place. The year fixed effects dummies are included to capture unobservable effects that impact the overall trend in returns. The fund fixed effects dummies serve to capture fund specific omitted variables that are similar during the time period of the study and could impact the return of the pension funds. After conducting statistical testing it is evident

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[17] The first effective year is 2009 as capital controls are put into effect in Q4 2008.

that heteroscedasticity and autocorrelation are present in the data errors (see Appendix B). Therefore all regressions are estimated using robust standard errors, clustered on fund level (Wooldridge 2010).

By including $Foreign$ and $Bonds$ only one portfolio asset class is excluded from the model, proportion of domestic stocks. This way, considering the included asset classes enables investigation of how much return increased if levels of foreign assets or domestic bonds rose compared to the 'left-out' asset class of domestic stocks. Moreover, in the model specifications where the CC dummy is included, the $Year$ fixed effects dummies are excluded as it would mean including the same dummies twice and result in multicolleniarity problems.

A priori, the factor loading on $Foreign$ was expected to be positive as the IPF hold on to their foreign assets, while the coefficient on $Bonds$ was expected to be negative. The effect of capital controls period was considered uncertain. If the factor loading on $For * CC$ is positive and statistically significant, it means that the IPF enjoy greater returns from their foreign assets than their domestic stocks. In that case it would be considered beneficial for the Icelandic pension funds to increase their proportion of foreign assets under the argumentation of enjoying greater returns and, therefore, the inability to do so constitutes for the cost of being unable to further invest abroad.

7.2. Model 2: Volatility

The model applied for examining volatility of annual returns is presented in Equation (7).[18] The purpose of the model is to consider the effect that different proportions of foreign assets have on volatility of annual returns.

$$Volatility_{i,t} = \beta_0 + \beta_1 Foreign_{i,t} + \beta_2 Bonds_{i,t} + \beta_3 CC_{i,t} + \tag{7}$$
$$\beta_4 For * CC_{i,t} + \beta_5 Fund_i + \beta_6 Year_t + \varepsilon_t$$

The controls included in Equation (7) are the same as in Equation (6) as $Volatility$ is likely to be affected by the same pension fund-specific factors. The variables of interest in this case are $Foreign$ and the interaction term $For * CC$ which a priori are expected to have negative coefficients, that is having greater exposure to foreign markets should decrease volatility. The factor loading on $Bonds$ is expected to be negative, that is, possessing higher proportion of bonds should decrease fluctuation. If holding higher proportion of foreign assets causes less fluctuation, it can be regarded as a cost of capital controls to not be able to contain fluctuation by increasing foreign assets.

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[18] Please note that this model uses annual returns instead of the accumulated annual returns as it considers volatility.

8. Results

The following section presents results of the empirical models applied with the purpose of answering the main question of this thesis. The models examine how proportion of foreign assets affects returns and relative volatility of the IPF as a way to capture costs caused by foreign investment limitation, stemming from capital controls. Foreign assets are investigated as the IPF are currently unable to further invest abroad due to restrictions on outflow of capital.

8.1. Correlations

Correlations are shown in Table 3 as they might indicate a predictive relationship between variables of interest and their explanatory variables. However, correlation does not imply causality. It does not take into account horizontal or vertical fixed effects in the data, nor consider impact from other variables. For this reason, further statistical testing must be performed in order to obtain plausible results. Looking at correlations in Table 3 indicates that a positive relationship exists between proportion of foreign assets and returns and a negative relationship for annual returns. In a period of capital controls, the relationship between foreign assets and returns is positive in both cases and capital control period is negatively correlated with returns but positively with annual returns. Bonds are negatively correlated to returns and annual returns. All factors are negatively correlated with relative volatility. The negative correlation by Bonds is expected as possessing bonds is usually considered less risky than holding higher proportion of stocks

Table 3: Correlations

Variables	Returns	Annual returns	Relative Volatility
Foreign	0.1098	-0.1520	-0.0002
For* CC	0.0165	0.0359	-0.1628
CC	-0.0029	0.0622	-0.1953
Bonds	-0.0033	-0.1006	-0.0238

8.2. Model 1: Returns

The estimation outputs from the panel fixed effects model in Section 7.1 are presented in Table 4. The results indicate that $Foreign$ does not have a statistically significant impact on $Returns$ (β_1 from Equation 6) which in other words means that it is equally beneficial for a pension fund to possess domestic stocks as retaining foreign ones.[19] This effect remains insignificant whether or not year fixed effects are included and whether the crash year of 2008 is included or not.

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[19] The reader should again keep in mind that *Returns* are the *accumulated annual returns* and $Foreign$ is the proportion of foreign assets out of total assets.

Capital control period yields a statistically significant positive estimate. The coefficients for years 2009 – 2012 when running the regression with year fixed effects are quite similar in every year, indicating that the positive results for the CC factor are not driven by one year. It should, however, be noted that when excluding $For * CC$ from the regression the effect from CC becomes smaller and insignificant. This is in line with the data as when taking mean returns for the period before, and after imposition of controls they are almost the same, or 1.3% annually in 2000 – 2007 and 1.2% annually in 2009 – 2012.

The coefficient on $Bonds$ is negative and statistically significant (in the first two model specifications). This has the implication that possessing higher proportion of bonds results in lower returns relative to possessing domestic stocks which is in line with prior expectations.

Table 4: Estimation output for returns

VARIABLES	(1) Returns	(2) Returns	(3) Returns	(4) Returns
Proportion of foreign assets	0.000986	0.00125	-0.000159	-9.39e-05
	(0.000654)	(0.000796)	(0.000274)	(0.000296)
Capital control period	0.071621***	0.082987***		
	(.01453)	(.016716)		
Foreign*Capital controls	-0.00254***	-0.00299***	-0.000600**	-0.000740**
	(0.000520)	(0.000642)	(0.000259)	(0.000345)
Bonds	-0.000664**	-0.000697**	-5.74e-05	-7.46e-05
	(0.000293)	(0.000320)	(0.000131)	(0.000142)
Constant	-0.00190	-0.00852	-0.0170	-0.0180
	(0.0246)	(0.0288)	(0.0111)	(0.0119)
Observations	195	180	195	180
R-squared	0.458	0.463	0.948	0.950
Year Fixed effects	NO	NO	YES	YES
Fund Fixed effects	YES	YES	YES	YES
Year 2008 included	YES	NO	YES	NO

<div align="center">Robust standard errors clustered on fund level in parentheses</div>
<div align="center">*** p<0.01, ** p<0.05, * p<0.1</div>

To consider the effect of foreign assets during the period of capital controls it is necessary to look at the sum of coefficients from $Foreign$ and $For * CC$ (β_1 and β_4 in Equation 6). This effect is of key interest as it predicts how capital controls affect pension funds via foreign investment limitation. $For * CC$ yields a negative and statistically significant coefficient. The negative effect is greater than the positive factor on $Foreign$ in the first and second model specifications. An explanation of the effect of foreign assets during a period of capital controls is that a pension fund

who has one percentage point higher proportion of foreign assets experiences a 0.17 percentage point lower returns or 0.065 when year fixed effects are included.[20]

The fit of the model (R-squared) is 96% when both $Year$ and $Fund$ are included. R-squared is 46% when fund fixed effects are included, and 1.5% when neither fund nor year fixed effects are included in the model. As a result it is plausible that fund and year fixed effects explain to some extent the variation in $Returns$. A significant coefficient for a particular fund could mean that they have more effective investment policy or simply more able pension fund managers.

Going back to the research hypothesis, those results do not indicate that having higher proportion of foreign assets yields a higher return, compared to funds with a lower fraction, prior to the imposition of capital controls. In the subsequent period, when capital controls are in place, statistical indication is found that holding greater proportion of foreign assets results in lower returns than when holding domestic stocks.

In conclusion, the proportion of foreign assets seems to be one of the channels through which returns are affected only in period of capital controls. Then the effect is negative, in contrary to what was initially expected. The conclusion leads to the principal question of whether foreign investment limitation causes cost in terms of lower returns for the IPF. From those results the IPF do not seem to bear cost of capital controls in terms of lower returns.

8.3. Model 2: Volatility

Relative volatility of annual returns is the center of attention in the second model. The estimation outputs from the panel fixed effect model in Section 7.2 are presented in Table 5. A priori all explanatory variables were expected to have a negative coefficient in line with correlations in Section 8.1, however the overall estimation results are somewhat mixed. The results show that $Foreign$ has a statistically significant negative impact on $Volatility$ (β_1 in equation 7) when year 2008 is excluded. The interpretation is that a fund having higher proportion of foreign assets has less fluctuation in annual returns relative to a fund that has a lower proportion. When including year 2008 the effect becomes insignificant which can be explained by the great fluctuation that year 2008 causes.

The capital control period yields a statistically significant negative estimate, meaning that there is less fluctuation of returns in the period of capital controls than before their implementation. This

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[20] $0.00125 + (-0.00299) = -0.00174$ and $0.0000939 + (-0.00074) = -0.0006461$ for the second and fourth model specifications respectively when year 2008 is excluded. The effect is -0.16 percentage points and -0.044 percentage points for the first and third model specifications respectively when year 2008 is included.

coefficient especially makes sense in the first model specification, when the crisis year of 2008 is included, as the former period was exceptionally volatile. When excluding $For * CC$ the effect is still significant in the first model specification but non-significant in the second one where year 2008 is excluded. Why is it that returns fluctuate less in a period of capital controls? Possible explanation lies in the main motivation for implementing of capital controls – stabilizing the exchange rate. Benefits of a more stable exchange rate include greater price stability and less inflation.

Table 5: Estimation output for relative volatility

VARIABLES	(1) Volatility	(2) Volatility	(3) Volatility	(4) Volatility
Proportion of foreign assets	0.0220	-0.0526***	-0.0476	-0.0402*
	(0.0280)	(0.0168)	(0.0280)	(0.0220)
Capital control period	-3.1838**	-2.2095**		
	(1.350)	(0.905)		
Foreign*Capital controls	0.0760	0.0781**	0.0243	0.00604
	(0.0492)	(0.0353)	(0.0491)	(0.0430)
Bonds	0.0355**	-0.00579	-0.0155	-0.0183
	(0.0144)	(0.0132)	(0.0129)	(0.0156)
Constant	0.965	3.902***	4.597***	4.480***
	(0.973)	(0.608)	(1.034)	(0.981)
Observations	195	180	195	180
R-squared	0.134	0.099	0.429	0.228
Year Fixed effects	NO	NO	YES	YES
Fund Fixed effects	YES	YES	YES	YES
Year 2008 included	YES	NO	YES	NO

Robust standard errors clustered on fund level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the first model specification it is potential that $Bonds$ and $Foreign$ capture some of the 2008 crisis effect since they both have positive coefficients. The interpretation of possessing bonds for example is that they cause higher fluctuation than possessing domestic stocks, which seems unlikely. When including year fixed effects, the year 2008 coefficient is by far the largest and is statistically significant. Therefore, in Model 2 it seems feasible to exclude year 2008 in order to prevent it from driving incorrect results of fluctuation estimates.

The factor loading on $Bonds$ is negative in the later model specifications, which is as expected, yet the figure is statistically insignificant. The effect of foreign assets during the period of capital controls on $Volatility$ is captured by looking at the coefficients from $Foreign$ and $For * CC$ (β_1 and β_4 in Equation 7). The factor loading on $For * CC$ is significant in the second model

specification and the positive coefficient outweighs the negative coefficient on $Foreign$, giving a positive effect of 0.0255.[21] This means that possessing one percentage point higher proportion of foreign assets results in 2.6 percentage point's greater fluctuation of annual returns. In the third and fourth model specifications the effect is insignificant but the negative effect from $Foreign$ would outweigh the positive effect from $*CC$.

To further test whether funds with higher proportion of foreign assets experience greater volatility in returns than funds who possess lower proportions, the fifteen funds were split up in five groups according to their average of foreign assets over the period examined. The three funds with the highest proportion of foreign assets had on average 29.17% and the tree funds with the lowest proportion of foreign assets had on average 17.4%. Thereafter, the standard deviations of the average annual returns were calculated for those two groups, the highest and the lowest, and a t-test performed to test whether their standard errors are statistically different. The null hypothesis that the standard deviation is the same for both groups cannot be rejected, and, therefore, it is concluded that they are not statistically different when it comes to volatility of their returns. However, this method does not differentiate between the period before and after imposition of capital controls but considers the period, 2000 − 2012, as a whole.

It is from the above estimation concluded that the IPF do seem to experience less volatility in returns compared to their peers when retaining higher proportion of foreign assets prior to imposition of capital controls. However after their imposition the results indicate the opposite effect, that holding higher proportion of foreign assets increases relative volatility in contrast to what was expected. This finding is discussed in further detail in Section 9.2

8.4. Robustness checks

Several robustness checks are conducted, for example including fixed effects, excluding year 2008, excluding $Bonds$ and running the regression with proportion of domestic stocks instead of bonds. The year fixed effects, $Year$, and the CC dummy variable are incorporated but never simultaneously to avoid problems due to multicollinearity, as explained in Section 7. Both model specifications are presented in Table 4 and 5 as well as the exclusion of year 2008.

When excluding $Bonds$ from Model 1, the coefficient on $Foreign$ increases slightly but remains insignificant and in Model 2 it remains insignificant but decreases slightly. When running the regression model with proportion of domestic stocks instead of bonds all estimates have the same sign as the ones in Table 4 and 5 but domestic stocks positively affect returns and volatility

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[21] $-0.0526 + 0.0781 = 0.0255$ from Table 5

compared to possessing bonds as expected. Additionally, coefficients on $Foreign$ in the first two model specifications in Table 4 become significant on the 5% confidence level.

The model was furthermore applied to annual returns instead of the accumulated annual returns. Foreign assets also insignificantly impact returns in the period prior to capital controls. During period of capital controls the impact of higher proportion of foreign assets is also negative but only significant in the second model specification.[22]

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[22] All model specifications are available upon request

9. Discussion

Which policy implications do the findings of this thesis have? First and foremost the findings provide evidence that the IPF do not invest abroad with the main purpose of acquiring higher returns on their investments, but rather to diversify risk or hedge against uncertainty.

9.1. Lower returns in period of capital controls

Results from Model 1 in Section 8.2 include the effect from possessing foreign assets during the period of capital controls.[23] The effect found is that having one percentage point higher foreign assets results in lower returns by 0.17 percentage points or 0.065 percentage points when year fixed effects are included. This implies that domestic stocks gave higher returns than foreign ones during period of capital controls. What is the scale of those figures? In 2012 the average accumulated return was 22% or a growth by 1.7 percentage point annually from 1999. In the period 2009 – 2012 the average annual growth was 1.2 percentage points, for example.

Table 6 illustrates the developments of the ISK, the Icelandic stock market (OMXI6), and the MSCI World Index (hereafter MSCI) in the period of capital controls. The IPF compare the performance of their foreign assets to the MSCI but their foreign assets do, however, only partially reflect the MSCI. Foreign assets of the IPF are mainly invested in stocks through foreign intermediaries, but a proportion of what is defined as variable income securities, is invested in private equity funds. In 2009 for example, it appears that several private equity fund investments of the IPF resulted in losses stemming from the crisis.[24] Therefore, the development of the MSCI does only indicate direction of performance of the foreign stocks held by the IPF but not necessarily its magnitude.

If market developments are examined, the OMXI6 index has risen by 19% from 2009 – 2012, giving way for relatively high returns of domestic stocks during the period.[25] This rise in the domestic stock market could also be contributed to a catch-up effect as the economy has been recovering from a systematic crisis.

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[23] Where all foreign assets are assumed to be stocks, however a negligible fraction consists of bonds (see Table 2)

[24] LSR, VR and Stapi pension funds for example provide this information in their annual reports.

[25] The OMXI6 index was established in January 2009 after the collapse of the Icelandic stock market in October 2008. Initially it included six companies, but currently includes eleven.

Table 6: Year on year change of the ISK, OMXI6, MSCI World and Europe indexes. Source: CBI and MSCI Index

Year		ISK		OMXI6		MSCI	
		Index value	Yearly change	Index value	Yearly change	Index value	Yearly change
2009	BOY	213	11%	548	-11%	839	39%
	EOY	236		487		1,168	
2010	BOY	234	-12%	504	14%	1,120	14%
	EOY	207		575		1,280	
2011	BOY	212	3%	595	-2%	1,308	-10%
	EOY	217		581		1,183	
2012	BOY	220	4%	603	9%	1,241	8%
	EOY	227		654		1,339	

The year 2009 is an outlier in the MSCI in terms or returns. Considering the percentage change in the period 2009 – 2012 the OMXI6 appreciated by 19% but the MSCI by 60%. However, looking at the period 2010 – 2012 the OMXI6 rose by 30%, but the MSCI by 20%. The bad performance of the OMXI6 in 2009 can be attributed to the fall of one company out of six included in the index at that time. The good performance of the MSCI is a result of catch-up effect after the financial crisis (see also Figure 2). Reaching its lowest value in February 2009, it still increased by 39% over the year. The ISK furthermore depreciated in 2009, increasing the ISK value of foreign assets. Domestic assets fared better in 2010 as the value of foreign assets was lowered by the appreciation of the ISK. In 2011 domestic markets depreciated less than foreign ones and in 2012 the MSCI rose less than the OMXI6, but value of foreign assets increased due to depreciation of the ISK.

9.2. Why do foreign assets increase volatility of returns post controls?

A potential explanation for greater volatility of foreign assets compared to domestic stocks in a period of capital controls relates to risk exposure. Prior to capital controls, the IPF could hedge themselves against risk in exchange rate movements, which they are unable to in the period of capital controls. Therefore, in addition to be exposed to market risk, foreign assets are also exposed to unhedged currency risk. Year on year fluctuations of the exchange rate can be seen in Table 6.

9.3. Why do the IPF hold on to foreign assets?

In light of the findings that the IPF yield lower or similar returns when possessing higher proportions of foreign assets one might ask why the IPF hold on to their foreign assets? A probable explanation is that the foreign assets might increase in ISK value if the economy comes under stress, for example during the dismantling of capital controls. As discussed in Section 3.2, the capital controls are expected to be lifted but the evolvement of several macroeconomic factors

once controls are dismantled are extremely uncertain. In a nutshell, possessing foreign assets is likely to result in stronger position even though they might not yield higher returns today. In other words expected future value of foreign assets is potentially higher than their currently estimated value.

10. Conclusion

The main research contribution of this thesis regards quantifying the costs Icelandic pension funds bear as a consequence of foreign investment limitation caused by capital controls. The research hypotheses used to assess the question regard how proportion of foreign assets, the factor probably most affected by the foreign investment prohibition, affects returns and volatility of pension funds. The findings indicate that in the period when capital controls are in place, holding greater proportion of foreign assets results in lower returns. Therefore, the IPF do not bear direct costs from the inability to increase their foreign assets, since they do not bring them higher returns.

Moreover, statistical indication is found that pension funds with higher proportion of foreign assets do not experience less volatility of returns during period of capital controls, than their peers with lower proportions. Therefore, the foreign investment limitation does not cause the IPF costs in terms of increased volatility by not being able to increase foreign assets.

From those results the IPF do not in the examined period seem to bear direct cost in terms of lower returns or decreased volatility. The policy implications are that the IPF do not hold on to their foreign assets to gain higher returns or decrease relative volatility. Rather they hold on to their foreign assets to hedge themselves against future uncertainty that arises due to the presence of capital controls and the uncertain macroeconomic developments following their lifting. Additionally, since the period when data is available after imposition of capital controls consists of four years, it will be interesting to evaluate how proportion of foreign assets will affect returns and volatility as time passes.

Going back to the initial motivation regarding comparison of returns of Icelandic and Nordic pension funds, the findings of this thesis do not support that presence of capital controls is a contributing factor to the difference in returns between the Icelandic and the Nordic pension funds. The difference could, potentially, rather be attributed to the limited downswing the Nordic countries experienced in the 2008 crisis and their relatively robust economies. Future research will hopefully contribute towards answering what causes the difference in returns of Icelandic and Nordic pension funds, for example by providing an analysis of underlying institutional and macroeconomic differences.

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Legislation

Act no. 87/1992 on foreign currencies

Act no. 129/1997 on pension funds

Act no. 87/1998 on Official Supervision of Financial Activities

Rules on Foreign Exchange no. 370/2010.

12. Appendixes

Appendix A: Data

Table A1: Descriptive statistics

Variable	Mean	Std. Dev	Min	Max	Observations
Indexed return	0.0124	0.032	-0.079	0.085	195
Annual real return	2.18	9.17	-31.4	17.7	195
Foreign assets	24.26	7.71	6.1	39.8	195
Foreign assets in CC	23.32	8.41	0	39.8	195
Bonds	56.76	17.97	0	86.8	195
Relative Volatility	2.21	2.04	0.007	10.64	195
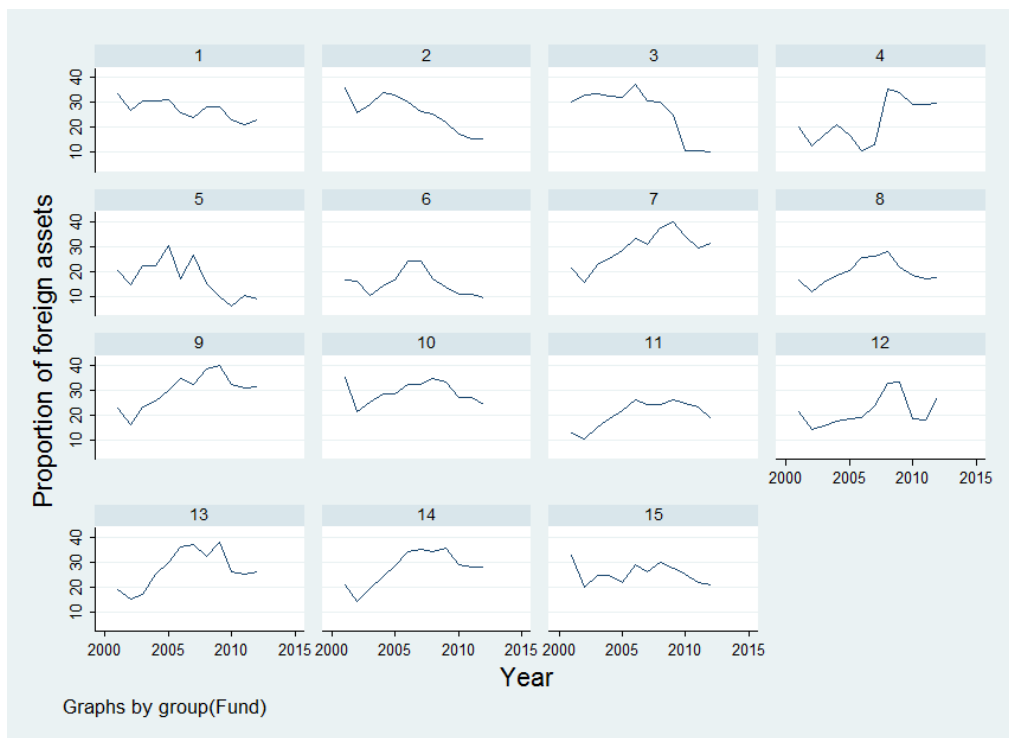
Figure A1: Plot of proportion of foreign assets per fund
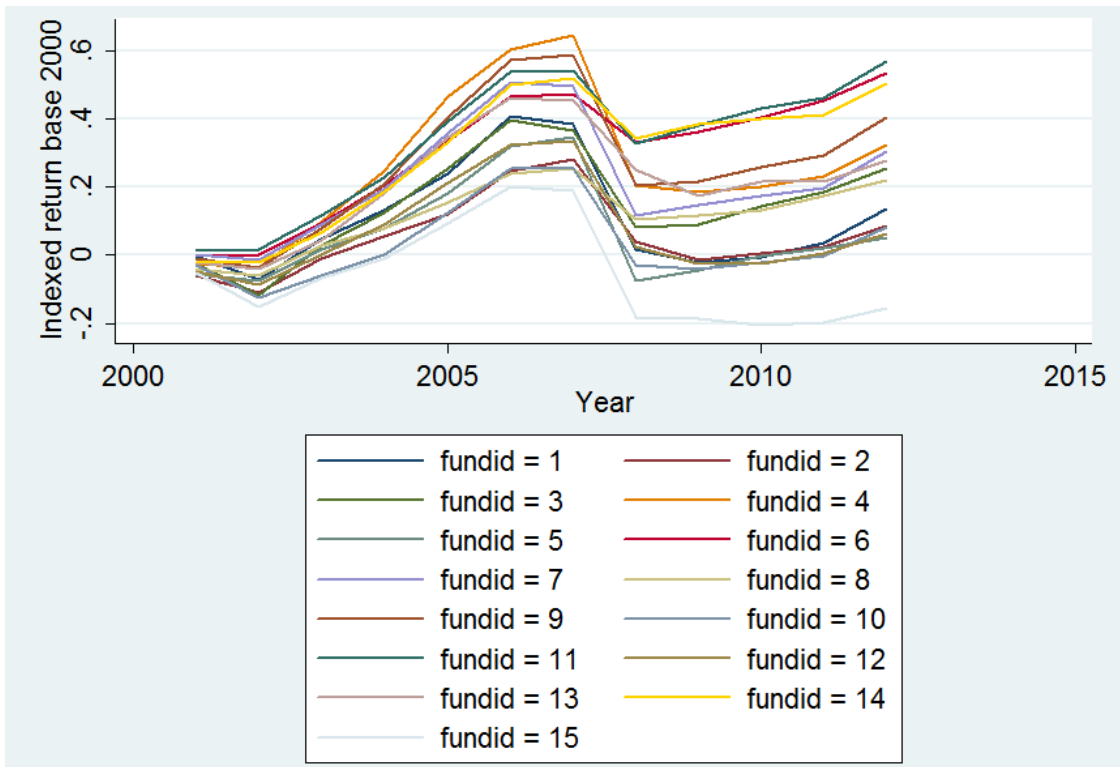
Figure A2: Indexed return
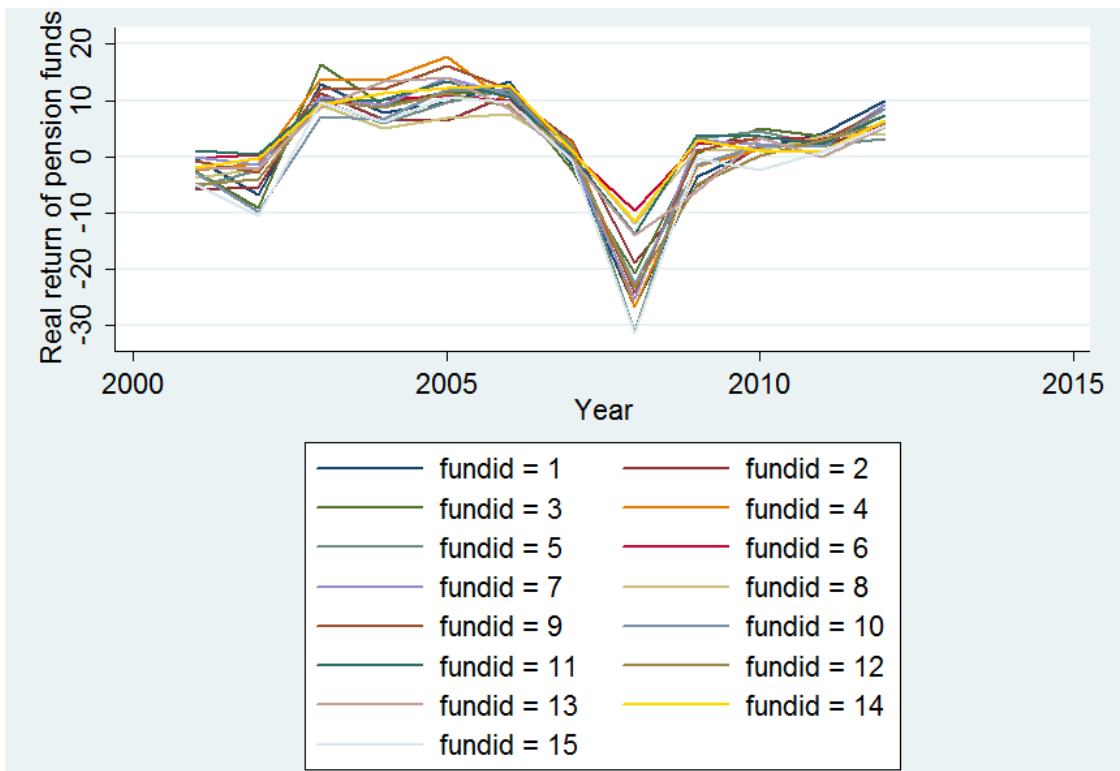
Figure A3: Real annual return

Appendix B: Statistical Tests

Wald test for groupwise heteroscedasticity within the fixed-effects model

The null hypothesis is that the variance is constant, homoscedasticity. However the p-value is zero and thus the null of a constant variance is rejected.

Lagrange Multiplier (LM) test for serial correlation

The null hypothesis is that there exists no serial correlation in the data. The p-value is zero, hence the null is rejected

In order to control for heteroscedasticity and autocorrelation robust standard errors are used when estimating the regression models.

Testing if year fixed effects should be included

To decide whether random a Wald test is performed where the null hypothesis is no presence of time fixed effects. When conducting the test the p-value equals zero and thus time fixed effects are needed.
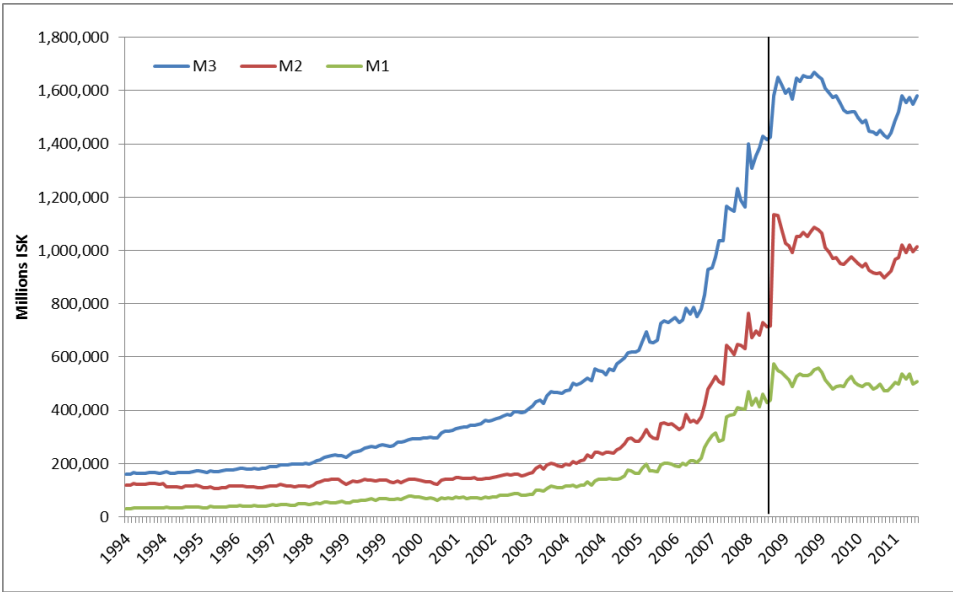
Appendix C: Macroeconomic Developments

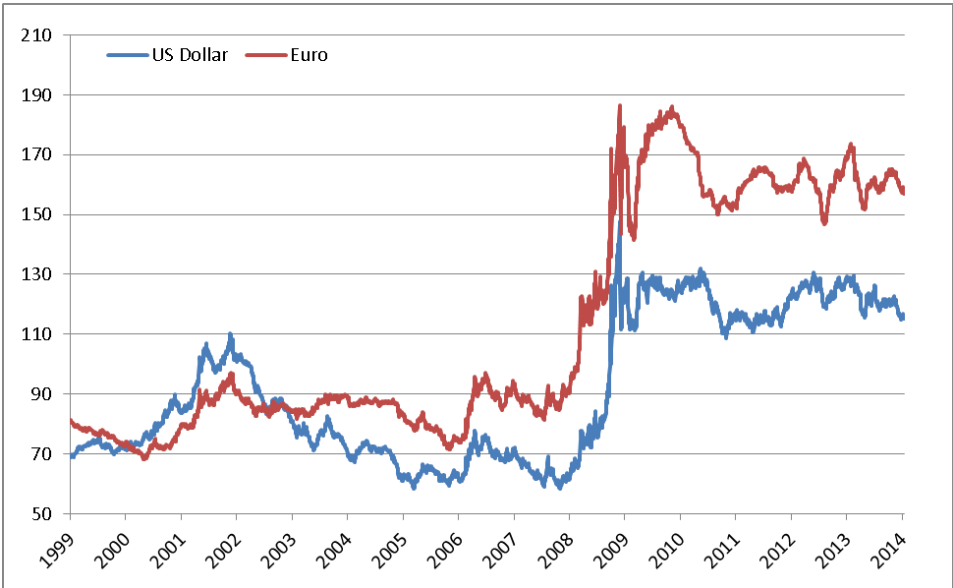**Figure C1: Money supply. Source: CBI data**

Figure C2: Exchange rate of the ISK against US Dollar and Euro. Source: CBI data

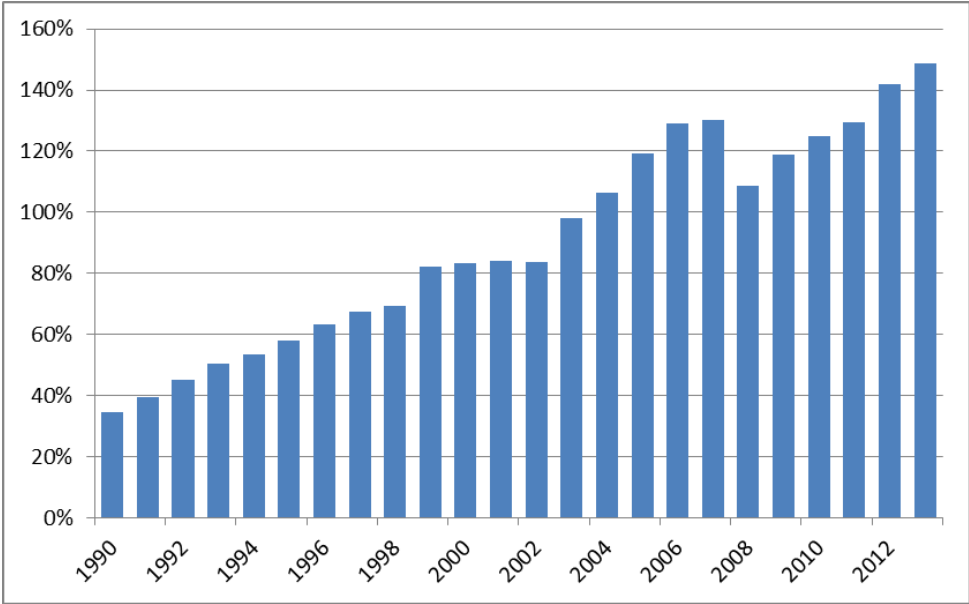# Appendix D: Pension Funds Evolvements

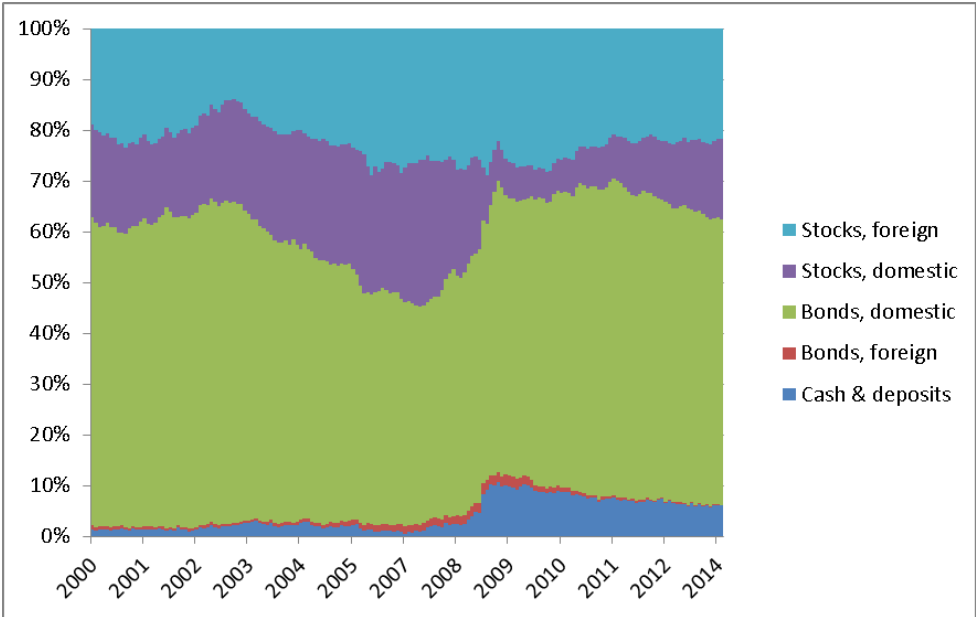**Figure D1: Total assets of pension funds as a proportion of GDP. Source: CBI data**

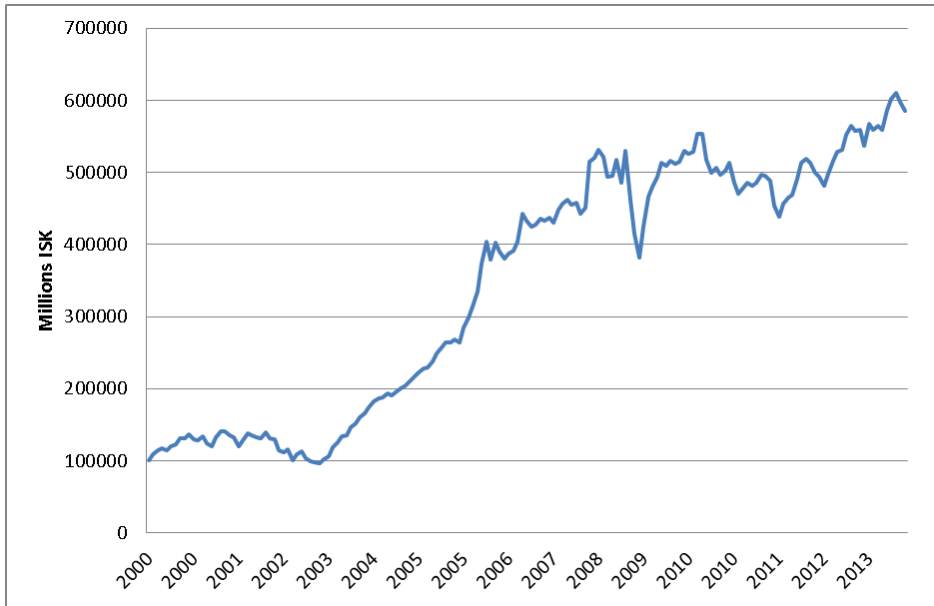**Figure D2: Assets composition of the Icelandic pension funds, 2001 – 2014.**
Source: CBI data

Figure D3: Evolvement of total foreign assets of IPF in millions ISK, monthly figures. Source: CBI data
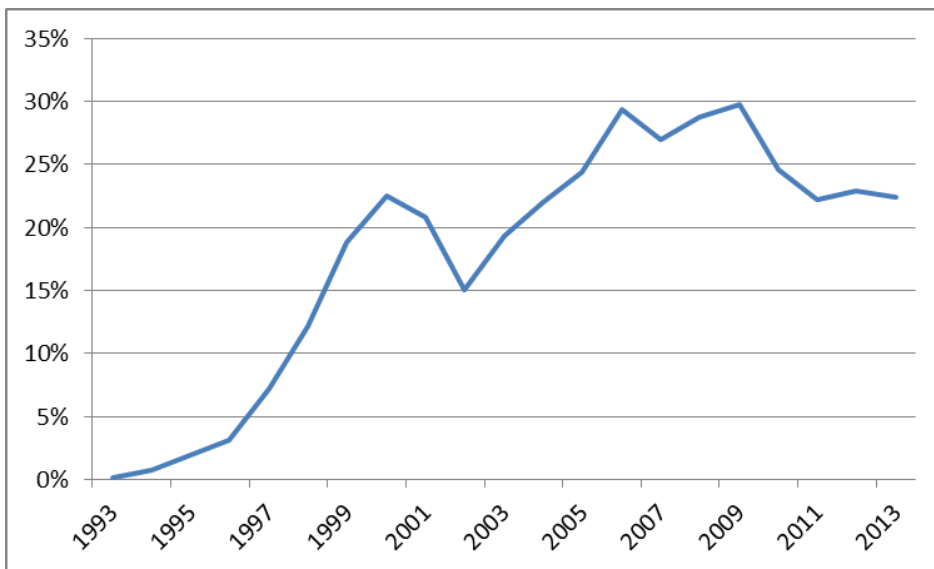

Figure D4: Evolvement of proportion of foreign assets of IPF in millions ISK, yearly figures. Source: CBI data

Appendix E: Included Funds

Fund no.	Icelandic Funds	Nordic Funds	Country
01 ALM	Almenni lífeyrissjóðurinn	Statens pensjonsfond	NO
02 FES	Festa lífeyrissjóður	ATP	DN
03 FRJ	Frjálsi lífeyrissjóðurinn	Alecta	SE
04 GI	Gildi lífeyrissjóður	PFA	DN
05 ILS	Íslenski lífeyrissjóðurinn	AMF	SE
06 LB	Lífeyrissjóður bankamanna	Keva	FI
07 LSR	Lífeyrissjóður starfsmanna ríkisins	AP Fonden 3	SE
08 LSS	Lífeyrissjóður starfsmanna sveitarfélaga	Varma	FI
09 LV	Lífeyrissjóður Verslunarmanna	Ilmarinen	FI
10 SAM	Sameinaði lífeyrissjóðurinn	Sampension	DN
11 SOF	Söfnunarsjóður lífeyrisréttinda	AP Fonden 2	SE
12 STF	Stafir lífeyrissjóður	AP Fonden 1	SE
13 STP	Stapi lífeyrissjóður	AP Fonden 4	SE
14 VEM	Lífeyrissjóður Vestmannaeyja	Industriens Pension	DN
15 VERK	Lífeyrissjóður verkfræðinga		

Note:
01: Is established in 2003 from Lífeyrissjóður Arkitekta og tækn. and ALVÍB.
02: Is established in 2005 from Lífeyrissjóður Suðurlands and Vesturlands
04: Is established in 2005 from Lífeyrissjóður Framsýnar and sjómanna
12: Is established in 2005 from Samvinnulífeyrissjóðurinn and Lífeyrissjóðurinn lífíðn
13: Is established in 2006 from Lífeyrissjóður Norðurlands and Austurlands

Lífeyrissjóður starfsmanna Reykjavíkurborgar is not included as it is an outlier in the data, both in terms of pension fund member composition and asset composition.