An Analysis of the Icelandic Financial Crisis

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The Icelandic crisis of 2008-2011 was initiated - like many other financial meltdowns in the latter half of the decade - by the Global Financial Crisis (GFC). However, rather than being a country that was simply hit harder than most by the global collapse, Iceland had positioned itself over the previous decade in such a way as to be almost uniquely vulnerable to the resulting credit crunch. In this article, we explore how the actions of the previous decade led to Iceland coming close to declaring bankruptcy as a country, the socioeconomic consequences thereof, and how the crisis was eventually resolved (Benediktsdóttir, Eggertson, & Þórarinsson, 2017).

Interesting Times: 1998 – 2008

For a country with less than half a million inhabitants, the currency of Iceland (the Icelandic krona, or ISK) was remarkably strong prior to the turn of the century, trading at roughly 70 ISK to the USD at the start of 1999 (TradingEconomics.com, 2020).

Seeking to exploit this strength, the three major privately owned banks in Iceland at the time - Kaupthing, Landsbanki and Glitsnir began to grow at pace. In the five years between 1998 and 2003, the liabilities of these three banks combined grew by a factor of four (from roughly 4 to 16 billion Euros): the result, as it turns out, of private investor groups taking out sizeable loans from each bank to purchase two of the others (Hreinsson, Benediktsdóttir, & Gunnarsson, 2010).

Even prior to these self-acquisitions, these three banks accounted for 95% of Iceland's banking system and 100% of Iceland's GDP. Moreover, the fact that it was a small, strongly inter-connected clique of investors that comprised the owners of these banks meant that the systemic risk of the group was far higher than suggested on paper.

Whilst prior to the turn of the century, Icelandic banks were - for the most part - financed by domestic deposits, the actualisation of the European Union set the charge for a vast surge in assets. Whilst Iceland is *not* a member state of the European Union (and at the time of writing, does not intend to begin accession talks any time soon), it *is* a member of the European Economic Area (EEA). This membership provided Iceland with access to Europe's financial markets in a manner akin to full membership, and in particular, allowed for Icelandic banks to open branches in EU member states.

This access and the aforementioned strength of the Icelandic krona (as Iceland was under no obligation to use the Euro) gave Europeans easy access to a readily available

investment diversification. Armed with artificially inflated balance sheets, the aforementioned Icelandic banks proceeded to lure in deposits from customers within (primarily) the United Kingdom and the Netherlands, with deposit guarantees of up to EUR20,000 as mandated by EU law. Between 2003 and 2008, the combined liabilities of these banks grew to 108 billion Euros - a figure roughly an order of magnitude higher than Iceland's GDP at the time. In Q1 2007, Moody's had given all three of these banks a long-term rating of Aaa (Moody's Investors Service, 2007).

The Domestic Impact Of A Hundred Billion Dollars

Flush with cash, the Icelandic domestic economy swelled. The OMX Iceland All-Share Price Index - a free-floating capitalisation-weighted index tracking the share price of companies trading on the Nasdaq Iceland exchange, set to 1,000 as of December 31, 1997 - grew from 1,407 in January 2003 to a peak of 8,174 in July 2007 (Nasdaq, 2020).

In terms of absolute wealth, the average Icelander was four times better off in 2006 than they had been just three years prior. However, this wealth came at the cost of rising house prices and inflation - nonetheless, with so much 'cheap' foreign currency readily available, many citizens simply took out second mortgages. This was not a situation truly unique to Iceland, however, taking place as it did during what Bernanke referred to as the 'global savings glut' (Bernanke, 2005). Inflation rates in the three months leading up to September 2008 were at 14%, with the Central Bank of Iceland (CBI) holding rates at 15.5%, further enticing foreign deposits.

The banks *themselves* went on what can best be described as a spending spree - acquiring shares in foreign companies, purchasing real estate, and - in Landsbanki's case - even going so far as to become a major shareholder in West Ham United, a Premier League football team in the United Kingdom. As global liquidity - and foreign deposits - began to slow in 2007, however, the three banks began increasingly relying on repurchase agreements (repos) from the CBI and the European Central Bank (ECB) in order to maintain their liquidity. Of the near 9 billion Euros that was being regularly borrowed, the CBI was providing roughly a third of this (Hreinsson et al., 2010).

Due to restrictions on the quality of the assets - e.g. bank bonds - that needed to be provided as collateral for these repos, the closely-interconnected Icelandic banks (which had, as mentioned above, *excellent* credit ratings), simply sold bonds between themselves and posted these as collateral. This came to be known as the 'love letter' arrangement (R. Wade & Sigurgeirsdóttir, 2010), and although the ECB did eventually catch wind of the scheme in April 2008, the CBI continued to accept these meaningless bonds up until the point of collapse. Worth keeping in mind, regardless, is that at the time of the GFC, the three banks had a loan exposure of 74 billion Euros to consumers (domestic and EU), a large chunk of which were *bullet loans* (where the principal and all accrued interest are repaid at the end of the loan tenor).

One final point to make is that at this point, Iceland's GDP was roughly 8.5 billion Euros, and the reserves of the CBI stood at 2.44 billion Euros (374.8 billion ISK). The Central Bank of Iceland was in nowhere near a position to act as a lender of last resort.

To recycle a phrase that became commonplace at the time: Kaupthing, Landsbanki and Glitsnir were not 'too big to fail' - they had become too big to *save*.

"Things Fall Apart, The Centre Cannot Hold"

The Icelandic crisis entered its' acute phase on September 15th 2008 - the day that Lehman Brothers went bankrupt, triggering a series of failures of both central banks and governments to aid financial institutions under duress. Insofar as Iceland is concerned, the three banks found no one willing or capable of refinancing their repo agreements, and collapsed as a result. Given their relative size compared to both the CBI and Iceland's GDP at the time, this collapse effectively signalled Iceland's bankruptcy as a nation.

The boards of all three banks were replaced, and all were placed into receivership: a form of administration designed to realise assets for secured creditors: in effect skipping over the 'administration' phase of a distressed company and moving straight to liquidation. In order to avert a further credit crunch, the banks were divided into 'old' and 'new' variants to ensure domestic services could continue without contaminated balance sheets (Darvas, 2011), with the 'new' variants funded with roughly 30% of Iceland's GDP.

Within the European Union, an immediate run on the deposits held by the foreign subsidiaries of the - now collapsed - banks led to strenuous negotiations between the Icelandic and both the UK and Dutch governments to assure the guarantee (and rapid return) of assets held and guaranteed by Icelandic subsidiary banks. Whilst agreements were eventually struck concerning repayment plans (with, for example, Landsbanki finally repaying the last of a 4.6 billion GBP loan to HM Treasury in January 2016 (Dunkley, 2016)), the way in which foreign subsidiaries were set up led to indiscrepancies in the depositor protection offered to different parts of the UK (i.e. depositors in Guernsey were left with no recourse or reimbursement).

Within Iceland itself, the result of the collapse was pretty much textbook: the value of the krona dropped by 50% in a single week, and the Icelandic stock market plunged by two-thirds over the course of a single weekend (Nasdaq, 2020). Within the course of a single year, pension funds were predicted to shrink by up to a quarter (Jóhannesson, 2008), GDP was predicted to drop by 10%, and inflation was earmarked to jump as high as 75%. By November 2008, unemployment figures had tripled (Icenews, 2008), and aid to developing nations was cut in order to address the issues unfolding at home.

Politically, the impact of the collapse led to widespread protests against the actions of the CBI, kickstarting a movement called the 'Kitchenware Revolution', frequently boasting crowds of up to 1-2% of the Icelandic population protesting outside the Icelandic Parliament, the AlÞingi (Althing). The primary goal of these protests was the resignation of government officials and the setting of new elections. In time, these demands were met, with the resignation in February 2009 of the erstwhile Prime Minister of the right-wing Independence Party, Geir Haarde (Gunnarsson & Tran, 2009), followed shortly by the Commerce Minister Björgvin Sigurðsson, citing the stress of dealing with the fallout of the crisis (Stringer, 2008).

The Recovery (2011-2013)

By 2011, the immediate impact of the crisis had dissipated, and recovery of a sort was underway. Three main factors can be attributed to this, and serve as the primary reasons why Iceland is considered one of Europe's success stories insofar as the fallout from the GFC is concerned.

Firstly, within the span of a year, Iceland's (new) government under the leadership of Jóhanna Sigurðardóttir began accession talks with the EU for full membership status (Vogel, 2011). Whilst more recent events have shown that these talks are staggered at best (with the application being withdrawn or re-entered into depending on the political party in power), at the time it was seen as a move that significantly improved its' reputation on the international money markets.

Second is the impact of the Stand-By-Agreement (SBA) enforced by the International Monetary Fund (IMF), in place in Iceland since November 2008 (IMF, 2020). Whilst the agreement itself comprises several pillars, fundamental to them all is the emphasis on enhanced capital controls and a vastly reduced domestic banking system. One fortuitous side-effect of the restrictions imposed by the SBA is that Iceland was spared from most of the damage of the Eurozone crisis which began two years later.

Finally, the emergency legislation passed by the Althing in October 2008 which allowed the Icelandic government to seize control of (and dismantle) the affected banks to minimise the disruption of their domestic banking activities, whilst placing the contaminated foreign subsidiaries into receivership. Fast action on the government's part meant that whilst Icelanders were definitely *affected* by the fall-out from the crisis, the degree to which the average citizen was damaged was significantly less than it could have been. As of 2011, an OECD report on Iceland considered that the nation was well on its' way to 'resolving the economic problems left by the financial crisis' (OECD, 2011).

The Evolution of Iceland's Interest Rate

To analyze the build-up to the crisis, we first look at the real interest rate (RIR) in Iceland, the economic variable we have chosen to examine. Echoing both the Asian Crisis and the Crash of 1987, the real interest rate was one of the leading drivers of said crisis. In particular, at the time of the Global Financial Crisis (GFC), the interest rate set by the Central Bank of Iceland was set at 15.5%, attracting international deposits right up until the point of no return (Boyes, 2014).

Figure 1 below plots the changing interest rate over time from 1987 to 2015 using data retrieved from the World Bank under the FR.INR.RINR tag[1]. We observe that the trough of the graph appears in 1990, where the interest rate reached 1%, but beyond that hovered consistently above 8% from 1991 to 2007, peaking at 14%.

Cross-referencing the above against data from the International Monetary Fund (IMF),

[1]We leverage data available via the World Bank data portal, accessed via the Python `pandas-datareader` package - references to 'tags' allude to this data.

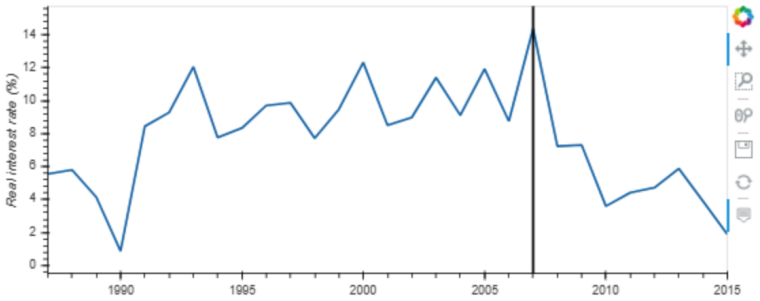


Figure 1: Real Interest Rate (%)

we see in Figure 2 below that in 2007, Iceland very nearly featured in the top ten countries with the highest RIR worldwide, and was the only country in the EEA in the top 20:

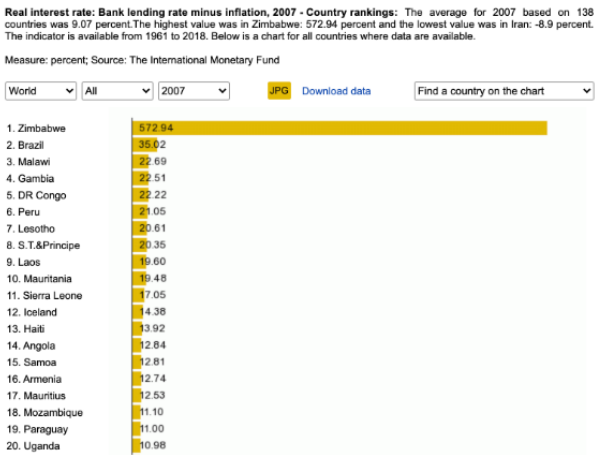


Figure 2: 2007 Real Interest Rates (Country Rankings)

As a consequence of Iceland's high RIR (recall this is the difference between a central bank's lending rate and inflation), the Icelandic Krona (ISK) became a target asset for *carry trading*. Carry trading is a trading strategy wherein a trader borrows an asset - typically a currency - with a low interest rate, and uses that asset to invest in a high interest rate asset (Chen, 2020). Due to the table-topping RIR of Iceland, this meant that ISK was increasingly the latter asset in carry trades, artificially inflating the strength of ISK as an investment.

The below chart - indicating official exchange rate data pulled from the PA.NUS.FCRF tag - shows that the relative strength of ISK against the USD significantly increased between 2001 and 2007, after over a decade of slow decline during the 1990s. The start of said decline corresponds to when Iceland first exceeded an RIR of 8%. As is to be expected, the strength of the ISK collapsed in the aftermath of the GFC, and has remained somewhat steady since then.

Iceland's RIR not only impacted carry trades, but it also impacted foreign direct investment due to the attractiveness of investment returns. With rates exceeding 8% since the 1990s, investors were receiving world-beating returns when investing in Icelandic fixed-income assets such as government bonds and commercial bonds. *Prima facie*, these

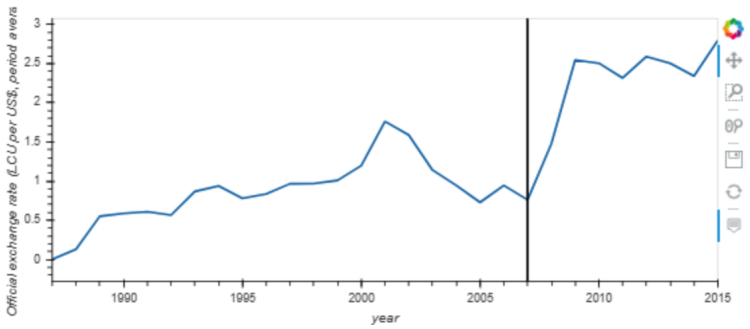


Figure 3: Official Exchange Rate (LCU per US$, period average)

investments had limited downside risk, given that the bonds were backed by the Icelandic government and corporations around Iceland.

During the boom years of 2002-2007, the strength of the ISK against the USD further reduced any uncertainties concerning exchange rate depreciation when these bonds reached maturity. All things considered, these circumstances made investing in Iceland hugely attractive in the years leading up to 2007; indeed, by mid-2007, the outstanding 'glacier bonds' issued abroad in ISK amounted to roughly a third of Iceland's GDP (Benediktsdóttir, Eggertsson, & Þórarinsson, 2017).

Taking advantage of their membership of the EEA, Icelandic banks set out to attract foreign deposits by offering one of the highest deposit rates in the EU (starting at 6%) and opening online banks partnered with institutions in various member states. A combination of these high interest rates - along with the legal obligation to guarantee up to EUR20,000 per account per EU law - led to foreign deposits increased to over EUR16 billion by mid-2008, representing 15 percent of the combined balance sheets of the banks underpinning their foreign subsidiaries at the time of failure (Benediktsdóttir et al., 2017).

The graph below, indicating the balance of payments in foreign direct investment - pulled from the BX.KLT.DINV.CD.WD tag - shows us the sheer scale of the meteoric increase in investment between 2004 and 2007, just prior to the crunch of the GFC.

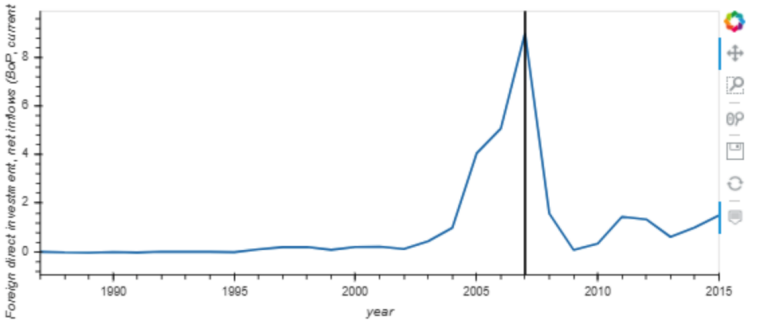


Figure 4: Foreign Direct Investment, Net Inflows (BoP, current US$)

The IS-LM Model

The IS-LM (Investment Savings - Liquidity-preference Money-supply) model is another useful tool that we can use to understand the relationship between the real output of an economy and the real interest rate. The model helps us to understand how an economy keeps itself balanced by maintaining an equilibrium between money supply and interest rates (Krugman, 2019).

According to the IS-LM model, liquidity is determined by the size and velocity of money supply. The LM curve on the model demonstrates that higher levels of income (GDP) induces an increased demand to keep money on-hand for transactions - leading to a reduction in savings - to meet the growing demand for money in the economy. As a consequence, it follows that in order for interest rates to be kept unchanged as GDP increases, the available real money supply needs to increase.

The below graph, indicating the percentage of broad money that constitutes GDP at any given time - pulled from the FM.LBL.BMNY.GD.ZS tag - shows us that the broad money supply increased threefold in Iceland between 2002 to 2006. This follows from the immense growth within the Icelandic stock market over the same period, with the average Icelander being four times better off in 2006 than they had been just three years prior.

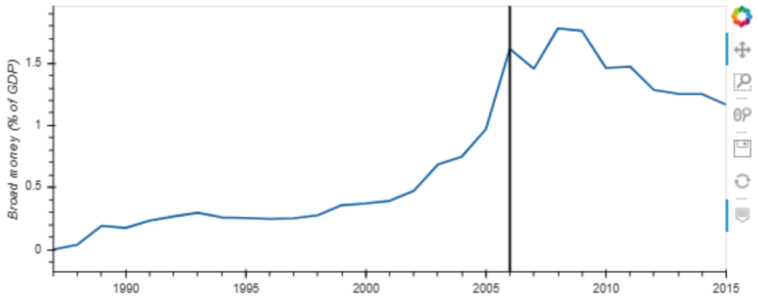


Figure 5: Broad Money (% of GDP)

A Broader View

Another contributing factor to the financial crisis in Iceland is a simple one - overleveraging by Icelandic citizens. To illustrate the point, Iceland's domestic credit within the private sector as a percentage of GDP also peaked in 2006, as shown in the graph - pulled from the FS.AST.PRVT.GD.ZS tag - below:

From the 1990s to the early 2000s, Icelandic Prime Minister Davíð Oddsson adopted economic policies and approaches to privatization in the same vein as that of Reaganomics. The 2001 privatisation of the banking sector in the country resulted in a new and wealthy elite with political and financial power, which - unsurprisingly - led to cronyism. In 2003, Iceland's government relaxed house-loan standards, offering mortgages with a loan-to-value ratio of up to 100% (i.e. no downpayment required). Banks also began offering customers 'exotic' products such as loans in foreign currencies.

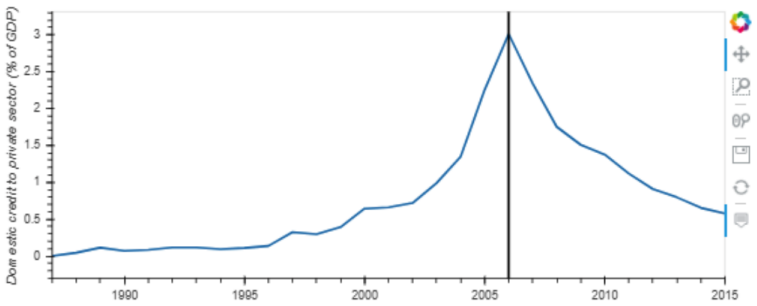


Figure 6: Domestic Credit To Private Sector (% of GDP)

With access to cheap credit and unsecured loans, many Icelanders took advantage of the latter to purchase assets in neighbouring economies when globalisation vaulted Iceland into the economic fast lane. This can be seen from the spike in domestic credit as a percentage of GDP to the private sector in Figure 5 above. At its peak, domestic credit to the private sector was 3% of Iceland's GDP.

In particular, the banking sector discovered the alchemy of borrowing cheaply abroad, buying assets abroad, and then transforming the revenue streams into dramatically higher profits, wages, tax revenues and political support at home (R. H. Wade & Sigurgeirsdottir, 2011). This enabled the Icelandic banks to rise into the league of the world's 300 largest banks. In the run-up to the 2008 financial crisis, the Icelandic banking system grew to almost nine times Iceland's GDP by the end of 2007 (R. H. Wade & Sigurgeirsdottir, 2011).

Whilst Iceland was enjoying the ownership of its newly purchased assets and newfound wealth, it eventually succumbed to the financial crisis when it fell victim to massive outflows of cash and an abrupt end of credit. Funding stresses in global financial markets - which had started in 2007 - had been building up, and became acute in mid-September 2008 when repo and money markets dried up after the demise of Lehman Brothers. Companies and governments in America and the European Union began clamping down on credit against the Icelandic (indeed, *all*) banks, leading to massive outflows of cash and the crushingly abrupt end of credit access.

The AS-AD Model

The AS-AD (Aggregate Supply - Aggregate Demand) model suggests that credit becomes more expensive and difficult to acquire as the money supply drops. The three major privately owned commercial banks in Iceland (Kaupthing, Landsbanki and Glitsnir) which had funded their breakneck international expansion with astronomical loans no longer had access to refinancing (France24, 2018).

As part of the credit tightening, Iceland was asked to repay its loans immediately. But Iceland did not have the money to avoid the financial calamity. It went on to default on some of the credit that it had borrowed, further damaging its credit rating and precipitating an economic crisis (Boyes, 2014).

By mid-2008, these banks had no other funding options. Confidence in the Icelandic banks was low and funding strains were widely felt - because wholesale funding could no longer be renewed, customer deposits were withdrawn and central bank collateralised lending had reached its full capacity.

In September 2008, banks in Iceland had to seek help from the Central Bank of Iceland. In October, Iceland nationalized the Glitnir and Landsbanki banks. In mere weeks, funding had dried up and the banks' credit scores were in ruins (Baudino, Sturluson, & Svoronos, 2020). By Friday 3 October, the whole Icelandic banking system was subject to an increasing and widespread run, bringing it to the brink of collapse (Hreinsson et al., 2010). As the crisis continued, 85% of the banking system failed and more than 50,000 people lost their savings (Boyes, 2014).

The Icelandic financial crisis happened with a combination of large macroeconomic imbalances, which had built up precedent the crisis, and an oversized banking system. The crisis has shown the importance of prudent monetary and economic policies.

Policy & Institutional Responses

The Emergency Act

At the height of the Icelandic financial crisis, the most important governmental policy response was the Emergency Act, which contained two important elements: firstly, it gave deposits priority claims over other debt liabilities held by affected banks, and secondly, it gave the Financial Supervisory Authority (FME) extensive resolution authority over the banks in the event of bankruptcy. The Act was passed on the 6 October 2008, with the latter authority exercised the following day, nationalising the three largest - and most affected - banks (Kaupthing, Glitnir and Landsbanki).

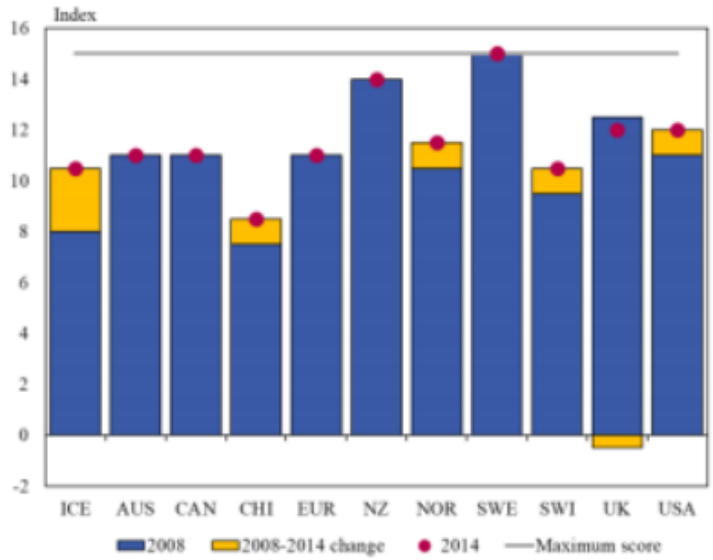
The Emergency Act's latter provision guided the orderly resolution of these crisis-stricken banks when they failed. All three newly nationalised banks were split into well-capitalised 'new' banks and bankrupt 'old' banks, with all domestic deposits - and most of the domestic assets - of each defunct bank being transferred to the newly formed variants. In making these splits, the government did not assume any prior liabilities, rather forcing creditors to bear all losses. A happy consequence of this swift nationalisation is that banks remained open for domestic business throughout the crisis, minimising disruptions to the real economy. There were no bank runs and banks were able to continue giving out loans to businesses and households. The Emergency Act enabled a smooth transition from the old banks to the new, and mitigated the effects of the banking crisis on the real economy (Benediktsdóttir et al., 2017).

Fiscal Policy Responses

It seems something of an understatement to say that the events of 2008 illustrated a number of weakpoints in the financial status quo of Iceland in the years leading up to them. It is also quite easy to suggest that these were being overlooked by the government of the time in the pursuit of a bubble - given the incredible boost in wealth that Iceland had received, it likely seemed reasonable to persist with high inflation (leading

to stratospheric amounts of foreign deposits) and to turn a blind eye to behaviour that - in the context of today's Basel III framework, at least - probably cause a systemic risk analyst to quit their job, in order to build up a mattress for when the music stopped. As we saw worldwide, however, no one expected the music to stop quite as quickly as it did, and Iceland's response has rightfully earned it praise as one of the countries that turned its' fortunes around the fastest.

Significant changes to this 'old way' of doing things were thus implemented in early 2009. Firstly, a single Governor - together with a Deputy Governor - replaced the previous three-member Board of Governors, and a five-member Monetary Policy Committee (MPC) replaced said Board of Governors as the primary monetary policy decision-making body. These significant governance structure changes aimed to introduce financial stability and closer collaboration between the Central Bank and the Financial Supervisory Authority. Secondly, monetary policy became more transparent as shown in the chart below, illustrating the change in transparency of various central banks according to an index score produced by (Dincer & Eichengreen, 2014).



Monetary policy decisions are now made by a simple majority and are announced at a press conference on the decision day. The minutes are subsequently publicised two weeks later, including information on individual voting (although the identity of individual votes is only revealed with a lag in the Central Bank's Annual Report the following year). In addition, MPC members are expected to explain their views publicly, and are required to both appear in front of a parliamentary committee and submit a written report to the Icelandic parliament biannually (Pétursson, 2018).

This is a significant break from the past, wherein minutes of monetary policy meetings were not published and information on the voting and individual views was opaque. There was little public explanation of the rationale behind monetary policy decisions and no fixed structure for parliamentary hearings.

As has been stated already, Iceland did not save contaminated banks, but rather placed them in receivership to ensure financial stability (Georgievski, 2014). The single most

important fiscal policy that resulted was the stability contribution from the creditors of the failed banks, amounting to 18.2% of GDP. Half of this was connected to ownership stakes in two of the new banks, which resulted in the state having near total control of Íslandsbanki (formerly Glitnir), and the dividends and sales proceeds of Arion Banki (formerly Kaupthing) was split between the state and claim holders. This contributed to an estimated 8.8% of GDP in the state's ownership of banks, which resulted in it owning 20.6% of GDP in bank equity at book value at the end of 2016. Other postcrisis revenues include a tax on the estates of the failed banks amounting to 3% of GDP (Benediktsdóttir et al., 2017).

Institutional Response

The primary institutional response was the creation of a Special Investigation Commission (SIC) to investigate the causes and lessons of the crisis - the resulting document of which has formed one of our primary references for this report. The SIC consisted of Supreme Court Justice Páll Hreinsson, who served as chairman, Parliamentary Ombudsman Tryggvi Gunnarsson, and Sigríður Benediktsdóttir, associate chair at Yale University. The Office of the Special Prosecutor (OSP) was also founded in December 2008 to investigate suspected criminal conduct pertaining to the banking crisis. As a result of the work of the OSP, the chief executives of all three of Iceland's largest banks had convictions upheld by the Icelandic Supreme Court for their role in the crisis, along with over two dozen additional prosecutions of 'lower-tier' participants (Scrutton & Sigurdardottir, 2015).

Capital Controls

Capital controls were imposed by the Icelandic government at the insistence of the IMF as part of the latter's Stand-By Agreement (IMF, 2020). This prevented foreign capital from leaving the country, and these foreign funds helped to lower the domestic financing cost. Said controls also prevented capital flight from wealthy Icelanders, as due to the crisis, the Icelandic government needed to engage in deficit spending. Capital controls helped the government in financing its large budget deficits.

Currency Devaluation

Iceland has its own currency, the Icelandic Krona (ISK). The relative strength of the ISK in the years leading up to the crisis, as well as the fact that it was an asset at a remove from the Euro, led to it being viewed as a particularly valuable diversification by European investors. During the crisis, the government allowed the real exchange rate to depreciate significantly by 40% from Q4 2007 to Q3 2009. This currency devaluation made imports much more expensive, forcing Icelanders to switch their expenditure toward domestically produced goods. This is in stark contrast to the boom years prior to the crisis, which were characterized by a large amount of net foreign borrowing - in the years leading up to the crisis, the current account deficit averaged 17% of GDP. In 2009, the current account reversed sharply to a surplus of 8% of GDP. The substantial depreciation of the ISK was an important factor in this reversal.

Due to devaluation, people stopped buying durable goods (which are mostly imported, given the lack of manufacturing capability in Iceland itself). For example, the number

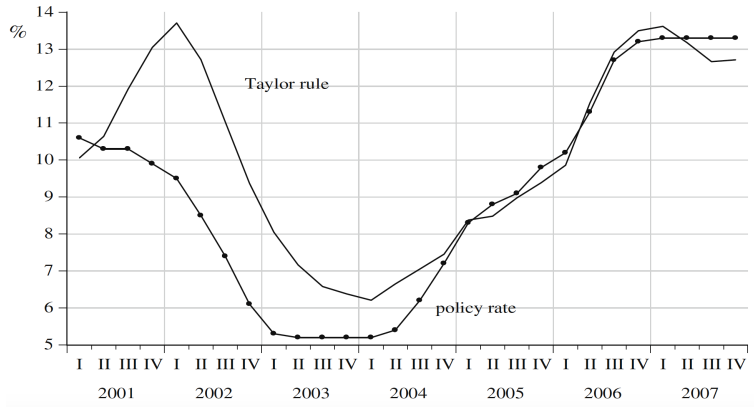
of new car registrations fell 94% from November 2007 to November 2008. However, a law was passed allowing for the re-export of newly imported cars that had not been sold when the crisis occurred, with similar stories for other durable goods. On the export side, the devaluation of the ISK led to a substantial rise in Iceland's tourism industry. After the crisis, Iceland's services balance was the largest contributor to the current account surplus, standing at 10% of GDP as of 2016. In addition, the devaluation of the krona, allowed for some inflation in Iceland, lowering real wages without causing social unrest. This helped the government get its budget under control (Benediktsdóttir et al., 2017).

Challenges To Traditional Risk Management

The Taylor rule was a popular interest rate model for the central bank at the time. According to Taylor rule, the interest rate evolves according to the equation -

$$R_t = aR_{t-1} + (1-a)[(R^* + P^*) + b(P_t P^*) + cG(t)]$$

- where R is the policy rate, P is the inflation rate, G is the difference between output and its potential, R^* is the equilibrium real interest rate and P^* is the target inflation rate. The Icelandic governments also employed the Taylor rule and the interest rate was observed to closely track the model from 2004 to 2007 with a specific set of parameters, particularly $a = 0.17, b = 1.5, c = 0.5, R^* = 3.5\%$ and $P^* = 2.5\%$ (Zoega, 2016).



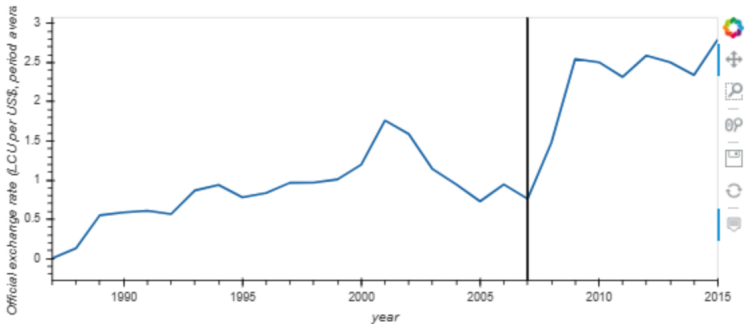
What came as a surprise to the policy maker was that the usage of a classic model, together with the knowledge of a target inflation rate and common equation parameters, presented an unique challenge to the monetary policy.

Prior to the crisis, in order to attract foreign investment, the Icelandic government decided to raise the interest rate to a high level of 15%. A high real interest rate in the short term would make domestic investments appear more attractive and raise the demand for domestic currency, resulting in a short-term currency appreciation. In the long run, the exchange rate is expected to follow the interest rate parity equation -

$$E = \frac{1+i}{1+i^*} E^e$$

- where E is the exchange rate, E^e is the expected exchange rate from foreign currency to domestic currency, i is the real interest rate and i^* is the expected real interest rate. This equation effectively indicates that a higher interest rate would entail a higher exchange

rate or in other word a long term currency depreciation. So if the interest rate parity has operated efficiently, we would see a sharp appreciation followed by a gradual depreciation of the currency. Surprisingly, the currency was bullish for four years from 2004 and only made the expected reversal sharply in 2008. This gave the capital inflow and carry-trades a longer opportunistic window to intensify and inflated bank balance sheets, raising the dependency on foreign capital to an unprecedented and uncontrollable level.



One explanation for this unusual long period of currency appreciation was the speculation that the government would continue to raise the interest rate in order to meet the inflation target according to Taylor rule and also to defend against currency depreciation that would disrupt the domestic price level. This boosted investors' confidence to assume more exchange rate risk and therefore further fueled the carry-trades. This was an interesting case of asymmetric monetary policy where currency depreciation would be patched by interest rate increment while currency depreciation would be entertained.

Another explanation, and also a divergence from traditional macroeconomic models and hence a challenge for policy makers, was that currency appreciation, instead of inhibiting domestic demand growth, shifted the demand toward durable imports and non-tradable goods and induced an economic boom. This further amplified the incentives and exposure to foreign capital, fortifying the currency speculation and paralyzing interest rate policies, effectively steering the economy toward a credit bubble.

Over the time, the Icelandic capital account became highly leveraged with large current account deficit and foreign debts. The inevitable result is abrupt bank runs and capital outflow when the credit bubble burst in 2008 as part of the global financial crisis, spurring a shattering crash of the currency value. As discussed above, primary responses to the crisis were monetary policies directly aiming at exchange rate recovery and capital outflow reversal, most notably through a scheme of capital controls and high interest rates, which were meant to be softened over time (Gudmundsson & Zoega, 2016).

It was however still a debating ground with respect to the effect of high interest rate in the context of capital control. Some research (Gudmundsson & Zoega, 2016) has shown empirical evidence of weak effect of interest rate change accompanied by strong effect of capital control enforcement, emphasizing the role of capital control for currency value recovery.

The Moral/Ethical Implications Of Financial Crises

Financial crises bring about moral and ethical implications that require addressing by policymakers and institutions alike. These efforts to institute some sense of ethics to the financial markets are certainly worthwhile.

Financial institutions have a duty of care to adopt prudent policies, and avoid taking excessive risks that add to the instability of the global financial system. In the 1997 Asian Financial Crisis, currency attacks on Southeast Asian currencies such as the Thai Baht by hedge fund manager George Soros were questioned from a moral perspective, even though there is a good argument to be made that as a sole market participant, he was exempt from a duty of care and was 'permitted' to make profit, come what may.

The 2008 Global Financial Crisis originated from a subprime crisis that was partly due to high-risk financial derivatives of collateral debt obligations (CDOs). Investment banks such as Goldman Sachs were criticized for not disclosing the risks involved with mortgage-backed securities (MBSs) despite knowing they were investments of low quality. The fundamental ethical requirement of financial markets is fairness; however, due to asymmetric information, investors can often be put at a distinct disadvantage. For instance, during the buildup to Iceland's financial crisis, loans by Icelandic banks were often related to cross-ownership or other relations between parties in which dubious collateral was placed (Jannari, 2009).

As we now know, one of the contributing factors to Iceland's financial crisis was the easing of lending restrictions. The loans that resulted were not only ill-considered, but also questionable from both a legal and ethical standpoint. The reason for this is because loans issued in the aftermath began requiring abnormally low collateral ratios relative to the size of the loans. The actions of Icelandic banks were akin to gambling on a high risk, high return strategy wherein they reaped all the benefits if they were successful, but none of the downside if not.

In addition, some of the loans were also used to finance purchases of the bank's own shares. In other words, Icelandic banks were issuing loans to manipulate and prop up their own share prices and keep them artificially high. A consequence of this laissez-faire approach to loans can be viewed in Figure 7, representing the relative growth of both holding companies and households in Iceland in the years leading up to the crisis.

Despite the frenzied increase in lending to households, and the warning signs that should have been observed as a result, Icelandic banks continued this practice because they had a chance of striking it rich if they were successful in their investments. In essence, stockholders, bondholders, and taxpayers behind Icelandic banks would pick up the tab if these investments were unsuccessful (Sigurjonsson & Mixa, 2011).

Thus, regulators have a responsibility to ensure that guidelines are adhered to by firms in their respective financial markets. In addition, central banks should be transparent in their decisions and publish results and views following their decisions. Macro/micro-prudential policies are important for financial stability especially for small and open economies, and doing the 'right things', such as ensuring sufficient reserve requirements,

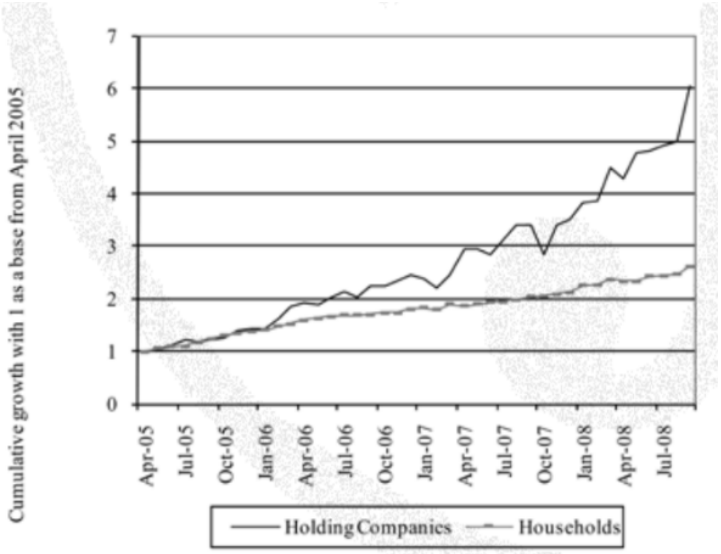


Figure 7: Relative Growth of Icelandic Holding Companies and Households

monitoring liquidity regulations, ensuring sound regulations on mortgage exposure, imposing limits on interbank exposure and building stress tests to model extreme scenarios to understand systematic risks can prevent crises in advance. Key decision-makers should ideally also be ethical 'guardians', striving to make the world a better place.

To save the country from the financial crisis, the Icelandic government introduced austerity measures as part of financial consolidation. Taxes were increased on its citizens, especially for those in the high income bracket. Spending reduction reforms were also made in health and education while public sector pay was cut. The spending reforms that were made on the health and education sector had an impact that lasted longer than the financial crisis itself. By reducing spending on healthcare and education, Iceland's government was sacrificing the future of the country in a bid to save the country from the mismanagement that led to the crisis. This moral dilemma of sacrificing the future for the country's present became one of those implications for Iceland.

There are, however, also some positive social impacts as a result of Iceland's financial crisis. In the years prior to the crisis, Iceland's Gini coefficient was rapidly trending towards increasing inequality. However, post the financial crisis, the trend actually reversed as a result of the government's policies that led to a redistribution of income back to levels seen before the financial boom that precipitated the economy's collapse (Tan, 2018).

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