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Working Paper

Lessons from a small country in a financial crisis or Dr. Minsky and Mr. Ponzi in Iceland

Working Paper Series, No. W10:03

Provided in Cooperation with:

Institute of Economic Studies (IoES), University of Iceland

Suggested Citation: Magnusson, Gylfi (2010) : Lessons from a small country in a financial crisis or Dr. Minsky and Mr. Ponzi in Iceland, Working Paper Series, No. W10:03, University of Iceland, Institute of Economic Studies (IoES), Reykjavik

This Version is available at:

<https://hdl.handle.net/10419/273272>

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INSTITUTE OF ECONOMIC STUDIES

WORKING PAPER SERIES

W10:03

December 2010

Lessons from a small country in a financial crisis
or Dr. Minsky and Mr. Ponzi in Iceland

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Abstract

This paper analyses the economic effects of the rise of an asset price bubble and a highly leveraged economy in Iceland in the first years of the 21st century and the subsequent collapse of the financial sector in the year 2008. In particular we look at the effect on the returns to investors in asset markets and how that is contingent on the timing of exit and entry. We also look at the effects on the domestic distribution of wealth and income. It is shown that the effects of the asset price bubble are in many ways similar to those of a Ponzi scheme, where net profits accrue to those that enter and exit early but others lose. Since the Icelandic economy was to a large extent financed by foreign creditors they end up with the bulk of the losses but domestic parties, including the public sector, escape on average surprisingly well. Such averages do however not tell the whole story since several segments of Icelandic society sustain heavy losses.

JEL Classification: G01;G28;H6

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Introduction

Recent turmoil in financial markets may be in many ways unprecedented but financial crisis are certainly not a new phenomenon. Quite the contrary, they seem to be intrinsic to financial systems.² Financial crisis have spawned huge volumes of research. Many aspects of them are seemingly fairly well understood but that has not changed the fact that they recur.

The current crisis has increased interest in the writings of the late Hyman P. Minsky.³ His financial instability hypothesis (Minsky, 1986, 1993) has especially been used to shed light on the rise and subsequent collapse of asset price bubbles in several countries. Minsky's hypothesis was that a prolonged period of economic growth and stability would make lenders and investors complacent with regards to risk. Leverage would increase and the number of borrowers who depended on a continuing rise in asset prices to be able to repay what they had borrowed would increase. Minsky termed the most aggressive class of borrowers Ponzi borrowers.⁴ This class of borrowers had insufficient income to pay even the interest on their debt without relying on profits from rising asset prices.

According to Minsky, at some point market participants start to realise that it is unreasonable to expect market prices to continue to rise from already very elevated levels. This leads to a flight to safety or de-leveraging. Since not all market participants can shed leverage or sell risky assets at the same time the outcome is a financial crisis with plummeting asset prices and bankruptcies.

² For a good overview, see Reinhart and Rogoff (2009) or Kindleberger and Aliber (2009).

³ For a recent discussion of Minsky's theories in light of the current crisis, see Mirowski (2010) and Ferri and Variato (2010).

⁴ Named after Charles Ponzi (1882-1949), a Boston entrepreneur who ran an investment fund promising 100% return in 90 days based on profits from trading international postal reply coupons. This trade was not nearly as profitable as Mr. Ponzi claimed but he could keep up appearances for a while by using funds from late investors to pay early investors. This could however not continue indefinitely since it would have called for an infinite supply of new funds to pay off investors. The scheme thus crashed with great losses to late investors and Mr. Ponzi was sent to jail. Bernie Madoff is a modern version of Charles Ponzi. He is now serving a 150 year jail sentence.

One of the most spectacular cases of financial turbulence during the present crisis has been seen in Iceland. Iceland managed in a few years, especially 2002-2008, to build up an extremely leveraged economy and go through the expansion and subsequent implosion of an asset price bubble.⁵ The path of the Icelandic asset price bubble has some clear parallels to the process that Minsky described and a Ponzi scheme. This article looks at these parallels, including how a massive inflow of funds into Iceland led to a price bubble in Iceland's main asset markets and an appreciation of the currency. This generated huge profits to early investors. The subsequent fall of asset prices and depreciation of the currency however left late investors with great losses. We analyse the economic impact of this roller-coaster ride, including how it has affected the distribution of wealth and debt in the country.

1. The road to a crisis

Iceland was until the 1990's a highly developed and affluent country but had a significantly underdeveloped and predominantly local banking system. Icelandic banks and other financial institutions did not operate abroad and there were no foreign banks with operations in the country. Foreign financial institutions had in general very limited interest in Iceland, a tiny market with its own currency.⁶ They did though occasionally lend to Icelandic parties or provide other direct services to the government or Iceland's largest companies, including some re-insurance and facilitating trade with the country's importers and exporters.

⁵ For a discussion of Iceland's crisis in an international perspective, see also Halldórsson and Zoega (2010) and Ólafsson and Pétursson (2010).

⁶ The Swedish financial firm Skandia tried to operate in Iceland in the nineties. It first bought a small financial services firm but quickly got into trouble when mutual funds that the company they had bought managed turned out to have overestimated the value of assets the funds held. Skandia later also tried entering the Icelandic insurance market but made little headway. Skandia sold its operations and exited the Icelandic market completely after a few years. Although on a small scale and ultimately unsuccessful, this attempt by Skandia to enter the Icelandic retail market for financial services was the most notable such attempt by a foreign firm since the establishment of the first Íslandsbanki early in the 20th century.

In addition the country had a very weak monetary system with a history of a highly unstable price level and exchange rate, easily the worst track record in post-war Western Europe in these matters. One result of this was that the domestic savings rate was fairly low and long-term contracts in local currency were usually indexed to the price level. The local króna was not freely convertible and its use outside Iceland was negligible. The banking system was to a large extent government owned and politicised but also small and fairly un-adventurous. Local bankers had very little experience in international banking, apart from what was needed to service Iceland's external trade and occasionally borrow from foreign banks.

Starting in the early nineties, this system was radically changed. Although it had little immediate impact on the Icelandic banking system a crucial step was taken in 1994 with the establishment of the European Economic Area.⁷ Among other developments this meant a free flow of capital within the area. It also allowed banks and other financial institutions to offer their services across borders and to acquire and set up foreign financial institutions.

The Icelandic banks took small and relatively cautious steps to utilize this freedom in the late nineties, usually by setting up or acquiring small subsidiaries or branches, initially in Luxemburg and later in London and the other Nordic countries.

The next crucial steps were taken in the years 1998-2002 when the Icelandic government privatized most of its stake in the financial system.⁸ This left Iceland

⁷ The European Economic Area was initially meant to lead the merger of the markets of Western Europe's then two main trading blocks, EU (then the European Community) and the smaller EFTA. In particular the agreement stipulates the free movement of goods, labor, capital and services within the region. In the end one of the EFTA countries, Switzerland, opted out, settling instead for bilateral agreements with the EU. Furthermore, soon after the EEA agreement came into effect three countries, Sweden, Finland and Austria, left EFTA for the EU. This meant that the EFTA pillar of the EEA now only consists of Norway, Iceland and Liechtenstein. The EEA agreement is still however in effect. Iceland applied for EU membership in 2009 but Norway has twice rejected membership in a referendum.

⁸ The main exception was the state-owned housing fund, the largest provider of mortgages in the country. One of the three large private banks that later collapsed, Íslandsbanki/Glínir, had been in private hands for some time before the other two were privatized. It emerged in 1990 from the merger of three small private banks that acquired a troubled state owned bank. It however grew

with three privately owned universal banks, Kaupþing, Glitnir/Íslandsbanki and Landsbanki⁹, and in addition several private savings banks and other much smaller financial institutions.

The three main banks all adopted a policy of aggressively seeking growth and profits, growing by leaps and bounds in the years 2003-2007. This policy had widespread public and political support at the time.¹⁰ To finance this growth they relied principally on international markets, both interbank loans and the bond market. Having grown by 7,8% per annum in real terms between 1986 and 2003 the banking system grew at a rate of 22,6% per year from 2003 until 2007. Growth is here measured by the banks combined *domestic* lending and bond holding. See fig. 1.

Taking their lending and other investments *overseas* into account as well, the growth rates were even more staggering. In króna, the combined balance sheets of Iceland's three large banks grew ten-fold from the end of 2003 until the end of the second quarter 2008, from 1.451 billion króna to 14.437 billion.¹¹ In Euros, the balance sheets grew from 16,2 billion to 115,2 billion in this four and a half year period, indicating an average annual growth rate of 55%. With the country running a very sizable current account deficit at the same time, all of the growth had in effect to be financed overseas.

substantially due to the privatizations of the period 1998-2002 as it merged in the year 2000 with a recently privatized investment bank called FBA.

⁹ Somewhat confusingly, the banks had a habit of tinkering with their name. Íslandsbanki started operating under that name in 1990, adopting the name of one of its predecessors that had collapsed in 1930. It later changed its name to Íslandsbanki-FBA, back to Íslandsbanki and finally to Glitnir. After the collapse of Glitnir the domestic operations were resurrected under the name Íslandsbanki. Kaupþing similarly went from Kaupþing to Kaupþing-Búnaðarbanki, to KB banki and back to Kaupþing (or Kaupthing abroad). After the domestic operations of Kaupþing were resurrected the name Arion banki was chosen. After Landsbanki collapsed the entity used to resurrect its domestic operations was formally called NBI but it kept on using the name Landsbanki for marketing purposes. This means that the estate of the collapsed old bank and the new bank both use the same name for their operations.

¹⁰ One example of the political support for the growth of the banking system was seen in 2005 when the prime minister commissioned a report on how to make Iceland into a hub for international finance. The chairman of Kaupþing headed the committee that wrote the report. The report was published with great fanfare in 2006. See Einarsson et. al. (2006).

¹¹ Source: Special Investigative Commission (2010), Vol. 7, Ch. 21.2. Note that there is a slight difference between these figures and figures from Ch. 11.2.5 in the Commission's report that we use later. The difference does not however materially affect the overall picture and is in part due to the effects of exchange rate movements in the second half of 2008 on figures in króna.

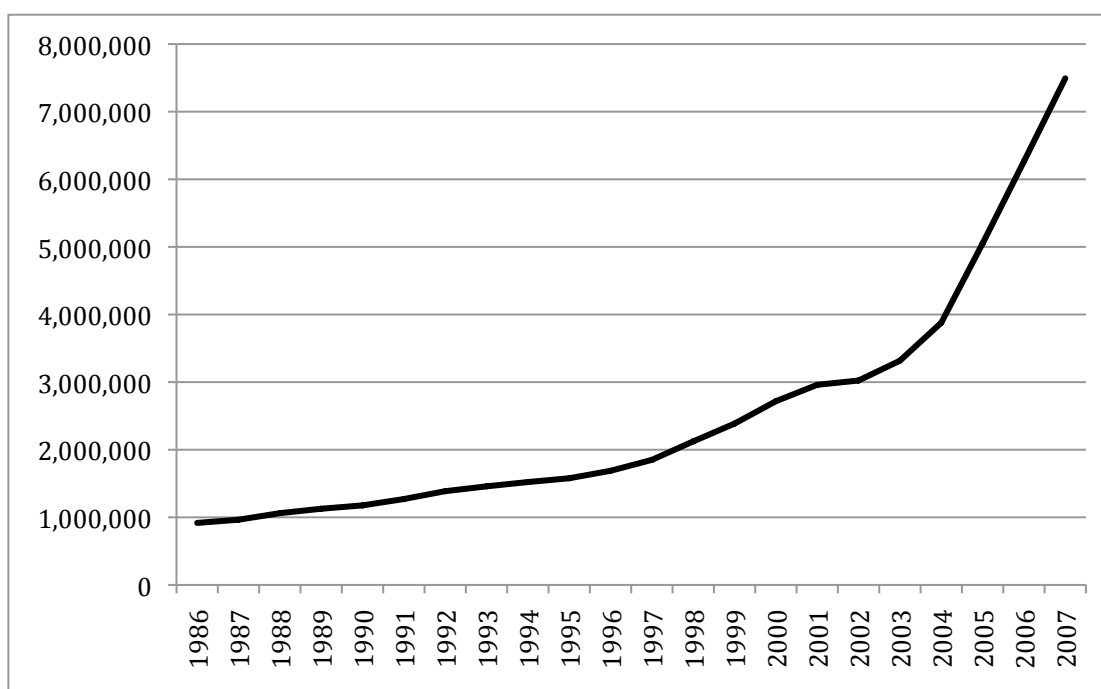


Figure 1. Domestic lending and bond holding by the Icelandic banking system. Millions of ISK at year-end 2009 prices. Source: Central Bank of Iceland.

2. A Minsky Moment

In the year 2006 worries over the stability of the Icelandic banking system started to impede its access to financing. At the same time worries over the stability of financial markets were increasing internationally. A crucial factor here was concern over financial products based on sub-prime housing loans in the U.S.¹² Liquidity started drying up internationally, with lenders and investors trying to reduce risk, in particular leverage and exposure to potentially toxic real-estate linked assets.

¹² The Icelandic financial system had negligible direct exposure to U.S. subprime based assets. Growing concerns over the subprime problem however affected the Icelandic banks since they were considered risky for other reasons and there was increasingly a worldwide flight from risk. The collapse of Lehman Brothers in the U.S. in September of 2008 was very unnerving for international financial markets. This helped push the Icelandic banks over the edge a few weeks later, even if the Icelandic financial system had little direct exposure to Lehman Brothers.

These developments led to a mini-crisis in the Icelandic banking system in early 2006. The industry fought hard to overcome this with the help of the government. The banks, the government and industry organizations, especially the Iceland Chamber of Commerce,¹³ tried, with some success, to convey the message that both the Icelandic banking sector and the various highly leveraged holding companies that by then characterised the Icelandic corporate sector were fundamentally healthy. A new source of financing was also found in the form of attracting deposits into on-line accounts, in Britain and several other European countries. Two of the three main Icelandic banks started aggressively seeking such deposits, either into their subsidiaries or branches abroad.¹⁴ Having temporarily overcome the drop in confidence in early 2006, the Icelandic banking system kept on growing and showing healthy profits on paper for a short while. The Icelandic asset bubble was also still not yet at its peak. That did not happen until the middle of 2007.

After the middle of 2007 the Icelandic asset price bubble saw a dramatic reversal. The price of listed stocks and real estate started falling rapidly and the exchange rate of the króna plummeted. Customers and owners of financial institutions quickly got into deep trouble as their net worth vanished with the asset price bubble. The local Central Bank could and did provide liquidity in local

¹³ The effort by the Chamber of Commerce included commissioning Mishkin and Herbertsson (2006). Their conclusions included *“The analysis in this study suggests that although Iceland's economy does have imbalances that will eventually be reversed, financial fragility is not high and the likelihood of a financial meltdown is very low.”* (p. 56). They however suggested that some steps be taken to reduce the likelihood of harmful “self-fulfilling prophecies”.

¹⁴ Landsbanki had less than 1 billion Euros in deposits in its branches in the U.K. and the Netherlands until late 2006, all of it wholesale deposits. Towards the end of the year 2006 Landsbanki started aggressively seeking more deposits overseas, including retail deposits in the U.K. Deposits in Landsbanki in the U.K. and the Netherlands reached almost 10 billion Euros at their peak in the autumn of 2007. At that time total deposits in Icelandic banks and their overseas branches also reached their all-time high of the equivalent of 38 billion Euros. In the spring of 2008 Landsbanki also started seeking retail deposits in its branch in the Netherlands. The retail deposits of Landsbanki overseas were sought in the name of *Icesave* and later led to the eponymous debate over deposit insurance. Kaupþing likewise sought retail deposits in various European countries although that bank did not start doing this aggressively until quite late, in 2008. Total deposits in Kaupþing's Edge scheme, which was used for retail deposits, equaled more than 5 billion Euros when the bank collapsed, having mostly been acquired in the year 2008. Most of Kaupþing's deposits were in subsidiaries and thus not covered by Icelandic deposit insurance. Despite the great efforts that Kaupþing and Landsbanki made in 2008 to attract retail deposits they did not manage to make up for the outflow of wholesale deposits and total deposits fell in the year 2008. See Special Investigation Commission (2009) for details, especially Vol. 7 Chapter 21.

currency but had very limited resources in foreign currency. The Icelandic banks only had limited access to ECB liquidity, mainly through their subsidiaries in Luxemburg. With the collapse of the króna, which made Icelandic assets worth far less measured in Euros, they found it ever harder to provide acceptable collateral for this.¹⁵ In the last days of the banking system the ECB was trying to reduce its exposure to the Icelandic banks, issuing margin calls that would have even further reduced the rapidly disappearing liquidity in the Icelandic system. In Britain the situation was no better with a run on the online accounts of Landsbanki and increasingly frantic demands by British regulators to move assets from the head office in Reykjavík to shore up the British branch. Kaupþing was likewise fighting demands to move assets from Reykjavík to bolster the finances of its British operations.

With a run on a banking system without a lender of last resort in any currency except the illiquid króna, liquidity in foreign currency quickly vanished.¹⁶ Finally the banking system collapsed in October 2008, having run out of foreign currency. Two of the banks, Landsbanki and Glitnir, collapsed on October 7th. The third bank, Kaupþing, got most of the Central Banks' currency reserves lent in a desperate last ditch effort to keep it alive. This was however far from sufficient and this bank also collapsed two days later, on October 9th, the last straw being the takeover of its main British subsidiary by the authorities.

The final chapter of the Icelandic bubble economy is fairly similar to that of a collapsing Ponzi scheme. If the confidence in the system evaporates, the flow of new funds is halted. Prior investors try in vain to withdraw their funds and the system collapses.

¹⁵ Crucially for the ECB it had earlier insisted on far better collateral for the liquidity it provided through the Luxemburg Central Bank (BCL) to the Icelandic subsidiaries in Luxemburg than the Icelandic Central Bank had for the liquidity it provided to the head offices in Reykjavík. The ECB now seems set to escape from this lending without a loss. The Icelandic Central Bank however suffered such heavy losses when the Icelandic banks failed that it too became insolvent and had to be refinanced by the government.

¹⁶ The Central Bank of Iceland tried to bolster its foreign currency reserves in 2008 by borrowing but made little headway. It also requested swap arrangements with the European Central Bank, the Bank of England and the U.S. Federal Reserve but got turned down. It did however secure swap arrangements with the Nordic Central Banks. These came with strict conditions that were not revealed until after the Icelandic banking system had collapsed. The Icelandic government apparently made little or no effort to meet these conditions in 2008.

The details of this story will not be provided here. Much of it has been documented elsewhere, especially in a 9 volume report compiled by a special investigatory commission convened by the Icelandic parliament.¹⁷ We will however look at the effects of this on the Icelandic economy and those who hold Icelandic assets.

3. Three markets

Over the course of its lifetime an asset price bubble can have a significant effect on the distribution of wealth and income. The expansion of an asset price bubble with rising prices generates a lot of wealth, at least on paper. Correspondingly, a lot of wealth disappears with its collapse. The process is of course not so simple as to make some people rich at first and then take that wealth away from them. That only happens to some. Others become rich and only lose part of that newfound wealth, if anything, during the downturn. Finally, some end up worse off than they were initially.

The process works in a similar manner as a Ponzi-scheme. Those that enter and exit early come out ahead on average. Those that enter late and do not exit while the going is good get hammered. This simple rule of thumb applies to all the Icelandic markets that we will look at here, the stock market, the market for real estate and the market for the króna (or carry trade).

3.1 The stock market

Of all Icelandic asset markets, the stock market had the most spectacular run in the period preceding the crash. The average annual real return was 18,2% from 1986 until 2007. That means that the value of the average stock rose by a factor of 30 in this period. Taking the dividend yield into account raises the annual real return by approximately 2 percentage points. When the pace of the expansion of

¹⁷ The report is in Icelandic but parts of it are available in English. See <http://sic.althingi.is/>. For the details on the last days of the Icelandic banking system see in particular Vol. 7, Chapter 20.

the banking system was at its peak, in the period 2003 until 2005, the real return of the stock market exceeded 50% every year, three years in a row. See also fig. 2. The stock market peaked in July 2007. After that prices declined very rapidly, despite wide-ranging and increasingly desperate attempts by financial institutions to prop up the price of their stock and that of related companies. This they did in part by purchasing their own stock and providing funding for highly leveraged purchases by others, as noted in the report by the Special Investigation Commission.¹⁸ The banks' accounting in their last years of operation has also been seriously challenged as misleading or even downright deceptive. Wide-ranging investigations into several aspects of this story are ongoing at the time of writing but few court cases have been filed.

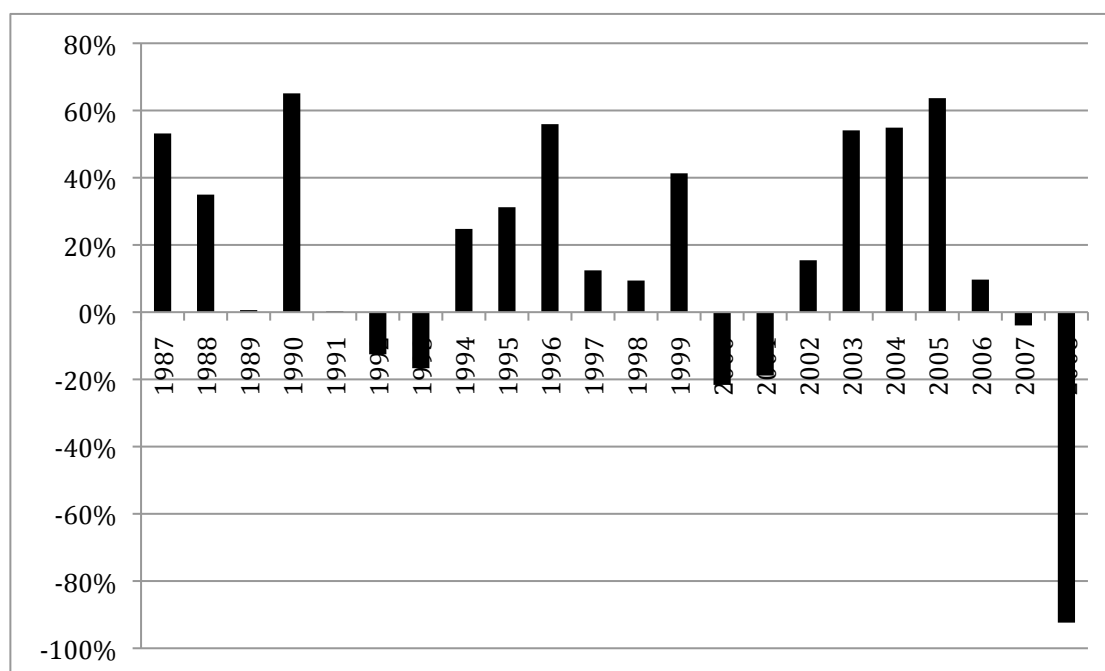


Fig 2. The real return of listed stocks in Iceland from 1987 until 2008. Nominal return in excess of the consumer price index without housing. Excluding dividend yield. Source: The Icelandic Stock Exchange, HMARK, Statistics Iceland and the author's calculations.

The stock market closed for a few days during the turmoil of October 2008. When it reopened, 94% of the value of listed stocks had vanished in 15 months. The market kept on sliding until April the following year when 96,7% of the market value as it was on paper in July 2007 had been wiped out. This of course means that the historical average return on the Icelandic stock market is much

¹⁸ See in particular Special Investigation Commission (2010), vol. 2, chapter 8.

lower than it was in 2007. The long-term return is however still reasonable, surprising as that may be, averaging 4,4% per year in real terms from 1986 until the end of 2008, without dividend yield, and approximately 6,4% with the dividend yield. See fig. 3.

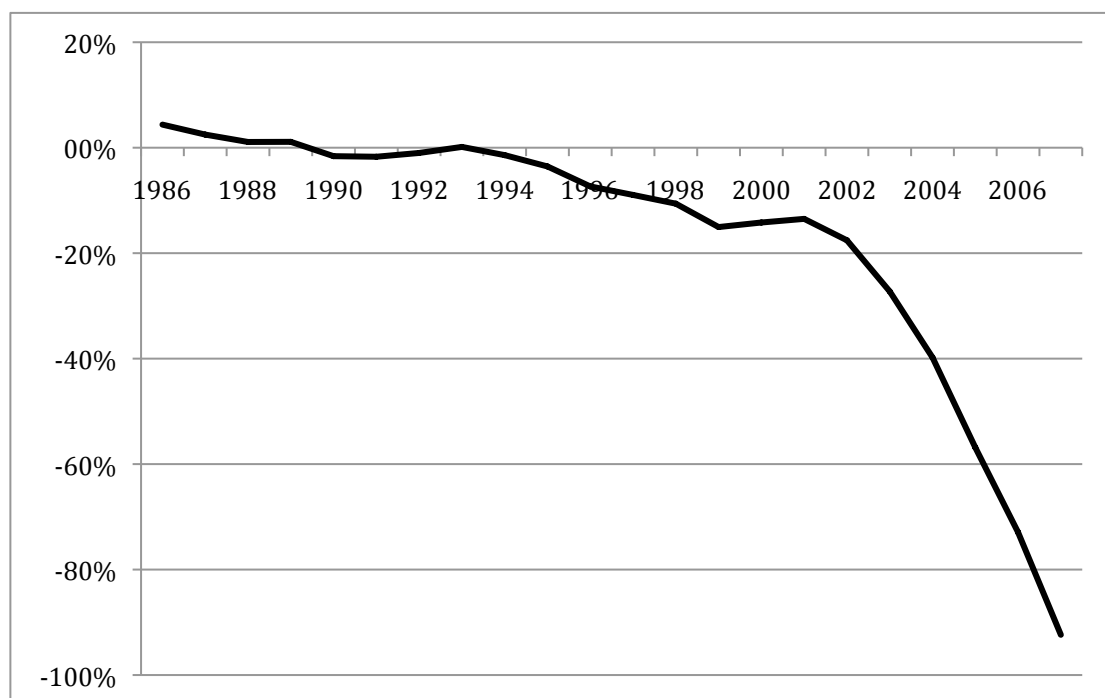


Fig. 3. Annual average real return on stocks held until the end of 2008, depending on the purchase date. Excluding dividend yield. Source: The Icelandic Stock Exchange, HMARK, Statistics Iceland and the author's calculations.

During the expansion phase of the Icelandic asset price bubble it became common for investors to take a leveraged position in the stock market, financing their purchase of stock in part by borrowing. In many cases they borrowed in foreign currency. This exposed investors to two types of risk. One was that stock prices might fall, measured in local currency, the other that the exchange rate of the króna might depreciate.

In this way investors could magnify the effects of the rise in stock prices. As an example an individual might have bought stocks at the beginning of the year 2002, with one million ISK in equity and borrowing to finance 70% of the stock purchase, a not-unusual leverage at the time. Let us assume the individual pays

the local interbank rate (REIBOR) for loans and adjusts his portfolio once a year to keep the equity ratio constant at 30%.

At the beginning of the year 2007 this original investment of 1 million ISK would have become 33 million ISK, at constant prices.¹⁹ Had the investor borrowed in foreign currency, at LIBOR rates, the return could have been even greater. The original 1 million would e.g. have grown to 39 million had the purchase been financed by borrowing in Euros and 71 million if the loan had been in Japanese yen. With scenarios like this possible it is not surprising that Iceland spawned several billionaires (in ISK) during this period. You did not need to be a genius to get rich. On the contrary, no special talent was needed, you just needed luck with your timing, easy access to loans and to be risk seeking.²⁰

With the downturn that started in the middle of 2007, luck ran out for those who had bet on the Icelandic stock market. Those who had a leveraged position lost their equity with few exceptions unless they were among the few lucky ones and managed to unwind their positions in time. An investor that had followed the strategy outlined above, borrowing to buy stocks, would have at year-end 2008 owed 38 million ISK more than his portfolio was worth. Had he borrowed in yen, the debt would have been 333 million ISK more than the value of his stocks.

During the downturn margin calls were of little use in protecting the interests of lenders. No buyers were in sight unless they could be produced by providing the lending needed to finance the deals. This meant that those who had provided funds for leveraged positions in stock could not get rid of the risk of a further decline in stock prices or the exchange rate. They could only transfer it from one borrower to another. With a stampede towards the exit, very few got anywhere. This applied to all asset markets, the stock market, the market for real estate and the foreign exchange market.

¹⁹ The example is somewhat simplified. We ignore the effects of taxation and any cost except interest. Ordinary investors would expect to pay a premium on top of the interbank rate. This is not taken into account. On the other hand, any dividend is not taken into account either.

²⁰ Timing is everything here. Had an investor started with the strategy described above in early 1999, his net worth would have been wiped out in the year 2001. In 2000 and 2001 the Icelandic stock market declined and the króna depreciated, although not nearly as dramatically as in 2008.

3.2 Real estate

The price of residential real estate in the capital region rose by 60% in real terms from the beginning of 1998 until the middle of 2004, after having been flat for most of the nineties. After mid-year 2004 prices started to rise at a much quicker pace until they had risen by 45% in real terms in two and a half years. The explanation for this is obvious; in the second half of 2004 Icelandic banks started competing with the state run Housing Fund for mortgages. The banks offered significantly higher loans than the housing fund and, unlike the fund, were not only willing to provide loans in ISK (indexed to inflation) but also in foreign currency. To make matters worse, the Housing Fund also relaxed its lending rules during this period.

The rapid rise in real estate prices and the construction boom that inevitably followed fuelled an already over-heating economy. GDP growth was measured at 6,9% in 2004 and 6,4% in 2005. The expansion of the Icelandic asset price bubble was faster than ever in the years 2004 until 2006. Towards the end of 2006 the rise in housing prices slowed down considerably but they did not peak until late 2007. Then prices had risen in real terms by 167% in a little under 9 years or on average 10,5% per year.²¹ See fig. 4.

Much as in the stock market, timing was everything in the market for real estate. A person that had bought property in early 1998 and sold when the market peaked in October 2007 would have seen the price rise by 166% in real terms during the period. In addition, she would also presumably have received benefits from living on the premises or renting to others, leading to a substantially higher accumulated real return. Had she not sold until the fall of 2010, after prices had declined considerably, she would still have received considerably more than her initial investment back, as fig. 4 shows. Those who took a leveraged position in

²¹ The figures on the real price of real estate are based on an index of housing prices in the capital region compared to the consumer price index without housing. The boom in the real estate market was usually much less dramatic outside the capital region. More than 60% of Icelanders live in the capital region.

housing (as most families do) would also have done very well if they entered the market early.

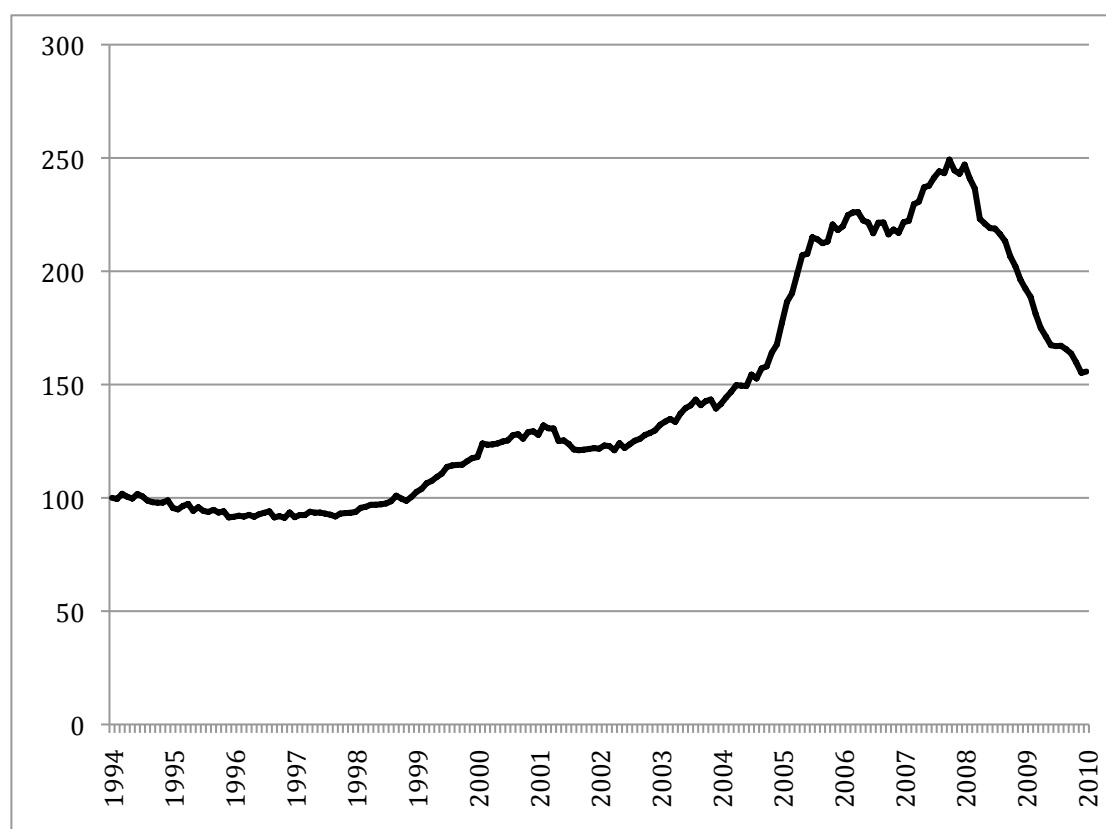


Fig 4. The price of residential real estate in the capital region in real terms 1994-2010. Index, January 1994 = 100. Source: Registers Iceland, Statistics Iceland and authors' calculations.

Those that bought late did not fare as well. Those that took out a mortgage and bought real estate when the market was at its peak in 2007 found themselves in many cases with negative equity in their houses in 2009. Those that borrowed in Japanese yen did especially poorly, being hit by declining housing prices, depreciation of the króna and the appreciation of the yen relative to other major currencies. In addition, the capacity of households to meet their mortgage payments was reduced by a considerable fall in the purchasing power of the average take home wage in 2008 and 2009.²²

²² The widespread indexation of mortgages in Iceland means that inflation has no effect on monthly mortgage payments or the outstanding amount in real terms. Borrowers can however be adversely affected if the purchasing power of their take home wage is reduced as this means that a higher proportion of their earnings is needed to service their mortgage. This happened in 2008 and 2009. To alleviate problems due to this a program was implemented nationwide in 2009 that reduced monthly mortgage payments to what they had been in the spring of 2008. The payments were then indexed anew to the development of average wages and unemployment, the

3.3 The market for foreign exchange

The real exchange rate of the króna depreciated somewhat in the years 2000 and 2001, with the Central Bank being forced to abandon its policy of exchange rate targeting in March 2001. The real exchange rate however quickly recovered and peaked in late 2005, having risen by almost 50% in four years. The next two years the real exchange rate fluctuated somewhat until it started a fairly rapid descent in the fall of 2007. This did not end until after the banking system had crashed and controls been put in place that severely curtailed the flow of funds out of the country. See fig. 5.

The causes of these currency fluctuations will not be analysed here beyond pointing out the obvious. They reflect an inflow of foreign currency in the market for the Icelandic króna, until 2006, and after that outflow, turning into a flood in late 2008.

Those that bet on the high interest rate of the Icelandic króna, borrowing in low yield currencies such as the Japanese yen and the Swiss franc, to purchase ISK denominated assets, did very well historically, until the very end in 2008. The story of these carry traders is in many ways similar to that of those that bet on Icelandic assets in general. Those that borrowed in foreign currencies early enough came out ahead, even if they did not unwind their positions before the collapse of the currency in 2007 and 2008. Those that borrowed in foreign currencies late fared far worse, at least in the short to medium run.

idea being that as the labor market recovered in the future payments could slowly rise again and the mortgages be paid off in full eventually. Approximately half of Iceland's homeowners with a króna mortgage enrolled in this program with the rest opting out. A similar program was implemented for foreign currency mortgages where the problem was the sudden fall of nominal wages, measured in the respective currencies. These programs undoubtedly had a say in preventing mortgage related problems becoming even worse than they did. According to an annual poll conducted by Statistics Iceland, 10,1% of Iceland's households reported in 2010 that they were in arrears with either their rent or mortgage payments. This is surprisingly close to the figure of 9,4% reported in the same poll in 2004, the year that the banks started aggressively marketing their mortgages. In the years 2006-2008 this ratio was between 5 and 6%. 49,3% of households said they 'had difficulty making ends meet' in 2010, compared to 46,2% in 2004. Again, the ratio was considerably lower in the interim period.

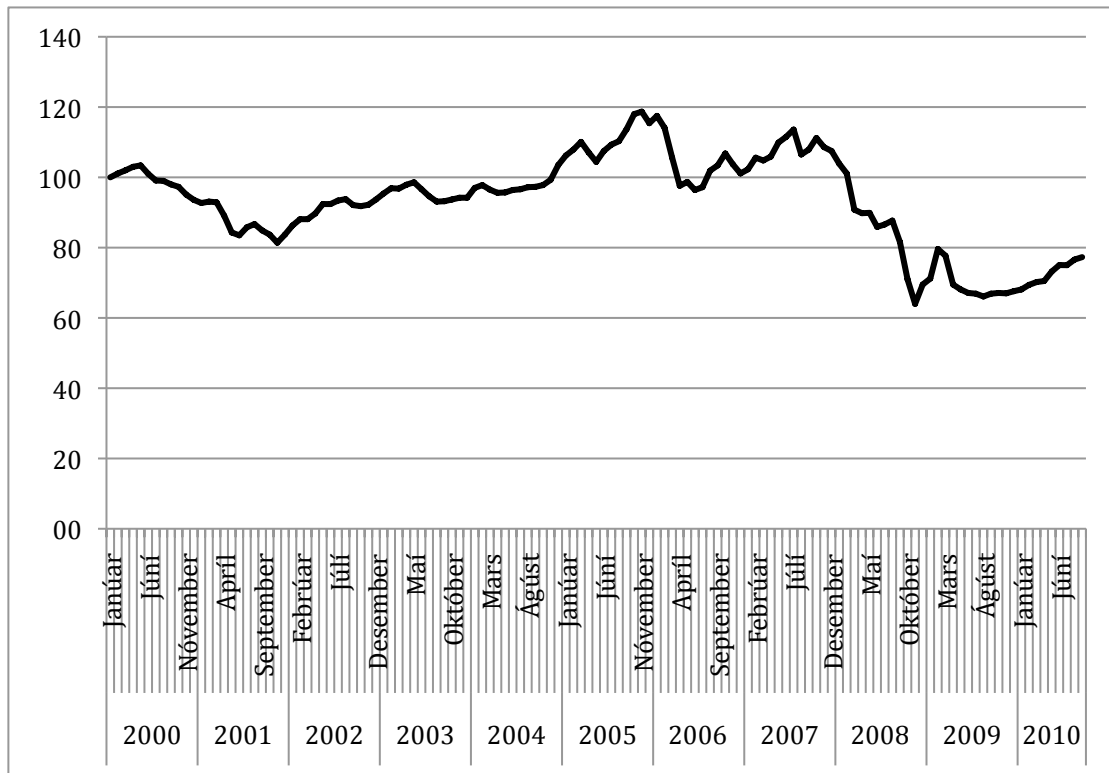


Fig 5. The real exchange rate of the Icelandic króna 2000-2010 based on purchasing power. Index, January 2000 = 100. Source: Central Bank of Iceland.

The temptation to borrow in foreign currencies rather than the local króna, with its high nominal and real interest rate, is obvious. In the nineties and the first years of the new millennium it was almost without exception less costly to borrow in foreign currency than the króna. To give an example, a loan at LIBOR rates in yen taken early in the year 1999 would have carried an average annual real interest rate in króna of -5,1% if held until the middle of the year 2007, before the króna started to depreciate. A similar loan in U.S. dollars would have carried a higher but still negative real interest rate of -1,1% and in Euros a positive real interest rate of 0,3%. In this time period borrowers in foreign currency in Iceland benefited from both the interest rate differential and the appreciation of the króna.

This was however not risk-free as could be seen in 2000 and 2001. Both the nominal and real exchange rate of the króna depreciated these years, the real exchange rate by a fifth over a period of a year and a half. This got many Icelandic companies that had borrowed in foreign currencies into trouble. This also showed clearly the dangers of borrowing in foreign currencies without any

hedge, such as foreign currency assets or income. The experience was though apparently quickly forgotten and the depreciation of the years 2000 and 2001 was soon reversed.

The depreciation of the króna in 2007 and 2008 was far more dramatic than in 2000 and 2001. In addition Icelandic companies and households had taken on far more debt in foreign currencies in the interim.²³ To make matters even worse, Icelandic borrowers had disproportionately taken out loans in low yield currencies, such as the Japanese yen and Swiss francs and these currencies appreciated relative to other major world currencies as the króna plummeted. The yen thus appreciated by 180% relative to the króna from July 2007 until March 2010 while the Euro appreciated by 108%, the U.S. dollar by 110% and the British pound by 56%. The effects of the currency movements of 2007 and 2008 on domestic balance sheets were devastating. Again, timing is everything. Had somebody taken out a loan in Japanese yen in July of 2007 at LIBOR rates and paid it back in December 2009, the annual real interest rate in króna would have been 76%.

Historically, loans in foreign currency are however still less expensive than loans in ISK. This reflects systematically higher real interest rates in ISK that over the long run weigh more than any short-term currency fluctuations.²⁴ A loan in Japanese yen, taken out in early 1999 at LIBOR rates, would in September 2010 have carried on average an annual real interest rate in króna of 2,1%.²⁵ A loan

²³ To complicate matters further there was a legal dispute after the collapse of the króna over whether some of the foreign currency loans had in fact been in foreign currency or whether they had been in króna with payments indexed to exchange rates. Although economically there is little or no distinction between the two the latter form of lending had been banned by law in the year 2001. In 2010 Iceland's supreme court ruled that some of the currency basket loans had in fact been in króna with an illegal indexation. The court furthermore ruled that in such cases loans should be re-evaluated as if they had been króna loans from the beginning carrying Icelandic interest rates rather than the usually much lower LIBOR based foreign interest rates. This ruling was particularly beneficial for households with short-term currency basket loans taken out soon before the króna depreciated, such as car loans.

²⁴ It seems that uncovered interest rate parity does not hold due to a persistent risk or illiquidity premium on the króna.

²⁵ In all cases the real interest rate is calculated based on the Icelandic consumer price index without housing. LIBOR and REIBOR rates are one month rates rolled over. It should be kept in mind that most borrowers have to pay a premium on top of LIBOR or REIBOR rates. Such premiums could be added to the interest rate figures quoted but it would not change the relative

taken in króna at the same time and carrying the local REIBOR rate would have ended up with an average annual real interest rate of 5,3%. Other major foreign currencies would also have been favourable for borrowers over such a long period. A loan in U.S. dollars would have carried an average annual real interest rate in króna of 2,5%, in Euros 3,2%, British pounds 3,6% and Swiss francs 3,4%. See fig. 6.

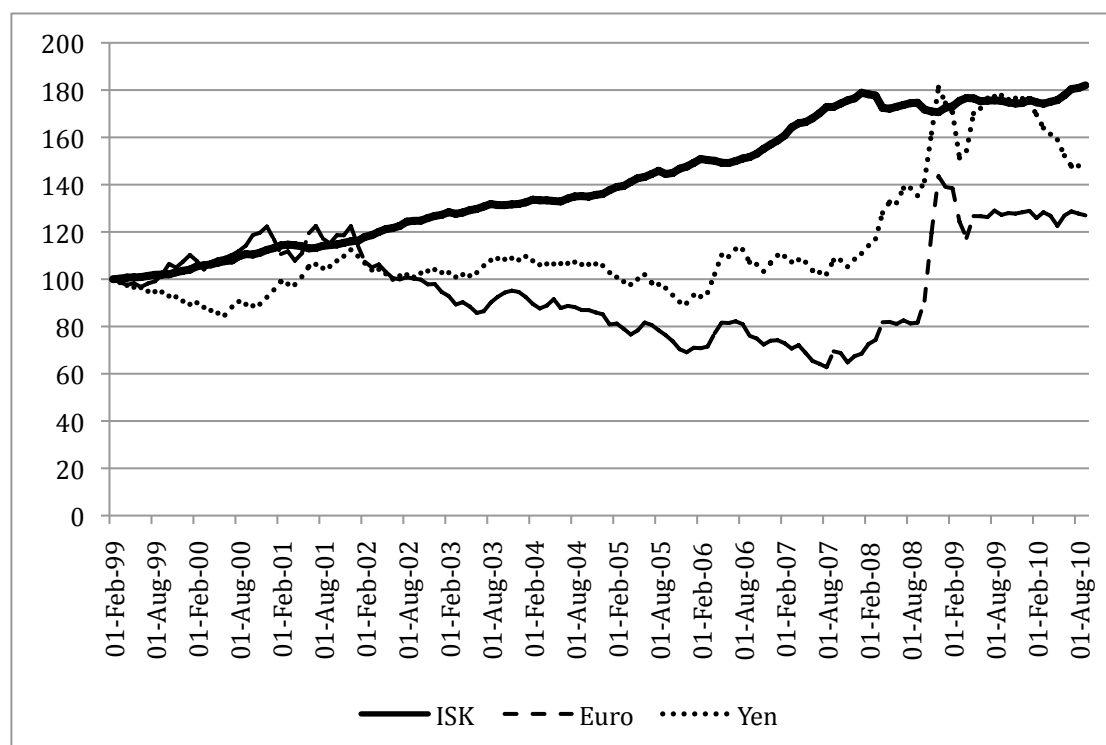


Fig. 6. Accumulated capital and interest of loans, measured in ISK at fixed prices, taken out in February 1999, assuming REIBOR rates (ISK) or LIBOR rates (Euro, yen).

3.4 Timing and leverage

Table 1: Asset Price Bubble: Key Milestones

	Increase starts	Increase stops	Real increase	Decrease stops	Real decrease
Stocks	August 2001	July 2007	694%	April 2009	97%
Real estate	April 2002	October 2007	106%	April 2010	39%
Króna	November 2001	November 2005	46%	November 2008	46%

cost of borrowing in different currencies unless the premiums varied widely across different currencies. It should also be noted that long term loans in króna are usually indexed to inflation. Such indexed loans would normally be expected to carry a slightly lower average interest rate (taking into account the implicit interest rate due to indexation) than non-indexed loans due to a lower inflation risk premium.

The tendency for early investors in Icelandic assets (including carry-traders) to do well but late investors to get hurt is universal across all the markets we analyse.

In this context it is noteworthy that ownership of stocks by individuals in Iceland took off in the eighties and nineties but the number of individuals owning stocks then declined again in the new millennium. The Icelandic stock market was practically non-existent until the eighties and did not become a formal market until the early nineties, with the first company listed in 1990. Popular interest in the stock market took off in these years, helped by high return, tax incentives and privatization through public offering, often followed by a significant rise in the stock price. The decline in subsequent years in the number of individuals owning stock directly is harder to explain but one factor may have been frequent delisting of companies that had been in dispersed ownership. During the asset price bubble years there was a clear trend towards more concentrated ownership of companies, often with highly leveraged owners.

Individuals who bought stock in the eighties and nineties but sold it again soon after the turn of the millennium will in most cases have gotten a very good return on their investment, even without taking tax benefits into account.

The same applies to Icelandic pension funds on average. Most Icelandic households held were mainly exposed to the stock market indirectly through the pension funds. The funds were early participants in the Icelandic stock market but were net sellers in the years leading up to the crash. The explanation for the selling was presumably mainly the fact that they are by law required to keep the share of their assets held as equity under a certain proportion. With the rapid rise of stock prices while the asset price bubble was expanding many of them were constrained by this condition and thus forced to sell. Unintentionally this legal requirement that was meant to guard against risk-taking has contributed to a fairly good average return on the holding of Icelandic shares by the pension

funds since they were forced to sell when prices were near their peak.²⁶ On the other hand the pension funds also lost a lot during the crash due to their investment in corporate bonds. They also did not benefit as much as they would otherwise from the appreciation of their foreign holdings as the króna depreciated, since they had to some extent hedged their currency risk, in part to benefit from the carry trade.

On the other hand, those that bought assets when prices were high or borrowed in foreign currency soon before the depreciation of the króna (and worldwide appreciation of the yen and franc) have done poorly on average. Those that got in very early, bought stock in the eighties or real estate before 2003 or borrowed in foreign currency before 2002, have done quite well on average, even if they did not unwind their positions before the asset price bubble vanished in 2007 and 2008.

Leverage magnifies all price movements. Those that used paper profits from ever-increasing asset prices as collateral for taking on more loans will in most cases have lost all their equity when prices started to decline. Often the losses will have been higher than the equity invested and thus creditors are also hit. If the creditors themselves lose more than their net worth, their creditors will also be hit and so on. It is now clear that the creditors of the Icelandic banks will suffer the bulk of the losses due to the collapse of the Icelandic asset price bubble and the leveraged financial system that spawned it.

A Ponzi system where participants play with borrowed funds and have either limited liability or limited equity will inevitably end up badly for creditors. If the creditors themselves are highly leveraged, their creditors will lose and so on. In

²⁶ The holdings of Icelandic pension funds of domestic shares rose faster than the return on the market in every year from 1988 until 2003, with only two exceptions, 1995 and 2000. These holdings then rose slower than the return on the market in the years 2004 until 2007. This indicates that the funds were net buyers until 2003 and net sellers in the period 2004-2007. Assuming the funds did on average in any given year get the market return on their portfolio of domestic stocks, it looks like they bought stocks for 211 billion ISK in the years 1988 until 2003 but sold stocks for 365 billion ISK in 2004 until 2007, all at 2009 prices. This indicates that their real return on their investments in Icelandic stocks was approximately 11% per year, excluding dividends, even if they lost more than 90% of their investment in 2008 and early 2009.

the end, all losses have to be subtracted from equity somewhere in the chain of providers of capital.²⁷

3.5 Where did the money go?

A natural question when analysing a failed Ponzi system is: Where did the money go? The answer is quite simple. Those who got their funds out early can profit. The money ends up there.

The failed Icelandic financial system is far more complicated than the simple scheme that Charles Ponzi came up with but the same principle applies. It is therefore a vital part of the effort to see the whole picture to try to pin down which investors got their money out in time. Unfortunately the data does not allow us to give as detailed an answer as would be preferable.

Table 2 makes an attempt at describing the various participants in the Icelandic system. It is however not the complete picture and involves considerable simplification.

²⁷ It should be noted that central banks worldwide have resorted to lowering interest rates to reduce the stress on financial systems and provide macro-economic stimulus. Although rising risk premiums have to some extent thwarted these efforts a side effect of this is to shift the burden of overvaluation of assets in the past. Lower interest rates in general increase asset prices (as the discounted value of future revenues rises with a fall in the discount rate), creating some short-term gains, especially for those who hold long-term assets when interest rates fall. In the long run however these gains disappear as the future return on assets falls. Those who hold assets to maturity are not materially affected although they may see a shift in the time profile of their earnings for accounting purposes. The practice of central banks to reduce in this way the short-term pain that over-valued assets would otherwise cause may have been one of the factors that induced the complacency of investors that is a part of Minsky's story. It is however beyond the scope of this paper to analyze that further.

Table 2: Participants (knowingly or not) in the Icelandic Ponzi system

	Stock market	Real estate market	Foreign exchange market	Credit market
State and local government in Iceland	+ Increase in tax revenues during boom times. + Sold assets at high prices, in particular Iceland Telecom.	+ Got a lot of revenue during boom times from sale of land and stamp duty. - Got stuck with overinvestment in land development.	+ Long term loans in foreign currency have done well. - Some local governments in trouble, having taken out forex loans late.	- Lost a fortune due to Central Bank lending and deposit insurance (Icesave).
Pension funds	+ Invested early and sold a substantial part of their holdings early.		+ Profited from hedging/carry trade initially - Lost on hedging/carry trade towards the end. + Invested abroad when króna was strong.	- Lost a lot on lending to banks and other companies.
Lucky entrepreneurs (sold early)	+ Sold before the price fell.	+ Sold before the price fell.	+ Converted their króna to foreign currencies in time.	
Less lucky entrepreneurs	+ Made a fortune initially - Got stuck with leveraged positions when the market collapsed.	+ Made a fortune initially. - Got stuck with leveraged positions when the market collapsed.	+ Made a fortune initially. - Got stuck with leveraged positions when the market collapsed.	
Lucky small investors	+ Bought early and sold early			
Less lucky small investors	- Got stuck with leveraged positions when the market collapsed.		- Got stuck with foreign loans when the currency collapsed.	
Lucky real estate owners (bought before 2004)		+ Have got a reasonable return on their investment		
Less lucky real estate owners (bought their first house after 2004)		- Have got a low or negative return on their investment.		
Foreigners who sold assets	+ Still smiling over the inflated prices that Icelanders paid.	+ Still smiling over the inflated prices that Icelanders paid.		
Lucky carry traders and exchange rate speculators (got out in time)			+ Profited from interest rate differential and exchange rate movements	
Less lucky carry traders and exchange rate speculators (got stuck holding króna)			- Lost on foreign exchange movements and are now stuck behind capital controls.	
Vultures (bet on collapse of Icelandic asset prices and the currency)	+ Made a fortune.	+ Made a fortune.	+ Made a fortune.	+ Made a fortune from credit default swaps.
Foreign creditors of banks				- Lost a fortune

Table 2 shows that several groups have almost certainly come out ahead after the financial turmoil in Iceland. Iceland still has a few billionaires, even if their numbers have dwindled and the remaining billionaires presumably have fewer billions each. It is also apparent that many foreign companies or individuals

made very lucrative deals when selling assets to Icelandic parties in the past. The overseas buying spree of Icelandic entrepreneurs was remarkable not only for its scale but also the timing. It was made when global asset prices, in particular real estate prices, were at a record high. And not only were prices high globally, the Icelandic entrepreneurs acted in great haste and thus often made terrible deals, even relative to the generally inflated prices. This means that sellers must have made a healthy profit, at least when the price they got is compared to presumably more reasonable post-crisis prices. The general decline in asset prices understandably has a detrimental effect on the recovery for creditors to the failed Icelandic banks and business empires. This applies especially to Icelandic assets, where creditors face not only low asset prices in local currency but also a low exchange rate. A lot of the assets of the Icelandic banks are however not Icelandic and that helps with the recovery rates.

It is tempting to try to draw a clearer picture of the groups in Table 2 and quantify the losses and gains. This will not be attempted here, mainly due to lack of data. We will however try to analyse the macro picture to see the effects on the Icelandic economy as a whole. We will also look at the figures for the Icelandic state and local government.

4. Wall Street and Main Street

There is a fundamental difference between financial assets and real assets. Financial assets are claims on real assets or value that can be generated using them. The destruction of financial assets does not automatically entail a corresponding destruction of real assets. On the contrary, most real assets are only indirectly, if at all, affected by what happens to financial assets. The destruction of financial assets however has very real implications for the distribution of wealth. From the viewpoint of owners of financial assets their destruction means a direct loss.

When macro-economic figures are analysed in this context it should always be kept in mind that they never tell the whole story. Figures on the distribution of wealth and income are needed as well. The greatest impact of the financial crisis in Iceland will mainly be seen in figures of the latter kind, the macro-economic figures only tell a limited part of the story.

It is interesting to note that during the boom years, the distribution of income in Iceland, as measured by the Gini-coefficient, became considerably more unequal than before. This was reversed with the collapse of the banking system. In 1993 the Gini-coefficient for the distribution of all disposable income (wage and non-wage) was 0,21 for married and unmarried couples. It rose steadily to 0,43 in 2007 but then fell dramatically in 2008 and 2009, ending at 0,29 in 2009. If the Gini-coefficient is calculated excluding profits from sale of assets the trend is the same but the rise leading up to the crash is not nearly as dramatic, going from 0,193 in 1993 to 0,295 in 2007 and then falling again to 0,273 in 2009.²⁸ It is of course not surprising that the tremendous paper wealth generated by the rise in asset prices skewed the income distribution. In the year 2005, the real (in excess of inflation) return on listed stocks on the Icelandic stock market was the equivalent of 690 billion króna or 67% of GDP, not counting dividends. In that same year, the value of all wages and wage related taxes in Iceland was 582 billion króna or 57% of GDP. The stock market was thus on paper generating considerably more wealth than all workers in Iceland, which is clearly unsustainable, and as good a sign as any that there was something very wrong with the valuation of stocks in the country. Despite this, stock prices continued to rise in real terms for a year and a half, before the downward slide started that ended with a collapse of the stock market.

Losses for the economy as a whole from a financial crisis will mainly incur if real assets are damaged or if the production of goods and services in the future is noticeably reduced.²⁹ A contraction of GDP has a very real effect and a reduction

²⁸ Source: Ólafsson and Kristjánsson (2010).

²⁹ The indirect effects of a destruction of financial assets can be substantial if developments in financial markets lead to a disruption of the real economy with high unemployment or under-utilization of other real assets.

of growth rates can have a long-lasting effect. Finally changes in foreign debt and in particular net foreign assets also have a macro-economic effect.

To symbolise the difference between the financial sector and financial assets on the one hand and the rest of the economy and real assets on the other it can be useful to adopt the familiar U.S. terms Wall Street (real economy) and Main Street (financial system).

Iceland's Wall Street certainly collapsed. All the main banking institutions became insolvent, the only exceptions being a handful of tiny companies.³⁰ At the same time the bulk of the domestic financial assets that these institutions had held and worked with were either destroyed or seriously damaged.³¹ The scale of this destruction was unparalleled, relative to the size of the economy.

Iceland's Main Street did however not collapse. It continues to produce goods and services and provide employment. This part of the economy has of course suffered a substantial blow and has to adapt to a changed environment but it is fundamentally fully operational. A contraction of annual GDP of approximately 10% from the pre-crash high to the post-crash low is almost miraculously small in light of what happened to the financial sector.

For the Icelandic economy to go through the crisis without contracting more than this several factors had to turn out right. Of outmost importance was to get a new financial system up and running. This new financial sector had to ensure that Iceland's payment and deposit system survived, as it did. Without these very basic financial services a modern economy cannot survive. A cash based

³⁰ Non-bank financial institutions did somewhat better. The insurance sector survived, one company though needing government support. The government owned Housing Fund also survived, though it did suffer some losses and will need an infusion of equity. The pension system suffered substantial losses. This wiped out accumulated returns from several high-yielding years, making it necessary to roll back increases in benefits that had been granted during the boom years. The system is still however fundamentally sound and most of it is fully funded. The part of the pension system that provides pensions to government employees however continues to be only partially funded.

³¹ The main exceptions were government-backed bonds. A handful of non-financial listed companies also survived with their stock market value more or less intact and deposits were saved. Some unlisted companies also emerged in reasonable health. The bulk of other domestic financial assets were either destroyed or significantly damaged.

economy was not a viable option. The domestic payment system never ceased functioning but access to the international payment system was sporadic for a while. With a Herculean effort basic access was however quickly restored and then gradually this too returned to normal. Iceland's external trade therefore continued with little interruption. Exports continued and even rose, despite the turmoil in Iceland and a worldwide decline in trade. Imports also continued with little interruption, although at a far less rapid pace than before the crash, as the price of anything imported skyrocketed with the depreciation of the króna.³²

5. The aftermath

At the time of writing, in late 2010, the final accounts for the collapsed Icelandic banking system have not been prepared. It is clear that they will not be for several years. The winding up of the estates of the collapsed banks will take quite some time. Until that process is finished we will not know for certain which claims will be accepted and how much each claimant will receive. One side effect of this is that in the meantime it can be hard to complete and decipher Iceland's national accounts. In particular the figures on gross national debt and net international position are troubling. This also affects figures on factor income and thus gross national income. The numbers are not only hard to pin down in the present; many past figures are also questionable.

Despite this we will try to analyse the available figures to see how the cost of the collapsed Icelandic bubble economy affects some key parties. This will clearly not be the final word on the issue. Further developments and better data will be needed for that.

³² There was some fear of shortages of imported goods in the fall of 2008. As an example it made the news a few days before the banks collapsed that Iceland's oil distributors had trouble acquiring the necessary foreign currency to pay for upcoming shipments from abroad. Some households did apparently stock up on imported goods but no significant shortages ever materialized. With Iceland's enrollment in an IMF program in November of 2008 there was no longer any fear of the country running out of currency reserves and being unable to pay for imports.

We will use as a frame of reference figures that are well known and seem beyond challenge, as far as such numbers can ever be. The year chosen for this purpose is 2002. At that time the Icelandic asset price bubble had not expanded to any significant degree. It had, if anything, deflated a bit in 2000 and 2001 with a decline of stock prices, depreciation of the króna and a fairly quiet market for real estate. The privatization of the banks was just ending but their main growth period was still ahead of them. In the year 2002 Iceland's external trade was unusually balanced, with a small current account surplus for the first time since 1995.

At year-end 2002 the net international investment position³³ of the Icelandic economy was negative to the tune of 562 billion króna. At year 2009 prices this is the equivalent of 860 billion króna.

In the period 2003 until 2008 Iceland ran a very substantial current account deficit, spending far more on foreign goods and services than the country exported. It took the collapse of the banking sector and a dramatic depreciation of the króna to reverse this and in 2009 imports had declined so much that Iceland had a current account surplus again.³⁴ The accumulated deficit in the period 2003-2009 was 1.380 billion króna at year 2009 prices.

Having run up such a massive tab abroad, Iceland's international investment position should have taken a substantial turn for the worse. If we look at the economy as a whole, including the collapsed banks, that is also the case. At the end of the second quarter of 2008, right before the collapse, Iceland's net international investment was negative to the tune of 2.734 billion króna, according to official statistics. That is not far from what could be expected given the position in 2002, the deficit in the years 2003-2008 and the depreciation of the króna. The official figures by the Central Bank got a lot worse after the

³³ The difference between Iceland's external financial assets and liabilities.

³⁴ As mentioned above, it is hard to precisely determine some key figures in Iceland's national accounts. One aspect of this is how to take into account accrued interest on debt owed by the estates of the collapsed banks since this interest will almost certainly never be paid. It is however clear that if figures concerning the estates of the collapsed banks are omitted, Iceland had a very substantial current account surplus in 2009 and 2010.

collapse of the banking sector. They have the net international investment position negative to the tune of 5.911 billion króna at year-end 2009. Figs. 7 and 8 show on the one hand the gross foreign debt in the period 1993 until the middle of 2010 and on the other hand the net international investment position, for the economy as a whole and without the estates of the collapsed banks.³⁵

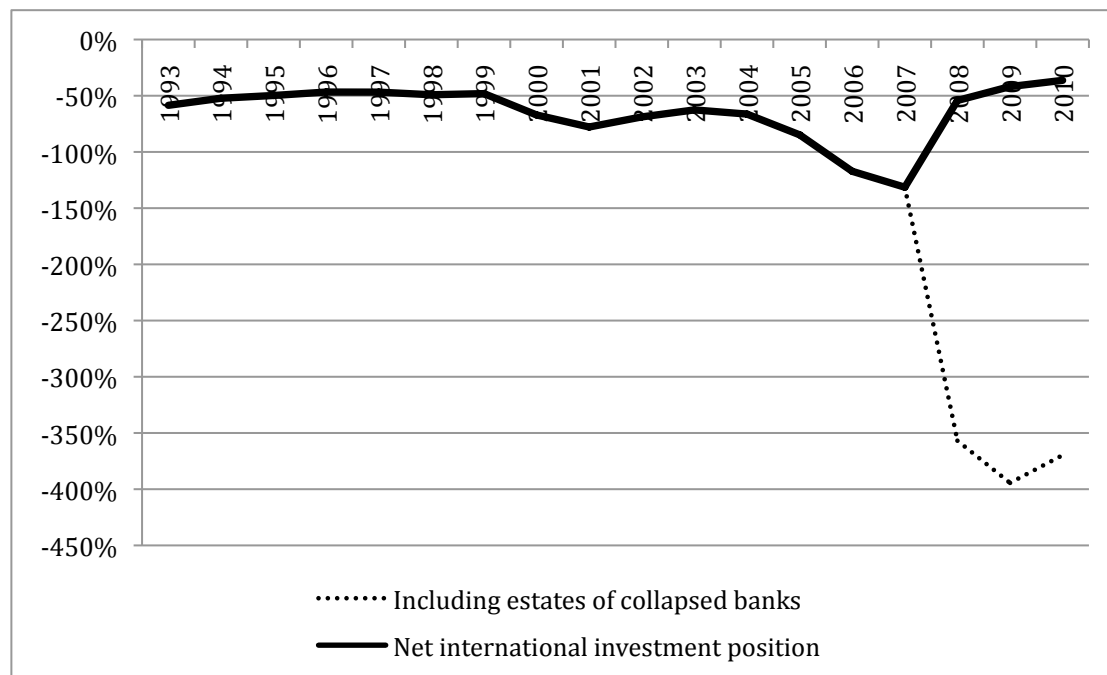


Fig 7. Net international investment position, as a percentage of GDP.
Source: Central Bank of Iceland

The estates of the collapsed banks are now being wound up. When that process is complete, their balance sheets will no longer exist and thus no longer be part of the national accounts. What will remain and matter for domestic parties are the Icelandic assets that foreign creditors acquire as a result of the winding up and what assets, foreign and domestic, Icelandic creditors acquire. Foreign creditors have made the bulk of the claims on the estates of the collapsed banks. Furthermore, most of the estates' assets are foreign.³⁶ The bulk of the payments from the estates will thus be made from the proceeds of the sale of foreign assets

³⁵ Note that the exchange rate of the króna affects these ratios. Depreciation increases them while an appreciation has the reverse effect.

³⁶ The domestic assets of the collapsed banks were used to set up the new domestic banking system. To compensate for this the estates of two of the large collapsed banks hold most of the equity of the corresponding new banks. The estate of the third bank was primarily compensated through a bond that the new bank issued. This equity and the bond are the main domestic assets of the estates of the collapsed banks.

and go to foreign creditors, without having a direct impact on the Icelandic economy.

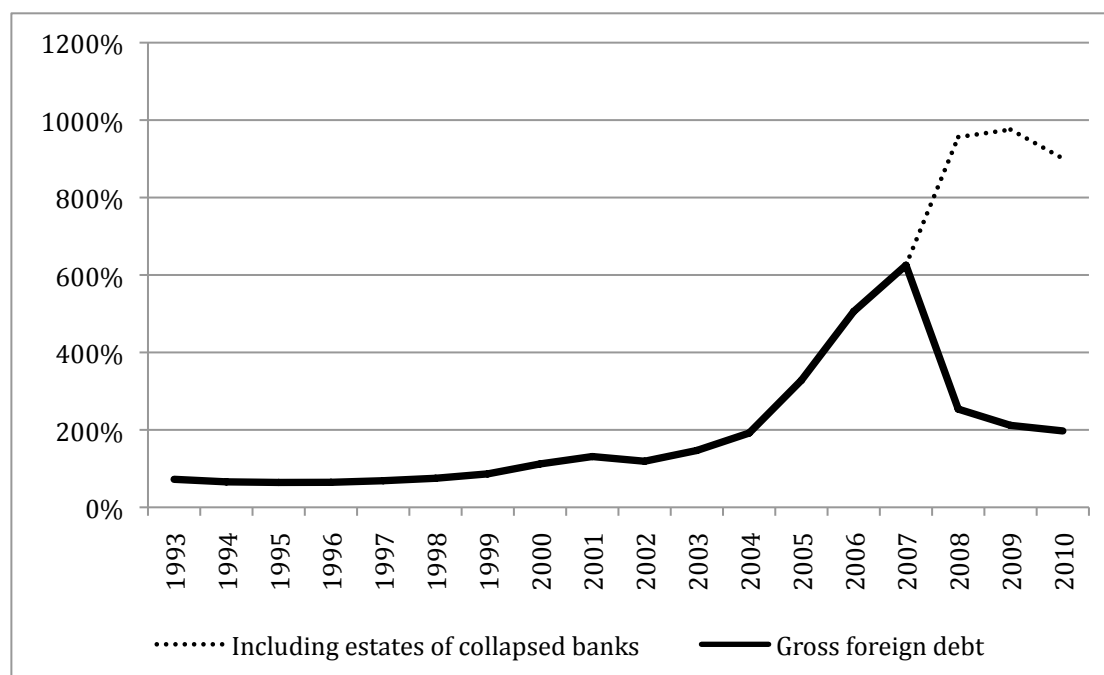


Fig. 8. Gross foreign debt as a percentage of GDP.
Source: Central Bank of Iceland.

If we look at the net international investment position of the Icelandic economy but exclude the collapsed banks we see a very different picture. According to the Central Bank's estimates in the fall of 2010 this position was negative to the tune of 628 billion króna at year-end 2009. Comparing that figure to the figure for year-end 2002 (adjusted for inflation in the period 2002-2009) we see that the position has *improved* by 230 billion króna.³⁷ It is of course striking if the various participants in the Icelandic economy have spent 1.380 billion more than they earned abroad in the years 2003-2009 but still end up with an improved investment position relative to the rest of the world.

³⁷ The improvement in the net international investment position is calculated converting the year-end figure for 2002 to 2009 prices by adjusting for the change in the price level in Iceland. If we instead use dollar values for the net international investment position at the end of 2002 (-6,96 billion dollars) and the end of 2009 (-5,03 billion dollars) the improvement comes out at 1,93 billion dollars. In Euros the improvement is even greater, the net international investment position at the end of 2002 being -6,63 billion Euros and at the end of 2009 -3,49 billion Euros indicating an improvement of 3,14 billion Euros. These figures do not take into account inflation in the U.S. or the Euro zone.

Things may however not be quite so simple. The calculations above include some simplifications that may skew the result. We will look at the main ones below.

5.1 Calculating the net investment position

Simply omitting the assets and liabilities of the estates of the collapsed banks from the national accounts does not take into account the fact that the estates have significant claims on other domestic entities and vice versa. It is very well possible that the domestic assets of the estates will be worth more than the claims of domestic entities on the estates. If that is the case then the figure above, -628 billion króna, for the net international investment position is too optimistic.

In addition, the cost to the state and thus the Icelandic economy due to deposit insurance for the so-called Icesave accounts of Landsbanki in Britain and the Netherlands has to be taken into account. This cost is at the time of writing unknown but will certainly have a negative impact on Iceland net international investment position.³⁸

Taking the above into account it may very well be that Iceland's net international investment position, without the collapsed banks, is worse than the figure of 628 billion suggests. This would furthermore mean that this position may not have improved by 230 billion from 2002 until 2009. The position may even have deteriorated somewhat. There is however no doubt that it has not deteriorated by anything close to 1.380 billion króna, which is the accumulated current account deficit.

5.2 What remains?

The domestic investment spree in the years leading up to the collapse of the financial system leaves a lot behind. The investments that got the most attention

³⁸ The cost to the Icelandic government was estimated in December 2010 to be approximately 50 billion króna or a little over 3% of GDP. This is based on an agreement reached between the three countries (Iceland, U.K. and the Netherlands) in that month. The agreement has however not been ratified. In addition, some uncertainty remains about the recovery from the estate of the collapsed bank. This may affect the outcome.

are in the energy intensive sector. The electricity generating capacity in Iceland doubled between the years 2002 and 2009. In the year 2002 public utilities in Iceland generated 8.411 gigawatt hours of electricity. In the year 2009 production had increased to 16.835 gigawatt hours or almost exactly doubled.

Investments were not limited to the energy intensive sector. Massive investments were made as well in real estate, both commercial and residential, roads, tunnels, harbours and so on. In the period 2003-2010 four tunnels were added to the Icelandic road system with a combined length of 23,6 km. This slightly more than doubled the combined length of all road tunnels in the country. The period 2003-2008 broke all previous records in the construction of residential housing. During those six years 17 thousand apartments were built or approximately 6 thousand more than would have been built in six average years. This extra production corresponds to approximately three years supply in a normal period. The number of summerhouses had risen by 30% at year-end 2009 from what it had been seven years earlier. This included some very large and expensive summerhouses belonging to Iceland's (sometimes ex-)newly rich.

At year 2009 prices the accumulated gross capital formation of the years 2003-2009 was 2.505 billion króna.³⁹ Net figures, subtracting estimated depreciation, are of course lower but the capital stock was though estimated to have increased by 1.274 billion króna from 2003 until 2009, at year 2009 prices.

Investments were also made in human capital. The number of people graduating from high school, college and graduate school and vocational training rose somewhat. One important indicator is that between the years 2003 and 2009 the number of Icelanders with a college degree increased by 14 thousand or more than a third.

As is to be expected, consumption does not leave as much behind as investment, with the possible exception of debt. When the Icelandic asset price bubble was

³⁹ This includes all man-made structures and machinery, houses, factories, roads and other infrastructure, power plants etc. It only takes into account real assets, not financial assets and also excludes human capital.

expanding at breakneck speed, consumption rose quite dramatically. Newly minted billionaires and high-flyers in the financial sector were especially prone to leading an extravagant lifestyle, flaunting their newfound wealth. This was seen in the purchase of yachts, private jets and helicopters, luxury cars and the ultimate trophy apparently being an English football team. The parties they threw were suitably extravagant, often held in exotic locations with world famous entertainers.⁴⁰ However, only a part of the increase in private consumption in the years 2003-2008 can be attributed to this relatively small class of people. The rest was spent by the general public which saw its purchasing power increase, especially for foreign goods. Travel abroad increased and so did imports of big-ticket items such as cars and expensive electronics. In the years 2005-2007 Iceland imported more than 20 thousand vehicles per year, far more than is usual. Imports of luxury cars and SUV's grew especially. At the end of 2008 the number of registered vehicles in Iceland had increased by 84% in 14 years.

5.3 The Range Rover problem

Many of the items that were bought or built during the boom times and remain in the country would never have been acquired under normal circumstances. Expensive and impractical cars or SUV's, such as Range Rovers, exemplify this.⁴¹ The same can be said for many of the personal acquisitions of Iceland's (former) rich, such as extravagant houses. The public sector was not immune to this. One glaring example is a huge and very expensive Concert Hall that was designed in euphoric times but only half-built when the company owning it collapsed. This monument to irrational exuberance would presumably never have been built, at least not in anything resembling its current form, in more sober times. Some assets could be easily sold abroad when the domestic market for them vanished, corporate jets being a prime example. Foreign assets could be sold as well. Other

⁴⁰ One small piece of anecdotal evidence being that the sale of Champagne and other bubbly wines in Iceland increased by almost 30% between 2001 and 2007. Sales then fell considerably again in 2008-2010.

⁴¹ Imports of cars and SUV's declined by an astonishing 87% between the years 2007 and 2009 in Iceland. The drop in the luxury car segment was though even more dramatic with the import of six luxury car brands (Audi, BMW, Lexus, Mercedes-Benz, Porsche and Range Rover) falling by more than 94%.

domestic assets are less mobile, with real estate being perfectly immobile of course. There was some export of vehicles, especially new cars, which had become near impossible to sell in the domestic market. There was also some export of construction equipment that was no longer needed. Other assets will have to remain in Iceland, even if they are valued well below the original cost of production there. When we try to value assets that the boom times brought to Iceland and remain there after the collapse, one has to mark them down considerably to take this into account.⁴² It is however not always clear what is the appropriate value.

A related issue is that many investments, such as in real estate, far exceed current needs, although there may be some use for the assets as time goes on. Some assets may though never be put to good use, one possible example being infrastructure for housing developments that may never see the light of day. This has to be taken into account when evaluating the assets, writing off those that will in all likelihood never be used and appropriately discounting the value of those that will probably not be used until after considerable time.

5.4 Government debt

When one looks at statistics on the foreign debt of the economy or its net international investment position it has to be kept in mind that ‘the economy’ as such owns no assets and is not liable for any debt. The same applies to ‘the country’ or ‘the nation’. The various entities that make up the economy, both private and public, however can and do own assets and carry debt. In general, each party owns specific assets and is liable for specific debt. It may therefore not be of much importance what kind of balance sheet results if we merge the various balance sheets of all private and public entities to come up with a national balance sheet. If private parties cannot pay all their debt then that is in principle a problem for them and their creditors, not others. Figures on gross

⁴² One can using similar logic come to the conclusion that part of the consumption expenses during the boom times was pure waste, with the utility of the consumers at the time not justifying the expenditure and many of them now regretting this, wishing they had not spent so freely. We will however not try to quantify this here.

national debt have to be interpreted with this in mind. It need not be a matter of great concern for the general public if gross national debt is high – and not even if the net international investment position is very negative. To the extent that private debt is unsustainable it will not be repaid and will eventually be written off, one way or another.

Government debt does however matter for the general public and can give cause for concern. Present and future taxpayers are expected to pay it all eventually. The Icelandic government sector (national and local) has taken on very substantial debt since year-end 2007. There was however an almost equally dramatic improvement in the government's financial position in the years leading up to this. As a percentage of GDP, the government sector has very similar net debt (gross debt subtracting financial assets but not real assets) as it had before the boom.⁴³ The net financial position of the government was negative to the tune of 39,8% of GDP at year-end 2009 but the same figure was -42,6% of GDP at year-end 1998.⁴⁴ See fig. 9 for details.

From 1998 until 2007 the net financial position of the government improved almost every year until it had become positive, by a hair, at year-end 2007. Primarily this was due to the effects of the over-heating of the economy and the asset price bubble. The tax base grew rapidly, with corporate profits increasing and private consumption and imports rising. Higher prices and increased turnover in the real estate market had a direct impact on both local and national government revenues with many local governments making a substantial profit

⁴³ This does not take into account off-balance sheet items. The Icelandic government has some off-balance sheet liabilities, including a partially funded pension scheme for public workers and some long-term private financing contracts that local governments have made. The figures involved are however not large by international standards (relative to the size of the economy) and to some extent offset by a large off-balance sheet asset, the deferred taxes on private pension funds' assets. When evaluating the long-term financial health of the public sector in Iceland it also helps that Iceland's demographics are fairly good, with birth rates high for Western Europe and close to what will eventually lead to a stable population. Iceland's 'aging problem' is thus fairly benign.

⁴⁴ The net financial position of the government will almost inevitably deteriorate somewhat from the year-end 2009 figures before it starts improving again. The reason is that the government sector is expected to run a deficit in 2010 and 2011 and in addition the cost to the government due to deposit insurance (Icesave) has to be taken into account. Based on current projections, the net financial position of the government should hit bottom at a little over half of annual GDP.

on the sale or lease of sites for real estate development. In addition the government got revenues from privatisation, in particularly of the former telephone monopoly. The government thus certainly got its share of the vast amount of wealth that was being created on paper.

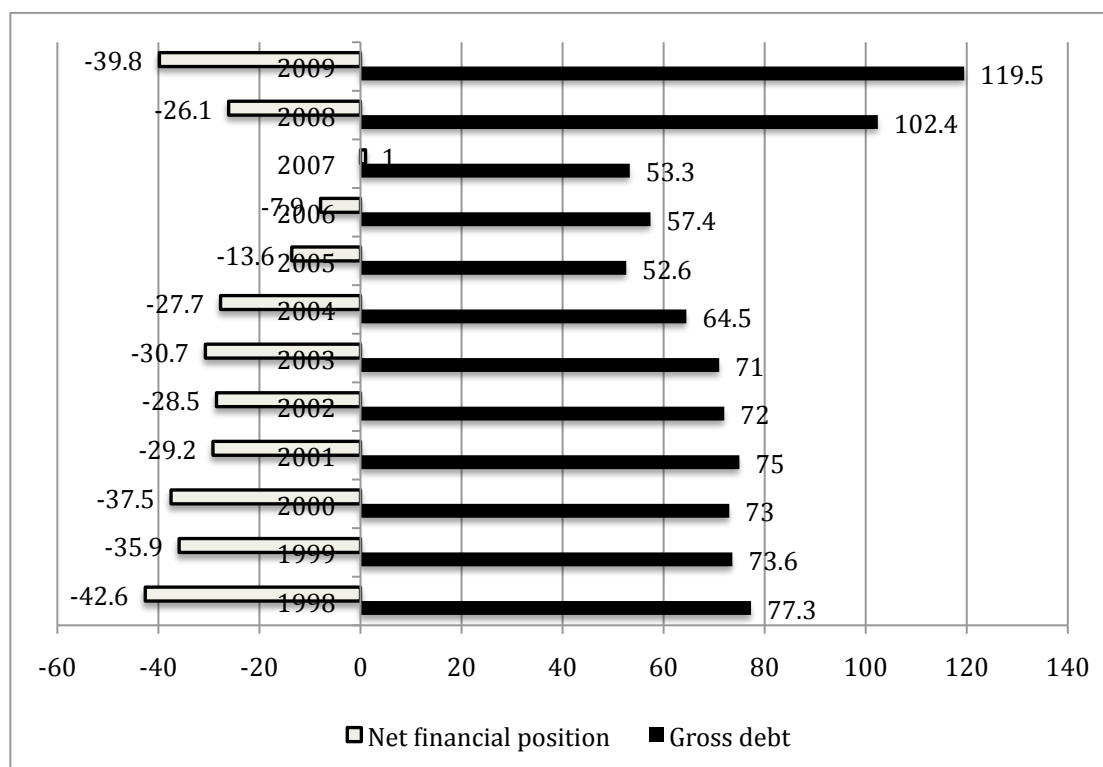


Fig 9. Net financial position and gross debt of the government. Percentage of GDP.
Source: Statistics Iceland.

To give an example, in the year 2007, government revenues per capita were, at year 2009 prices, 2.440.976 króna while in the year 2002 a comparable figure was 1.760.034 króna. This means an increase in real terms of 38,7% or 5,6% per year. Before that, between 1980 and 2002, government revenues had also grown but at a much more relaxed pace of 2,7% per year. Had government revenues kept on growing after 2002 at this slower pace instead of taking off at a fast pace, accumulated government revenues in the period 2003-2007 would have been 432 billion króna lower than they actually were, all at year 2009 prices. The difference is close to a third of one year's GDP, which is more or less equal to the improvement in the government's net financial position between 2002 and 2007. The extra flow into the government's coffers was at its peak in the years 2005-2007, on average 125 billion króna a year. In the year 2009 the situation was

reversed and government revenues were 61 billion króna below what they would have been had they grown steadily at an annual rate of 2,7% since 2002.

The net financial position of the government took a sharp turn for the worse in 2008 and 2009. Three factors played the largest role in this. The fiscal deficit played the largest role, with tax revenues declining and expenditure rising virtually overnight. The second factor was the losses incurred by the Central Bank when the banks collapsed. The Central Bank had been accepting very questionable collateral for many of its loans.⁴⁵ When the banks collapsed, the losses on these loans far exceeded the equity of the Central Bank and it thus needed to be refinanced by the government. Finally there is the cost to the government due to deposit insurance (Icesave). All these three factors added to the net debt of the public sector, mainly the national government. In addition gross debt increased as the government took on considerable debt as part of the IMF program to bolster currency reserves. This debt however came with matching assets, not affecting net debt. Finally the government provided some of the equity for the new banking system, most of it for the new Landsbanki. To manage this, the government took on debt but got equity in return, meaning that its net financial position did not change materially although it is now of course exposed to fluctuations in the value of this equity. See fig. 10.

Roughly, the public sector thus lost during the collapse of the financial system the financial gains it had made during the boom times. The division between local and national government complicates this though, with some local governments ending up with considerable financial problems. Some municipalities had taken on a lot of debt in foreign currency and are having trouble servicing that out of their declining revenues in króna. Some of them had also invested heavily in real estate development that now seems unlikely to pay off, at least not for quite some time.

⁴⁵ Often the collateral posted by one bank was simply bonds issued by another bank, which was in effect the borrower. This kind of collateral was obviously of little use when the banking system as a whole collapsed.

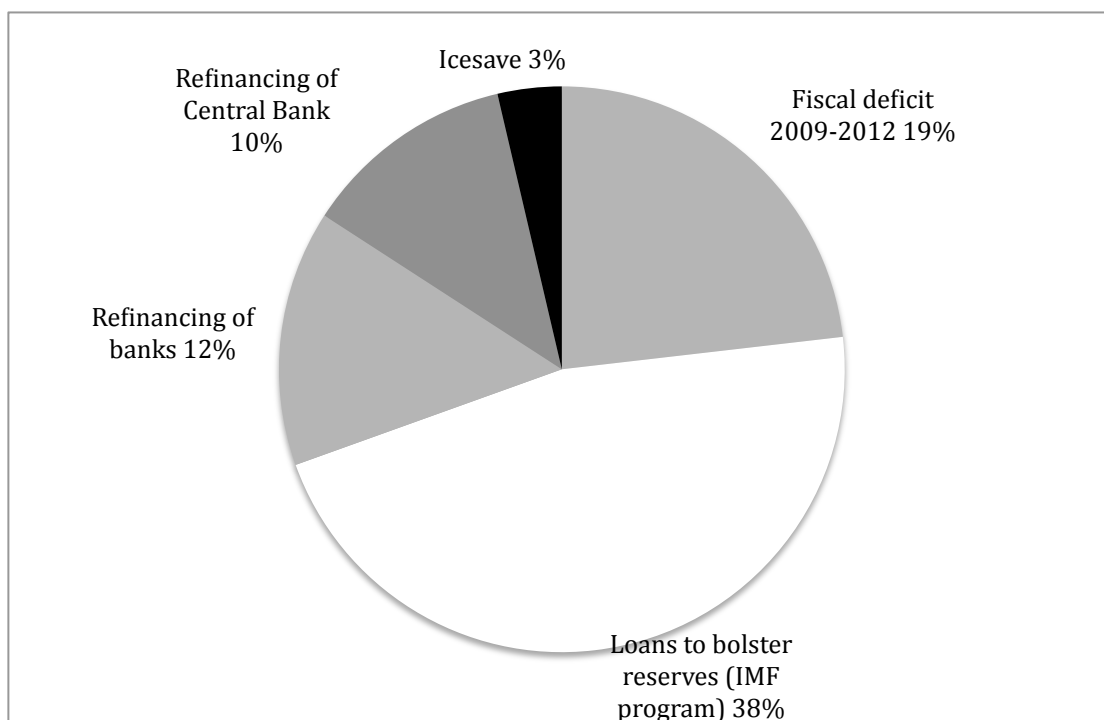


Fig. 10 Main factors contributing to increased indebtedness of the public sector. Percentage of GDP. Source: Ministry of Economic Affairs, except for the figure for Icesave, which is based on public estimates released in December 2010.

6. Conclusion and discussion

The picture of the rise of the Icelandic bubble economy and its repercussions will not be fully known for quite some time. It is however gradually becoming clearer. What may be most surprising is how small the financial damage to the Icelandic economy as a whole seems to be when we compare the post-crisis economy to the pre-bubble economy. The Icelandic economy had at year-end 2009 considerably more real assets than at year-end 2002, before the bubble started to expand aggressively. The net international investment position of the country may also even have improved slightly over those seven years. That is almost unfathomable given the pace of consumption and investment in real assets in the period 2003-2007. The picture is similar if we only look at the public sector. The net debt of the public sector is similar to what it was at the end of the pre-bubble period. The public will also benefit in the future from substantial investments that were made in infrastructure during the bubble era.

The rise and subsequent collapse of the bubble economy did however lead to very real losses. The bulk of it lands on the foreign creditors of the collapsed banks and the related business empires. They will in the end pay for a large share of the Icelandic consumption and investment feast and for the profits of the various foreign entities that profited from selling assets at inflated prices to Icelandic entrepreneurs and their business partners. The final bill will take several years to emerge. We do though already know that it will be several times Iceland's GDP.⁴⁶

Averages or macro statistics do however not tell the whole story. Even if the Icelandic economy as a whole or the Icelandic public sector emerges surprisingly unscathed, the same can not be said about many Icelandic households, companies and municipalities that end up significantly worse off than they were before the party started.

The asset price bubble had a considerable effect on the distribution of wealth in Iceland, both while it expanded and collapsed. Those that end up significantly worse off than before are primarily those that purchased assets late and did not sell them before the collapse. This includes many individuals or households that bought their first apartment after 2004 and many who purchased stocks late. Those that used leverage and in particular loans in foreign currency were especially adversely affected. The post-crash contraction of the labour market

⁴⁶ The combined assets of the six largest financial institutions that collapsed in 2008 and 2009 were valued at 13.103 billion króna on the banks' books in October 2008. After the collapse they were valued at 5.299 billion and had thus been written down by 7.831 billion. The equity of the companies was valued at 995 billion in the banks' books at the end of the second quarter of 2008. Based on this the losses to creditors could be close to 7.000 billion (writedown of bank assets minus their nominal equity). See for details the Report of the Special Investigation Commission (2010), Vol. 3., chapter 11.2.5, in particular Tables 4 and 5 on page 134. The actual value of the bank's assets will of course not be known until they have been wound down and the assets liquidated, so the figure of 7.000 should not be taken literally. It is the equivalent of almost five times GDP. It is however not the total loss due to the destruction of financial assets. In addition, creditors that lent directly to Icelandic companies have lost substantial amounts. So have of course those who held shares. The market capitalization of listed stocks fell by more than two times GDP. In addition, unlisted stocks also declined in value or became worthless but estimating the market value lost there is difficult and will not be attempted here. Finally, one must keep in mind that those who lost due to the destruction of financial assets in Iceland had often profited from the increase in value of Icelandic financial assets earlier. Their net losses may therefore in some cases be smaller than the gross losses towards the end – and in some cases they may even have come out ahead when all losses and prior profit are tallied. The same applies to domestic and foreign claimants in this respect.

also affected some far worse than others. Many were hardly affected at all, except perhaps by some loss of the purchasing power of their take-home wage. Others were hit hard and lost a lot of their income, sometimes becoming unemployed for a prolonged period. The effects of this will be felt for quite some time.

Since Iceland's real assets or production factors have emerged fairly unscathed from the financial turmoil the capacity to produce goods and services is fundamentally intact. The economy will however have to adjust, re-allocating resources from industries that have shrunk, such as construction and import related services, to other industries. The public sector also has to adjust to more debt and a smaller tax base by cutting expenditure and raising tax rates. Such an adjustment cannot take place overnight and will hardly be enjoyable for those affected by it, at least not in the beginning.

Iceland was before the financial crisis one of the richest countries on earth if you look at the per capita purchasing power of GDP or GNI. Using broader measures on development gave more or less the same result. One indicator is that Iceland was the highest-ranking country on the UN Human Development Index in both 2007 and 2008 (based on data from 2005 and 2006). This is the result of a very successful development in the 20th century. See fig. 11. The financial crisis takes Icelanders a few steps backwards in economic terms, to approximately 2004 if you look at the purchasing power of households and 2005 if you use the purchasing power of per capita GDP as a measure. That still leaves Iceland very well off, both by historical and international standards. Fig. 12 depicts the contraction of the economy in several countries in the year 2009. Note that although the contraction of the Icelandic economy in this year is above the average for the European Union (4,5%) and the OECD (4,0%) Iceland is not an outlier in this regard. If we look at the development since the year 2002, the base year for our analysis, we see that despite the contraction in the year 2009 the average growth of GDP in the period 2002-2009 in Iceland is quite reasonable and even slightly higher than the OECD average. Even if we take into account current projections for a further contraction of the Icelandic economy in 2010 (2,2%) and economic growth (2,7%) on average in OECD countries, the average

growth for the period 2002-2010 is slightly higher in Iceland than within the OECD (the difference is though not statistically significant).

This is a striking result when you have in mind that during this period the Icelandic financial system collapsed and financial assets worth several times GDP were destroyed. The real economy in Iceland, Main Street, has managed despite this to turn in growth figures that are quite reasonable and close to or even slightly above the OECD average for the period from before the bubble started to expand, in 2002, until it had hit its projected post-collapse low, in 2010. The collapse of the financial sector thus seems to have caused far less damage to the real economy than could have been expected and was predicted immediately after the financial collapse in late 2008.⁴⁷ It is tempting to look at the contraction of the Icelandic economy in 2009 and 2010 as mainly an unavoidable adjustment after the severe over-heating of the period 2003-2007, rather than the consequences of significant damage due to the financial collapse. When we look at the real assets of the economy and its financial position in the year 2010 nothing seems to indicate that this economy cannot continue to provide a very high standard of living for the population of the country.

Having seen such a dramatic story unfold it is tempting to ask if it would have been possible to materially change the course of events by making different decisions at key points. One possibility is to try to analyse at what point the Icelandic banking system had gone beyond the point of return, so to speak, making it impossible to save. We will not attempt this here, although it is tempting to look at the mini-crisis of 2006 in Iceland as the 'last warning'. At the time there was still a reasonable market for bank assets internationally. It is thus not unthinkable that a massive scaling down of the Icelandic financial system, by selling assets, would have been possible as late as 2006.⁴⁸ No such attempt was

⁴⁷ As an example, when the IMF program for Iceland was announced in November of 2008, the IMF predicted that Iceland's GDP would contract by 9,6% in 2009. The actual contraction in that year was approximately 3 percentage points lower.

⁴⁸ One major obstacle to going this route is that the owners of the banks relied on them to finance their highly leveraged empires. Scaling down the banks would presumably have closed off this source of funding, bringing these wobbly empires and their owners down and causing massive losses to the banks. The owners and managers of the banks therefore had little or no incentive to

made however. With rising problems in Iceland and a rapidly diminishing appetite for risky bank assets internationally after 2006, the Icelandic system had clearly passed the point of no return. Instead of trying to down-size to save itself, the system kept on growing for a while, fuelled mainly by deposits.

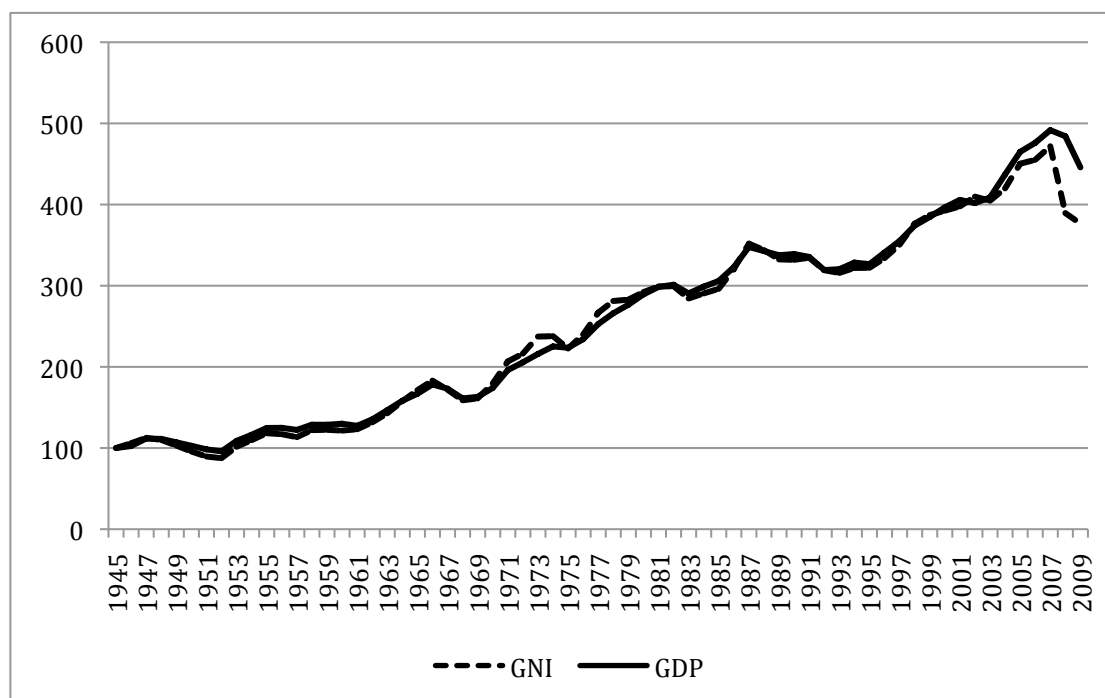


Fig. 11. Gross National Income (GNI) and Gross Domestic Product (GDP) per capita in Iceland 1945-2009. Index, 1945=100. Source: Statistics Iceland and author's calculations.

Many have compared developments in Iceland in recent years to those in Ireland. Both countries built up highly leveraged economies with over-sized financial systems and an asset price bubble. The story did not however have the same ending. The Irish government decided in late September 2008 to save the Irish banking system by providing it with a government guarantee. The Irish in effect took the problems of the banking system on to the government's balance sheet, with the aid of their European Union partners and especially the ECB. The Irish financial system staggered on after this but the Icelandic one collapsed a few days later.

try to reduce the size of each individual bank. From their viewpoint it was probably best to step on the accelerator and hope for a miracle.

Iceland did not have the Irish option. The problems of the financial system were far too great to take them on to the government's balance sheet. The government was too small an economic entity to credibly do this. The Icelandic Central Bank did not have the liquidity that the banks needed, unlike the ECB in the case of Ireland. In Iceland, the question of whether the banks were too big to fail was moot. The banks were too big to save.⁴⁹

It is too early to tell whether Ireland or Iceland will recover earlier and whether it would perhaps have been better for the Irish to follow Iceland's example, letting the financial system fail rather than save it at the government's expense. It is however certain that if the Irish manage to save their financial system without subjecting its creditors to substantial losses, this will be a far better outcome for the creditors than what they face in Iceland.

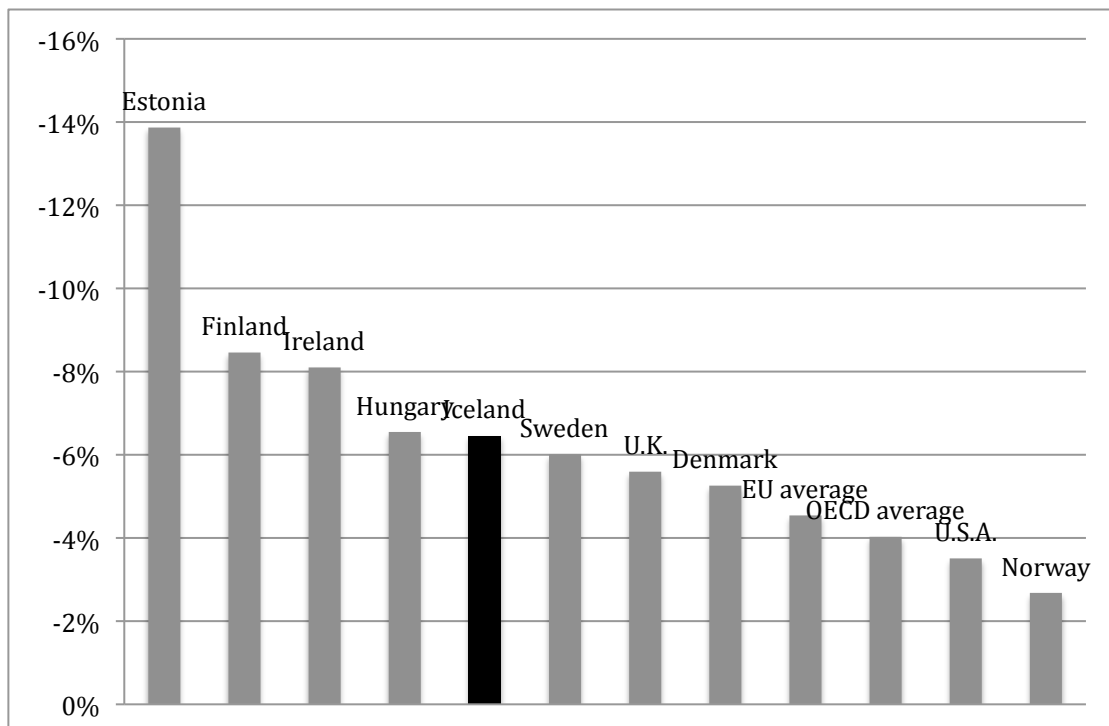


Fig. 12. Contraction of GDP per capita in real terms in 2009. Selected countries. Source: OECD.

⁴⁹ Even if the Icelandic banks were too big to save for the Icelandic authorities they could, in theory at least, have been saved by outsiders with more financial muscle. The main difference between Iceland and Ireland may be that in the case of Ireland an outsider with deep pockets was available, namely the European Union and the ECB. That made it possible to keep the Irish system liquid even if the domestic government did not have the resources for that on its own.

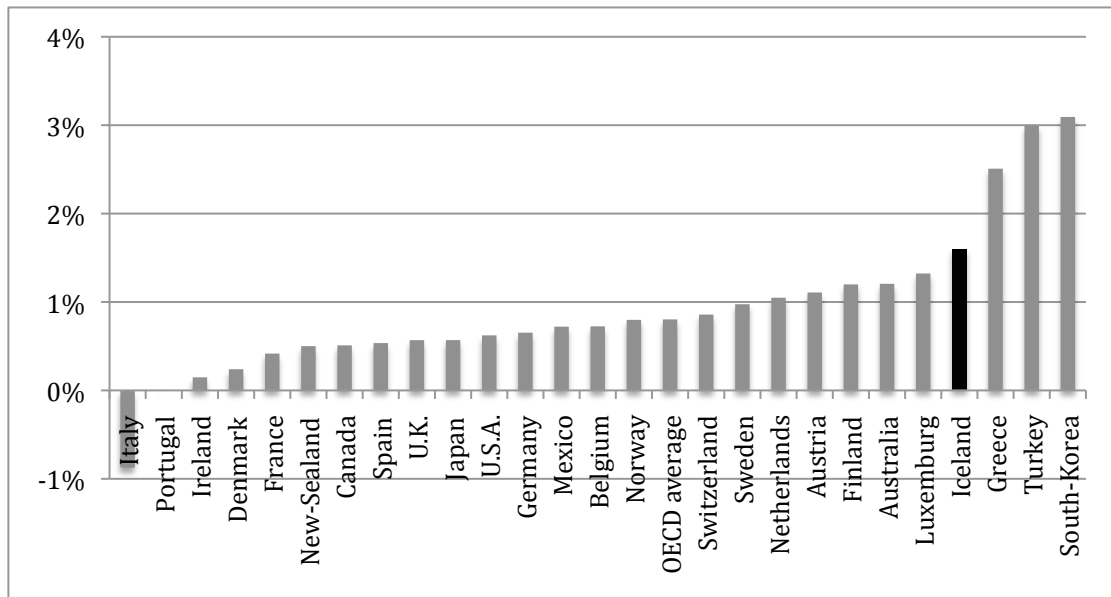


Fig. 13. Average economic growth (annual growth of per capita GDP in real terms) 2002-2009. Source: OECD and author's calculations.

It has to be kept in mind that a society can sustain heavy damage that is not portrayed in economic statistics, at least not in the short run. The social fabric matters more than most economic variables, both for the economy as such and for society in general. If the social fabric has been damaged in the turmoil of recent years the full extent of the damage may not be known until after a long time. Developments such as a substantial increase in the number of long-term unemployed can be very hard to reverse. The same can be said of reputational effects. Many, both inside and outside Iceland, have lost a lot due to what happened to the Icelandic financial system. The picture that has been drawn up of Icelandic business people, bankers in particular, and politicians is also not very flattering. It may not be much consolation that the same seems to apply to some extent to their colleagues in many other countries.

A fairly good reputation, built by many generations, has been tarnished and will not be repaired overnight. It is hard to measure the effects of this now. The final bill left by the Icelandic bubble economy will probably not be known until the dust has settled and future economic historians can start looking at this very brief period in Iceland's history with the benefit of the perspective that only time can provide.

Circumstances differ across countries that are now dealing with financial stress. The solution that Iceland chose – to the extent that it had any choice – may not be feasible or attractive in other cases. Iceland's problems were primarily due to excessive leverage of the private sector and reckless bankers. Although the government at the time is certainly responsible for letting this situation arise the government's own finances were in reasonable order. There was no chronic fiscal problem and the public sector emerged from the bubble years with no net debt. The fiscal adjustment needed after the collapse of the asset price bubble was well within the feasible range, although certainly not enjoyable. Most of it had already been achieved in the year 2010. The budget for the year 2011 in effect closes any remaining gap so that only a mild economic recovery is needed to bring the public sector into a surplus.

Other important factors that affect the Icelandic saga include having its own currency, the financial sector being to a large extent financed abroad and being a very small country.

Having its own currency is certainly a mixed blessing and the case of Iceland shows that quite clearly. On the one hand the currency was a significant factor in causing the problems that the country now faces. The plummeting exchange rate made debt problems harder, destroying many balance sheets and reducing the hopes for recovery by creditors, measured in foreign currency. The capital controls that were put in place to stabilise the currency added the extra burden to investors of almost no liquidity of Icelandic assets for the time being, except within Iceland. The depreciation of the króna also contributed to a sharp fall in the purchasing power of the public, especially as measured in imported goods.

On the other hand, the depreciation of the króna has been the main stimulant of the economy. Iceland's export sectors are generally having their best years ever and domestic consumption has shifted noticeably towards domestic goods and services, providing a much needed boost to Icelandic producers.⁵⁰ This feature of

⁵⁰ Between 2007 and 2009 gross national expenditure (the sum of private consumption, public consumption and investment) fell by an astonishing 27,8% in Iceland in real terms (i.e. using

the Icelandic situation can of course not be universally exported – not all countries can devalue at the same time. Furthermore countries in a currency union, like the Euro zone, by design all have to use the same nominal exchange rate. This means that to achieve a needed depreciation of the real exchange rate, countries like Ireland and the southern Euro zone countries need to bring about a fall in the price and especially wage level in these countries relative to countries such as Germany. Although this may happen eventually it is considerably harder and more time consuming to pull off than a depreciation of an independent currency.⁵¹

Although the króna now provides a much-needed short-term stimulus to the economy it remains a problem, both in the long term and the short term. All the historical weaknesses of this battered currency are still there and now it even needs capital controls to shelter it. Due to the high debt levels of Iceland's companies and households it is especially troubling to be stuck for the time being with a currency that has historically had and seems destined to have high nominal and real interest rates.⁵² A highly unstable currency will also inevitably have a detrimental effect on investment in Iceland. Reviving investment is a crucial step towards economic recovery in the short to medium term in Iceland and of course vital to long term growth.

fixed prices). Over the same period exports rose by 15,0% and imports fell by 37,9% in real terms. The stimulus that rising exports and the shift to domestic goods and services provided to the Icelandic economy meant that despite the dramatic drop in national expenditure (that could have decimated domestic demand), GDP only fell by 5,9% in this period.

⁵¹ Wage inflation in Germany would help.

⁵² At the time of writing nominal interest rates in Iceland have fallen considerably from their post-crisis high. In particular the Central Bank's current account rate (deposit rate) was lowered to 3,5% in December of 2010, having reached a high of 17,5% in late 2008. The drop in nominal interest rates was in step with a rapid fall in inflation after the effects of the depreciation of the currency in 2008 had passed through to the price level. The 12 month inflation (including housing) was measured at 2,5% in December 2010, having been slightly above 18% two years earlier. Without housing, inflation was measured at 3,5% at the same time, having hit 21% two years earlier. Other interest rates have followed the Central Bank's and in particular the government has been able to finance itself locally at quite favorable rates. The relatively low nominal interest rates in Iceland at present do however to a large extent reflect having considerable sums held by foreigners frozen in Iceland due to the capital controls. When the capital controls are eventually lifted it is to be expected that the supply of capital in the domestic market will be reduced, raising domestic interest rates.

The fact that the Icelandic financial sector was to a large extent financed abroad means, as described above, that the bulk of the losses due to the destruction of financial assets in the Icelandic crisis falls on foreign creditors. That is of course unwelcome news for them, to say the least, but the effects of this for the international financial community in general are nevertheless limited. The Icelandic financial sector may have been very large relative to the Icelandic economy but it was still very small by international standards and in isolation it was not source of systemic risk internationally. A similar destruction of financial assets, relative to the size of the economy, in a larger country could obviously have far worse ripple effects outside the country. The Icelandic financial system was not too big to fail from the viewpoint of the worldwide financial system. That was part of Iceland's uniqueness.

That still leaves unanswered the question of whether a rescue package that would have allowed for a more orderly wind-down of the Icelandic financial system would have been justifiable. The potential benefits of such a package would presumably mainly have come from higher recovery rates if the Icelandic banks had been saved from outright collapse but had instead been absorbed or backed up by an entity or entities with sufficient liquidity and solvency to allow for an orderly sale of assets and scaling down of operations without going through a bankruptcy process.

The Icelandic state had sufficient resources, with the help of the IMF and countries that provided funding alongside the IMF, to allow the domestic operations of the Icelandic banking system to continue to function. The rest of the collapsed banking system had to be wound up as insolvent. Since the domestic part of the banking system continues to operate, as 'new banks', the assets that were carved out of the estates of the collapsed banks to set them up are now on the balance sheets of fully functioning, both liquid and solvent, financial institutions that presumably can do a proper job of realizing the value of those assets. The question of whether higher recovery rates would have been possible from the collapsed banking system is therefore mainly whether the foreign assets of the collapsed banks, that the estates manage themselves, would

have been worth more if they too had been somehow taken, preferably before October 2008, on to the balance sheet of fully functioning financial institutions. This is in essence a question of whether the bankruptcy or winding up process *per se* manages to salvage enough value from the assets of a failed bank to make a rescue effort unnecessary. Even if there is some inefficiency in the winding up process relative to what a fully functioning financial institution could achieve the question remains whether the creditors of the failing institution, that benefit from higher recovery rates, could have been persuaded to participate in a rescue effort, providing the needed financial resources upfront in hope for better recovery down the line instead.

With a larger financial system in trouble the question of ripple effects or international systemic risk becomes pertinent. Then the value of a rescue effort must include potential benefits from containing the problem. Figuring out who may benefit and by how much is however a daunting problem. Getting potential beneficiaries to foot the bill may very well be impossible.

We will not try to answer all these questions here. Although the lessons from the collapsed Icelandic financial system do shed some light on these issues, further research is needed, both into the case of Iceland and in general the financial tsunami that has hit most developed countries in the last couple of years, before we can hope to have answers to these questions and many more that have arisen.

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W09:09 Yu-Fu Chen and Gylfi Zoega: An essay on the generational effect of employment protection.

W09:08 Anna Gunnthorsdottir, Roumen Vragov and Jianfei Shen: Tacit coordination in contribution-based grouping with two endowment levels.

W09:07 Axel Hall and Gylfi Zoega: Working in spite of High Taxes: On the Role of Culture in Explaining High Employment in the Nordic Countries.

W09:06 Gylfi Zoega: Employment and asset prices.

W09:05 Gylfi Zoega: Market forces and the continent's growth problem.

W09:04 Gylfi Zoega: A double-edged sword: High interest rates in capital-control regimes.

W09:03 Jon Danielsson and Gylfi Zoega: The collapse of a country.

W09:02 Manoj Atolia, Tor Einarsson and Milton Marquis: Understanding liquidity shortages during severe economic downturns.

W09:01 Thorolfur Matthiasson: Spinning out of control: Iceland in crisis.

W08:07 Ragnar Arnason: Natural resource rents: Theoretical clarification.

W08:06 Axel Hall and Gylfi Zoega: Feminism and labour supply in the Nordic countries.

W08:05 Gylfi Zoega: Productivity, wages and relationships.

W08:04 Thrainn Eggertsson: Knowledge and economic progress: The role of social technologies.

W08:03 Thrainn Eggertsson: Genetic technology and the evolution of property rights: The case of Decode Genetics.

W08:02 Tinna Laufey Asgeirsdottir and Gylfi Zoega: Sleeping.

W08:01 Thorvaldur Gylfason: Development and growth in mineral-rich countries.

W07:14 Ragnar Arnason: Fisheries enforcement with a stochastic response function.

W07:13 Thorvaldur Gylfason and Eduard Hochreiter: Growing apart? A tale of two republics: Estonia and Georgia.

W07:12 Thorolfur Matthiasson: Economic gain from education in Iceland during the period 1985 to 1999.

W07:11 Alison L. Booth and Gylfi Zoega: Worker heterogeneity, new monopsony and training.

W07:10 Yu-Fu Chen and Gylfi Zoega: Aging and job security.

- W07:09 Ron Smith and Gylfi Zoega: Keynes, investment, unemployment and expectations.
- W07:08 Thorolfur Matthiasson and Claire W. Armstrong: Effects of foreshortening of transferred quota in an ITQ market.
- W07:07 Helgi Tomasson: Likelihood based surveillance of continuous-time processes.
- W07:06 Helgi Tomasson: Review of Econometric Modeling Approaches in Finance.
- W07:05 Anna Gunnthorsdottir, Roumen Vragov, Kevin McCabe and Stefan Seifert: The meritocracy as a mechanism to overcome social dilemmas.
- W07:04 Gylfi Zoega: Endogenous employment cycles in Euroland.
- W07:03 Thorvaldur Gylfason: The international economics of natural resources and growth.
- W07:02 Helga Kristjansdottir: Talking trade or talking aid? Does investment substitute for aid in the developing countries?
- W07:01 Ali Choudhary, Thorlakur Karlsson and Gylfi Zoega: Testing for customer markets using survey data.
- W06:13 Brynhildur Davidsdottir: Sustainable energy development.
- W06:12 Helga Kristjansdottir: Substitution between inward and outward foreign direct investment.
- W06:11 Helga Kristjansdottir: Evaluation of Icelandic trade flows, the gravity model approach.
- W06:10 Brynhildur Davidsdottir: Capital constraints and the effectiveness of environmental policy.
- W06:09 Gylfi Zoega: Market forces and the continent's growth problem.
- W06:08 Fridrik M Baldursson and Nils-Henrik M von der Fehr: Vertical integration and long-term contracts in risky markets.
- W06:07 Ragnar Arnason: Conflicting uses of marine resources: Can ITQ's promote an efficient solution?
- W06:06 Thorvaldur Gylfason and Gylfi Zoega: A golden rule of depreciation.
- W06:05 Ron Smith and Gylfi Zoega: Global factor, capital adjustment and the natural rate.
- W06:04 Thorolfur Matthiasson: To whom should the rent accrue?
- W06:03 Tryggvi Thor Herbertsson and Gylfi Zoega: Iceland's Currency Dilemma.
- W06:02 Thorolfur Matthiasson: Possible stakeholder conflicts in quota regulated fisheries, contribution to the political economics of fisheries.
- W06:01: Eyjolfur Sigurdsson, Kristin Siggeirsdottir, Halldor Jonsson jr , Vilmundur Gudnason, Thorolfur Matthiasson, Brynjolfur Y Jonsson: Early discharge and home intervention reduces unit costs after total hip replacement: Results of a cost analysis in a randomized study.
- W05:14 Gylfi Zoega and J Michael Orszag: Are Risky Workers More Valuable to Firms?
- W05:13 Friðrik Már Baldursson: Fairness and pressure group competition.
- W05:12 Marias H. Gestsson and Tryggvi Thor Herbertsson: Fiscal Policy as a Stabilizing Tool.

- W05:11 Tryggvi Thor Herbertsson and Gylfi Zoega: On the Adverse Effects of Development Aid.
- W05:10 Thráinn Eggertsson and Tryggvi Thor Herbertsson: Evolution of Financial Institutions: Iceland's Path from Repression to Eruption.
- W05:09 Tryggvi Thor Herbertsson: The Icelandic Pension System in 2004.
- W05:08 Ron Smith and Gylfi Zoega: Unemployment, investment and global expected returns: A panel FAVAR approach.
- W05:07 Gylfi Zoega and Thorlakur Karlsson: Does Wage Compression Explain Rigid Money Wages?
- W05:06 Thorvaldur Gylfason: India and China
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- W05:02 Alison L. Booth and Gylfi Zoega: Worker Heterogeneity, Intra-firm Externalities and Wage Compression
- W05:01 Tryggvi Thor Herbertsson and Martin Paldam: Does development aid help poor countries catch up?
- W04:12 Tryggvi Thor Herbertsson: Personal Pensions and Markets
- W04:11 Fridrik M. Baldursson and Sigurdur Johannesson: Countervailing Power in the Icelandic Cement Industry
- W04:10 Fridrik M. Baldursson: Property by ultimatum: The case of the Reykjavik Savings Bank
- W04:09 Ingólfur Arnarson: Analyzing Behavior of Agents of Economic Processes in Time
- W04:08 Otto Biering Ottosson and Thorolfur Matthiasson: Subsidizing the Icelandic Fisheries
- W04:07 Niels Vestergaard and Ragnar Arnason: On the Relationship between Greenland's Gross Domestic Product and her Fish Exports: Empirical Estimates
- W04:06 Ingolfur Arnarson: Modelling Fishery Management Schemes with an Olympic System Application
- W04:05 Ingolfur Arnarson and Pall Jensson: Adding the Sales Markets Dimension to Bio-Economic Models. The Case of Fishery Management
- W04:04 Edmund S. Phelps: Changing Prospects, Speculative Swings: Structuralist Links through Real Asset Prices and Exchange Rates
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- W03:07 Sveinn Agnarsson and Ragnar Arnason: The Role of the Fishing Industry in the Icelandic Economy. A historical Examination

- W03:06 Thorolfur Matthiasson: Paying paper by paper, the wage system of Icelandic University teachers explained
- W03:05 Gur Ofur and Ilana Grau: Bringing the Government hospitals into line: The next step of reform in the healthcare sector
- W03:04 Ingolfur Arnarson and Pall Jensson: The Impact of the Cost of the Time Resource on the Efficiency of Economic Processes
- W03:03 Torben M. Andersen and Tryggvi Thor Herbertsson: Measuring Globalization
- W03:02 Tryggvi Thor Herbertsson and J. Michael Orszag: The Early Retirement Burden: Assessing the Costs of the Continued Prevalence of Early Retirement in OECD Countries
- W03:01 Eirik S. Amundsen, Fridrik M. Baldursson and Jørgen Birk Mortensen: Price Volatility and Banking in Green Certificate Markets
- W02:10 Tryggvi Thor Herbertsson and Gylfi Zoega: A Microstate with Scale Economies: The Case of Iceland
- W02:09 Alison, L. Booth and Gylfi Zoega: Is Wage Compression a Necessary Condition for Firm-Financed General Training
- W02:08 Asgeir Jonsson: Exchange rate interventions in centralized labor markets
- W02:07 Alison, L. Booth, Marco Francesconi and Gylfi Zoega: Oligopsony, Institutions and the Efficiency of General Training
- W02:06 Alison L. Booth and Gylfi Zoega: If you're so smart, why aren't you rich? Wage inequality with heterogeneous workers