The Rise and Fall of the Icelandic Economy

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Iceland became the first developed country in 30 years to request help from the IMF in 2009. While the depths of its recent recession are well studied, the causes of its origin are still misunderstood. This paper looks at two factors: (1) the blanket guarantees provided to the Icelandic banking system by various public agencies, and which fostered an environment of excessive risk taking; (2) a faulty inflation-targeting framework by the Central Bank of Iceland, which resulted in a credit binge engulfing the small island. While the first factor explains why Iceland´s banking sector grew as large as it did, the second accounts for the magnitude of the imbalances in both the real and financial sectors.[1]

Key Words: Iceland; Economic crisis; Inflation targeting; Credit; Deposit insurance.

Despite Iceland's being one of the oldest democracies in the world, its monetary regime has a much shorter history. The small island nation gained monetary autonomy from Denmark only in 1918, and didn't start minting its own coinage until four years later. The Central Bank of Iceland (CBI) is one of the world's youngest central banks, serving in its capacity since only 1961. Bouts of hyperinflation ended in 1981 with a revaluation of the Icelandic króna and a shift towards monetary stability. This shift was completed in 2001 as the CBI ended the fixed exchange-rate regime, which had defined the króna for decades, while also moving to an inflation-targeting framework to achieve price stability.

In 2008, the most severe recession to affect a Western country

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enveloped Iceland. The country became the first developed economy in over 30 years to request aid from the International Monetary Fund (IMF). The CBI had evidently failed to provide monetary stability less than a decade after the floatation of the króna brought on lofty calls for it.

Consider the following stylized facts. Between 2001 and 2008, the island's population increased by only 1.66 percent per year, while its narrow money supply (M1) increased by almost 34 percent. Consumer price inflation averaged more than 6.6 percent annually over this period. While the stock market boomed, increasing its market capitalization by over 12 percent per year, the average citizen saw his real (inflation-adjusted) share of the wealth increase by less than 2 percent per year.

Somehow there was a disconnect between the impressive growth on the money-side of the economy and the lackluster performance of the real-side. In this paper I look at two sources of imbalance.

On the one hand, there was a wide range of investment guarantees motivating the increase in risk-taking of both Icelandic and international investors. These included, primarily though not exclusively, (1) a broad and comprehensive deposit insurance plan offered by the country's financial supervisor, the FME ("*Fjármálaeftirlitið*" or "Financial Supervisory Authority"); (2) mortgage insurance offered through the Icelandic government's Housing Financing Fund (HFF), (3) explicit lender of last resort guarantees by the CBI; and (4) implicit guarantees to the Icelandic State through supranational organizations such as the IMF. These guarantees motivated Icelanders to increase their risk-taking more than would otherwise be sustainable, and also increased the amount of foreign funds entering the country as international investors moved to exploit Icelandic profit opportunities in the mid-2000s.

On the other hand, there was a faulty inflation-targeting framework by the CBI. The key rationale behind such a framework is that price stability will promote broader economic stability. As we shall see, not only did the CBI regularly overshoot its inflation target, but economic stability would not have been the result even if it had

been met. The manipulations to the interest rate at the hands of the central bank caused investors to change their consumption-investment patterns, with the result being an unsustainable boom waiting for its luck to turn.

Investment Guarantees – Narrow and Broad

Housing Financing Fund

Iceland's government-owned mortgage lender, the Housing Financing Fund (HFF), was created in 1999 by the Housing Act (no. 44/1998). Its stated goal is to "ensure housing security and equality for all Icelanders through lending and organization of housing affairs … to increase people's opportunities of obtaining and leasing housing on controllable terms."

The HFF quickly extended its operations to a large segment of the population. By 2004, almost 90 percent of Icelandic households held an HFF loan, which the Fund financed by issuing debt; almost half of the Icelandic bond market was invested in HFF-issued bonds (Hunt, Tchaidze and Westin 2005: 29). The size of the debt market guaranteed by the HFF, and in turn the government, had quickly grown too large for the state to guarantee if wide-ranging defaults occurred, as would almost certainly happen if housing prices declined in the highly leveraged market. By striving for housing security for all, the HFF imperiled the solvency of the Icelandic state through the reliance on increasing housing prices it engendered throughout the housing boom.

The HFF is not unique among developed countries. Fannie Mae and Freddie Mac also existed to promote housing opportunities in the United States. What set the HFF's operations apart from other similar institutions was the scope of its involvement and the range of individuals granted access to its services. While many housing funds existed to aid individuals in the lower-income strata gain access to the housing markets, Iceland extended these opportunities to all. (Bagus and Howden (2011: 56) note that this could be a result of a conscious effort to promote egalitarianism among Icelanders.)

Most state housing agencies in other countries aided home ownership only indirectly. The HFF, in contrast, was not just limited

to underwriting private loans but also issued loans directly to consumers. Icelanders showed widespread public support for the state-controlled mortgage system. Furthermore, the HFF was explicitly guaranteed by the Icelandic government, leaving no ambiguities as to the solvency of the Fund. HFF-guaranteed mortgages could be issued at essentially the same risk as the Icelandic government because the latter served as a guarantor of the former. This support encouraged the HFF to expand its operations beyond its already lenient core operating mandate. By 2005 the Fund was funneling excess liquidity into the commercial banking system. Approximately 80 billion krónur (1 billion euros) were made available to Icelandic businesses. This was an activity not covered in HFF's original mission (Íslandsbanki 2005).

The imbalances bred through the HFF were noted during the housing boom, though often as a side comment about the efficiencies brought by the Fund. Hunt, Tchaidze and Westin (2005: 31), for example, commented that efficiencies in the mortgage market by the HFF had brought positive effects to mortgage interest rate reductions. Icelandic mortgage lending had increased by 63 percent during 2004, and long-term mortgage interest rates fell by 5.10 percent in nominal terms and 4.15 percent in inflation-adjusted terms. This decline in mortgage rates was not due to any positive effects of lending competition, but rather to an accommodative monetary policy by the CBI coupled with risk-reduction via HFF-guaranteed mortgages.[2]

Although the HFF was the major player in the early stages of Iceland's housing boom, private banks soon followed. Flush with cash, they aggressively sought to meet the HFF's terms in order to secure

[2] Repeated calls from the IMF to reform the HFF were regularly ignored. In 2005 the IMF recommended that the HFF alter the scope of its operations to align it with those of Fannie Mae and Freddie Mac; i.e., take a secondary or indirect role in the mortgage market. It should be noted that even this advice would not have shielded the Icelandic economy from the pernicious effects of a state-guaranteed agency. After all, mortgage securitization by Fannie Mae and Freddie Mac are both commonly cited roots of America's own crisis.

their main source of banking profitability (Bagus and Howden 2011: 58). Banks increased mortgage maturities to 40 years from the then-conventional 25. Króna loan limits were increased to allow for more high-end houses to be purchased. The maximum loan-to-value ratio was increased to 80 percent (versus the HFF's maximum having ranged from 65-70 percent throughout the 2000s).

Bank lending was not limited to construction and housing loans, as was the case with the HFF. Equity withdrawals and mortgage refinancing became the norm. This expansion in lending opportunities by the private banking system spurred on additional competition from the HFF in a bid to remain relevant. The competitive back and forth between banks and the HFF was apparent as early as 2004 (Thovarldsson 2009: 150).

The HFF reduced long-term mortgage rates further to 4.15 percent, still protected by the credit guarantee of the Icelandic government. While banks could not compete with the Fund in terms of mortgage pricing, they could in risk-taking via the terms of their loans. Loan-to-value ratios were increased to 100 percent, allowing homeowners to finance the whole cost of their housing purchases. It was soon clear that banks, despite competing in different areas of business than the HFF (i.e., in the broad terms of the loan instead of just the interest rate), would be unable to sustain themselves in the long run against the state-guaranteed entity.

Being at a disadvantage concerning the interest rates they could offer to customers, banks competed on different types of credit services. These new services turned out to be destabilizing not just to the individual banks but to the broader economy. The quality of acceptable collateral for mortgages continually fell, causing a general under-pricing of risk in the private mortgage market (Tchaidze, Annett and Ong 2007: 24). By 2006, over 16 percent of new mortgages had loan-to-value ratios above 90 percent (Honjo and Mitra 2006), and 40-year mortgages became increasingly the norm. The increased duration coupled with decreased collateral quality exposed banks to large losses if interest rates rose. Tchaidze, Annett and Ong (2007: 24-25) estimated that a 2 percentage point increase in

rates would cause almost a half billion dollars in losses to the banking sector.

The result of this sustained competition between the public and private lenders, combined with artificially imposed state guarantees, was a demand surge for housing. Prices steadily increased, with housing price growth remaining above income growth until the recession was well underway in 2009. Since income growth was not responsible for the increase in housing prices, an increased dependence on credit facilitated the housing boom (Howden 2013b).

Investment Guarantees, Narrow and Broad

Just as the HFF reduced risk on real-estate investments, there was another series of additional guarantees on wider-ranging financial transactions. These guarantees can be defined as narrow, in the sense that they only applied to one financial product, or broad in the sense that general support was given to all financial products.

Deposit insurance, for example, solves the immediate problem that the bank run poses while exacerbating the larger issue of moral hazard (Bhattacharya *et al*. 1998; Thies and Gerlowski 1989). By removing the threat of losses, deposit insurance also removes the monitoring role that depositors serve with respect to their banks. Instead of seeking the most prudently managed banks, depositors shift their funds to those banks offering them the lowest expenses or highest returns. These criteria, incidentally, also generally indicate that the bank is pursuing riskier activities than its competitors.[3]

While central banks and deposit insurance agencies can mitigate this problem by actively monitoring banks, most deposit insurance plans also include provisions to entice depositors to aid them with this

[3] Uninsured depositors are much more likely to withdraw their deposits from a bank when they perceive it to be financial unstable (Iyer et al. 2013). Uninsured depositors, along with bank employees, are thus one of the key forces imposing market discipline on banks as their deposit redemptions signal to banks that lending practices are not sufficiently prudent to maintain a stable level of core funding. In addition to concern about unsafe lending practices, uninsured depositors may also withdraw funds as they grow weary of abrupt management changes or in response to deterioration in general economic conditions.

task.

A maximum insurable amount on deposits is generally defined, creating the incentive for depositors above this threshold to actively monitor their bank. Foreign-denominated deposits are usually not covered, partly to create another group of depositors to monitor banking activities, and partly to eliminate exchange-rate risk from the insurer. Icelandic deposit insurance ventured from these guidelines in important ways.

In 1998 the Icelandic government made a number of changes to the organizational and regulatory structure of the country's financial industry that proved destabilizing (Mayes 2009). The CBI was given one role in its new inflation-targeting mandate, while the financial supervisory role was removed and amalgamated with the deposit insurance provider under a new financial supervisory authority, the FME. Central banks typically take on a regulatory role to better align the risks of excess credit creation with the constraint of capital requirements. The complete removal of any regulatory role from the CBI removed an important policy tool which hindered its ability to actively monitor the extent to which credit creation was destabilizing the growing banking system.

The instability came in the form of having a central bank in charge of the country's credit conditions without also having some role in monitoring banking stability. In standard literature on the microeconomics of banking, the agency that eliminates a banking panic must also fill the regulatory void caused by a lack of client monitoring (Gorton and Huang 2003). The historical evolution of central banks saw them take on their regulatory roles as they assumed the role of lender of last resort to replace depositors as monitors (Bagus and Howden 2012: 167).

Article 7 of the "Act on the Central Bank of Iceland" of 2001 announced for the first time an explicit lender of last resort role (CBI 2001: 33; see also Bagus and Howden 2011: 95). This contrasts with most developed countries, such as the United States, which assume this role only implicitly. Despite improving its transparency since 2000, the CBI still ranked far below its European counterparts in this

respect (Dincer and Eichengreen 2009). With only partial knowledge of the lending practices of the CBI, the FME was ill-equipped to properly oversee the private banking system the CBI funded.

Adding to this problem and further skewing the CBI's incentives was the fact that it was highly politically motivated (Bergmann forthcoming). A history of state intervention in the economy bred an unprecedented bond between politics and business (Jonsson 2009), and in few places was this as engrained as the CBI. Political connections at all levels in the financial sector made effective oversight and regulation almost impossible (Sibert 2009). David Oddsson was prime minister for 13 years before taking on his new role as governor of the CBI in 2005, and carried his own political baggage with him. Indeed, it was difficult to discern who was captured, the banks or the government regulators. While prominent politicians, such as Oddsson, moved into the financial sector, the financial sector returned the favor – they were regularly the largest donors to political parties (Vaiman *et al*. 2010: 267).

Most deposit insurance plans purposely exclude foreign-denominated deposits from coverage. By insuring deposits denominated exclusively in domestic currency, the insurance fund can more easily manage its potential payouts. By extending insurance to foreign-denominated accounts, Iceland created an ambiguity as to who was liable for Icelandic banks operating in foreign countries. For example, one of Iceland´s largest banks, Landsbanki, opened an online retail bank in the United Kingdom, Icesave. British regulators were uninterested in monitoring the bank´s operations, as it was presumed to be accountable to the Icelandic authorities. Icelandic authorities had relatively little knowledge of the subsidiaries' operations, as they were located in a foreign country. This foreign coverage proved to be one of the causes of undoing for Iceland´s deposit fund during its crisis, as it lacked sufficient foreign currency reserves to honor the accounts (Bagus and Howden 2011: chap. 4).

Furthermore, in order to leave a set of depositors interested in monitoring their bank´s operations, most deposit insurance plans mandate a maximum limit on the insurable deposits. Deposits held

above the limit are subject to losses, and thus motivate the depositor to be selective as to which bank he entrusts his funds. There was no maximum limit in the Icelandic plan. Not only did this remove an important set of monitors from the banking sector, but it also exposed the Fund to potentially unlimited losses in the event of a bank failure.

The Icelandic deposit insurance plan was thus a narrow guarantee on deposit-taking institutions. As a consequence of this risk reduction, investors, both domestic (and later on foreign), continued channeling money to these banks to earn higher risk-adjusted returns.

Actual risk in the banking system, as investors eventually found out, was higher than originally perceived and depended on the solvency of the Icelandic government (the *Althingi*). As the state acted as the ultimate back-stop of the financial system, and guarantee would only be as good as the government making it. Luckily for the *Althingi*, additional support was forthcoming from the International Monetary Fund.

In the wake of the Russian, Asian and Latin American currency crises of the late 1990s, IMF Counsellor Jack Boorman (2000: 366) noted that "If the crisis has taught us anything, it should be a reminder of the key importance of the *institutional* infrastructure needed to manage a successful market capitalist economy — legal systems, bankruptcy procedures, standards, transparency — many of the things now captured under the heading of architecture." The IMF was to be a key component of this "institutional architecture."

On a visit to the Central Bank of Iceland, Anne Krueger, then-Deputy Managing Director of the IMF, reiterated these sentiments and assured leaders of developed and developing economies alike that the Fund was prepared to assist where necessary: "Crises have always been part of the Fund's work. The challenge for the IMF is to do as much as possible to prevent them, but, once crises occur, to resolve them as smoothly as possible" (Krueger 2004).

As the IMF increased its role in assisting sovereigns during times of crisis, it decreased the risk premium placed on cross-border investments. Foreigners previously weary of investing in countries with high or unstable inflation, such as Iceland, were enticed to enter

new and exotic markets where they had the chance for above-average profits with little risk in light of the IMF's guarantees standing behind the country's sovereign.

Iceland Bank Operations

The CBI adopted an inflation-targeting program on 27 March 2001. This target rate was continually exceeded, and sowed the seeds of its own demise by fostering greater amounts of credit expansion than would otherwise be possible.

The inflation-targeting framework was borrowed from other countries and calibrated in ways that were not relevant to the new flexible exchange-rate króna (Hunt et al. 2005: 11; Bagus and Howden 2011: 16-18). The policy model itself was borrowed from the Bank of Canada, and then fine-tuned for the *minor* differences between the two countries (Pétursson 2002). The differences ultimately proved to be not so minor. Canada's model estimated the target interest rate with the United States as the relevant foreign sector. The CBI recalibrated this to make use of the United Kingdom, yet each country's relationship with the other is markedly different. Canada enjoys a much higher degree of trade with the U.S. than Iceland does with the U.K. Canadian capital flows are primarily into or out of the U.S, while Iceland is linked extensively with Scandinavia. Canada's interest rates largely mirror those in the U.S., and its output relies on many of the same inputs. By comparison, besides both being the belligerents in the Cod Wars of the 1950s and 1970s, Iceland and the United Kingdom share very few economic similarities.

The CBI knew that its inflation-targeting framework was a failure and that the target was regularly overshot (Central Bank of Iceland 2007: Box I-2).[4] The source of this problem may have been that the inflation target used a much wider range than most countries (four times as wide as the Bank of Canada's initial specification). This shift was made to allow for volatile inflation to not unduly influence policy decisions, though it resulted in a lenient approach to controlling

[4] The IMF also noted these problems during Iceland's boom, though calls for reform went mostly unnoticed (Honjo and Hunt 2006; Honjo and Mitra 2006).

inflation. It also excluded many prices from its calculation, some of which were prices on imported goods and essential for a realistic modeling of inflation (Hunt *et al*. 2005).

As the CBI regularly overshot its inflation target, real borrowing rates plunged and remained around zero for the entirety of the 2000s (table 4).

With little adherence to an inflation target, the CBI commenced a period of rapid credit expansion. While inflation remained high, a decline in real borrowing costs occurred because of three factors, only one of which was under the direct control of the CBI.

First was an extremely accommodative monetary policy. Narrow measures of Iceland´s money supply, such as M1, grew at a feverish pitch of at least 22 percent annually from 2002-08 (table 5). Total M1 outstanding grew by over 650 percent from 2000-08. It had taken the economy the previous 14 years to achieve this growth in percentage terms, and the creation of money during the 2000s was greater than the country had ever witnessed in its history. Indeed, many economists were taken by surprise when the CBI reduced the reserve requirement in 2003, and furthermore when it eliminated this requirement for deposits of foreign subsidiaries in spring 2008 (Matthiasson 2008: 15).

Second was through the private fractional-reserve banking system. Coupled with lax regulatory monitoring by the central bank and government, the comprehensive deposit insurance plan removed the last bastion of monitors of bank lending practices: depositors. As a result, Icelandic banks were free to engage in what otherwise might have been seen and discouraged for what it was – extreme risk-taking with funds entrusted to them for safekeeping purposes.

Indeed, banks turned from holding debt instruments as assets to taking equity positions in domestic and foreign companies in a bid to bolster profits (Howden 2013a). By 2004-05, bank investments in other firms expanded by 57.5 percent and 24.7 percent (Report of the Special Investigation Commission 2010: chap. 21). This strategy

Table 1: Some stylized facts on Iceland's boom

	2001	2008	Average annual increase (percent)
Population	285,000	320,000	1.66
Real GDP (2005 USD)/capita)	$38,175	43,180	1.78
Stock Market Capitalization (percent GDP)	49	111	12.39
Price level	81.75	128.36	6.66
M1 (billions króna)	70.869	542.601	33.96
M3 (billions króna)	342.904	1,626.15	24.95

Table 2: Icelandic Housing Price and Income Annual Growth (percent change y-o-y)

	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12
Housing Prices	13.9	7.0	5.7	9.3	7.8	16.2	13.7	12.5	13.7	-0.5	-2.4	3.8	4.0
Gross National Income	2.6	2.9	4.2	-0.6	4.6	8.1	3.4	7.0	-18.2	-9.1	1.5	6.1	3.7

Source: OECD (2010), "Main Economic Indicators - complete database", Main Economic Indicators (database), http://dx.doi.org/10.1787/data-00052-en (Accessed on 05 Sept. 2013); Statistics Iceland (2013), "Gross National Income Index", National Accounts (database), http://www.statice.is/Pages/1267 (Accessed on 05 Sept. 2013)

Table 3: International Debt Issues (Public and Private) to GDP for Iceland

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
85.9	108.0	127.7	143.3	182.4	232.4	291.1	318.5	319.0	381.0	374.9	281.4

Source: World Bank, Global Financial Development, Series GFDD.DM.07 (accessed 05 Sept. 2013)

Table 4: Icelandic borrowing costs

	10-year Government Bond	CPI Inflation	Real Borrowing Rate
2000	5.3	5.1	0.2
2001	5.3	6.4	-1.1
2002	5.2	5.2	0.0
2003	4.4	2.1	2.4
2004	3.8	3.2	0.7
2005	3.7	4.0	-0.3
2006	4.4	6.7	-2.3
2007	5.0	5.1	-0.1
2008	4.3	12.7	-8.4
2009	4.3	12.0	-7.7
2010	3.5	5.4	-1.9
2011	2.9	4.0	-1.1
2012	2.3	5.2	-2.9

Source: OECD, "Main Economic Indicators - complete database", Main Economic Indicators (database), http://dx.doi.org/10.1787/data-00052-en (Accessed on 05 Sept. 2013);

Table 5: Money supply growth (M1 in billions of króna)

	´00	´01	´02	´03	´04	´05	´06	´07	´08	´09	´10	´11	´12
M1	72.5	70.9	87.8	108	140	173	212	411	543	514	498	499	459
Percent Change	4.44	-2.21	23.8	22.6	30.1	23.4	22.5	94.1	32.1	-5.29	-3.15	0.22	-7.9

Source: OECD, "Main Economic Indicators - complete database", Main Economic Indicators (database),http://dx.doi.org/10.1787/data-00052-en (Accessed on 5 Sept. 2013)

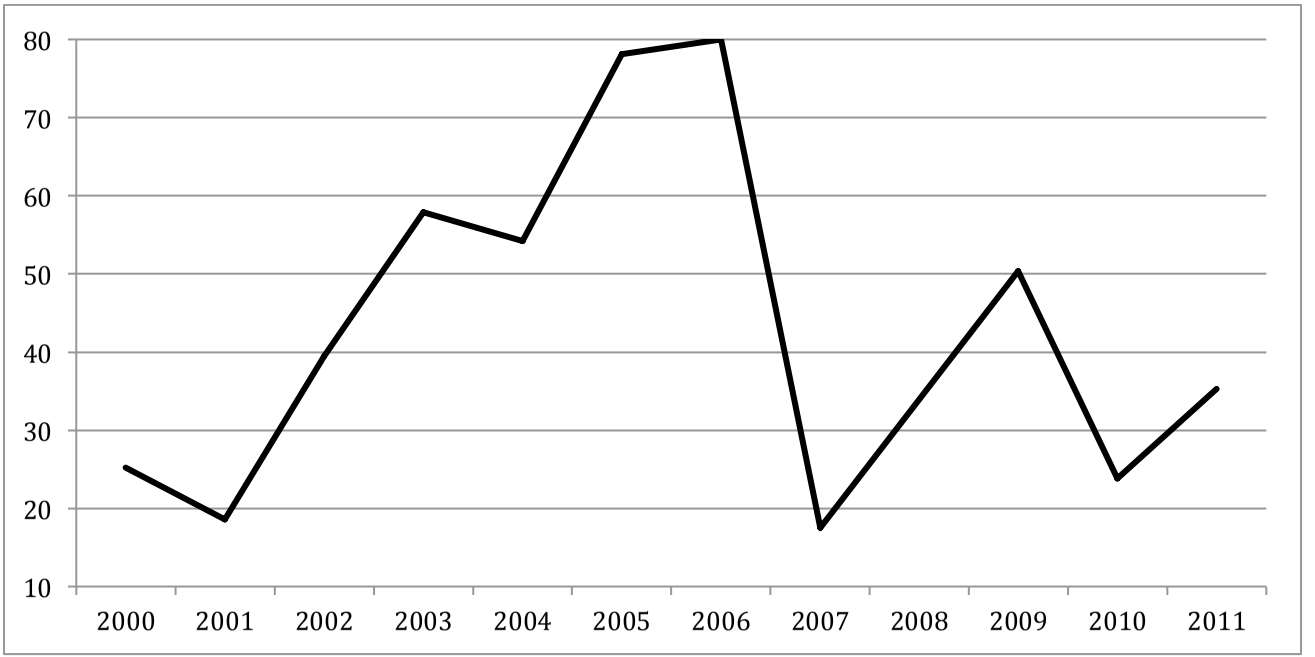

Figure 1: Icelandic Banks' Non-Interest Income as a Percent of Total Income

Source: Federal Reserve Bank of St. Louis (series, DDEI03ISA156NWDB (accessed 5 Sept. 2013).

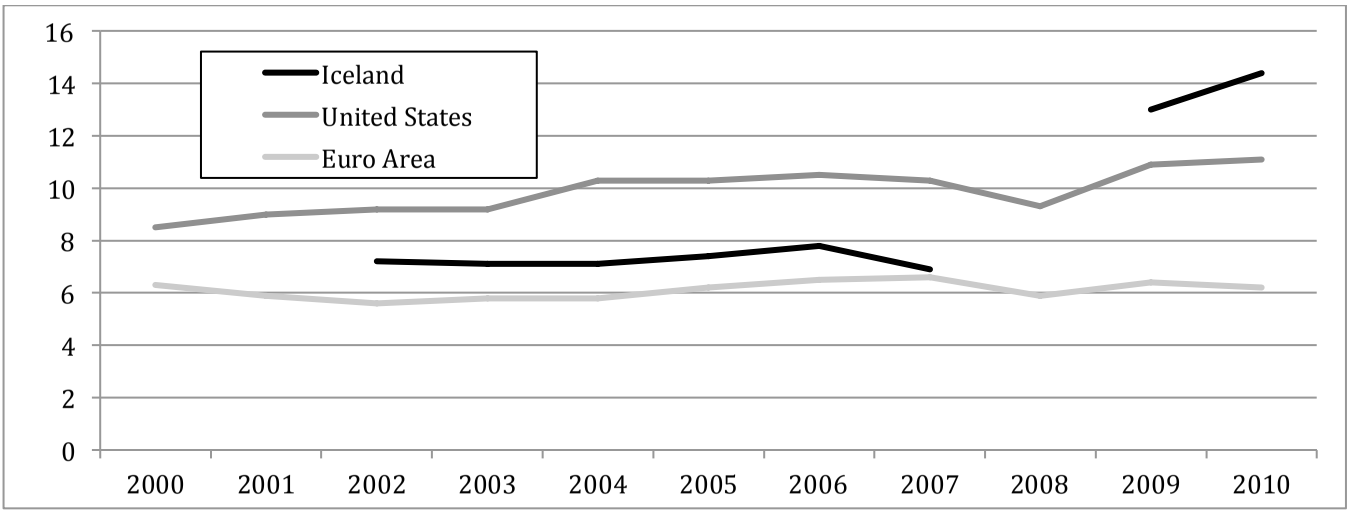

Figure 2: Bank Capital to Assets Ratio (percent)[1]

Source: St. Louis Federal Reserve Data Base, series DDSI03ISA156NWDB, DDSI03USA156NWDB, DDSI03EZA156NWDB, (accessed 7 Sept. 2013).

[1] Includes all equity and reserves as a percentage of total assets.

allowed banks significant returns on their equity investments from 2000-07, with all of the big three Icelandic banks earning more than 24 percent on their equity investments during 2006 and 2007 (Portes and Baldursson 2007). As banks came to rely increasingly on equity returns for their growth, the importance of continued expansion through investments in other businesses grew. This growth was primarily promoted by decreasing the quality of investments made (Flannery 2009: Annex 3). By 2006, 80 percent of Iceland bank profits were earned on capital gains and non-interest income in distinction to the more usual interest incomes (figure 1, compare with Tchaidze et al. 2007: 22).

As a consequence of this asset appreciation, banks begin to issue more liabilities without endangering their regulatory capital or liquidity requirements. The IMF soon characterized Icelandic deposit banks as more closely resembling investment banks as a result of this reliance on equities. Regulators were not alarmed by such a development because the buoyant stock market kept Icelandic banks well-capitalized. Indeed, from 2000-07, Icelandic banks held more capital relative to their asset base than their European counterparts, and were comparable to those in the American system (figure 2).[5]

Finally, by 2005, Icelandic banks had more-or-less exhausted the opportunities for organic growth from the domestic market (Portes and Baldursson 2007: 36-38; Jónsson 2009: 107-112). In a bid to maintain high growth rates and profit margins, they began seeking foreign capital.

High domestic króna interest rates spurred by high levels of inflation pushed banks to foreign markets to access lower-cost funding. Online retail branches were set up in several European countries (primarily the U.K. and Netherlands) to attract foreign depositors. These foreign retail deposits offered accounts in the local currency, but at higher interest rates more reflective of the Icelandic

[5] The gap in the Icelandic data in 2008 represents the bankruptcy of the financial system. It was only with the writing off of large amounts of bad assets, and the shedding of liabilities, that the banking system could return to solvency from 2009 onward.

market. The banks would convert the foreign deposits to króna and invest them domestically in the Icelandic market. Thus the banks were able to pay foreign depositors higher króna interest rates on their foreign-currency deposits.

As the incoming foreign funds were converted to króna, the now well-known carry trade (borrowing at low foreign interest rates to invest in higher yielding Icelandic investments) became prevalent. This fresh demand for króna kept the currency strong, and removed the threat that the exchange-rate risk that the foreign-denominated accounts provided would threaten the solvency of the Icelandic banks (Report of the Special Investigation Commission 2010: chap. 21: 30).

More risk-averse foreign investors could invest directly in the Icelandic market through "Glacier Bonds". The króna-denominated bonds were marketed directly to foreigners to further attract foreign capital. These bonds allowed for higher interest rates because they did not involve the cost to the issuer of exchanging the foreign currency into króna, but they also exposed the borrower to additional exchange-rate risk. First issued in August 2005, by 2007 more than $6.3 billion of these bonds were outstanding, equivalent to almost 40 percent of the country´s GDP (Bagus and Howden 2011: 63).

Coupled with the guarantees provided through the deposit insurance fund and, more broadly, the IMF, Icelandic banks rapidly escalated their foreign-currency exposure. While this approach provided cheap funding during the boom, when the króna started depreciating in 2008 it set in motion a series of króna-denominated asset sales by banks that spiraled into a depreciating spiral. The CBI lacked sufficient foreign-exchange reserves to meet foreign withdrawals. By 2007 the banking sector held only 1/14 the amount necessary as central bank foreign exchange reserves to cover the banks' foreign short-term liabilities (Gylfason 2008). In this way a run on foreign branches of Icelandic banks put in motion a currency crisis that endangered the domestic banking system's solvency.

The use of foreign funding had allowed a rapid expansion of Icelandic banks. By 2007 deposit bank assets were 275 percent the size of the small country´s whole GDP. (In contrast, the United

States never saw its banks´ total asset holdings grow to more than 71 percent of its GDP.) In 2006 alone, Icelandic bank assets grew 72 percentage points quicker than GDP.

The final result of these three factors – an accommodative central bank policy, an influx of foreign funds and a reliance of equity investments that maintained the illusion of healthy liquidity and capital ratios – was a spurt of credit expansion rarely seen.

The amount of bank-created credit relative to the deposit base remained above 200 percent for the whole boom of the 2000s in Iceland. By comparison, the same figure in the United States never rose above 84 percent, and averaged around 80 percent. (In 2005, Icelandic banks issued more than four times the amount of credit against their deposits as their U.S. counterparts.) While the dot.com bust in the early 2000s saw the United States´ broad money supply diminish relative to its deposits, in Iceland credit continued growing and almost doubled in 2007 alone. Icelandic credit creation was able to surpass even that of an American economy that itself seemed awash in liquidity.

Furthermore, a two-fold danger resulted from the broad implicit and explicit commitments of support. First is that as the risk of a sovereign default is reduced through IMF intervention, investors will support higher levels of debt at lower interest rates in these countries. Indeed, after debt remained steady throughout most of the 1990s, the new millennium ushered in a period of escalating and rapidly increasing debt issuances in the Icelandic economy after Krueger´s reassuring speech at the CBI.

More dangerous, perhaps, was that as a country´s long-term stability was promoted artificially through the IMF, the volatility of its exchange rate decreased. If this were attributable to a fundamental improvement in the country´s financial position, the risk reduction would be welcome. Unfortunately, in Iceland´s case there was no improvement in the underlying fundamentals and the decreased volatility increased the inflow of foreign investment contingent on the IMF coming to the country´s aid if misfortune struck.

What Instigated Iceland's Bust?

Iceland's collapse in 2008 has been attributed to various causes, including: (1) an unstable and oversized banking industry (Buiter and Sibert 2008), (2) a central bank ill-suited to serve as a lender of last resort (*ibid.*), (3) collateral damage of the global liquidity crisis made apparent by the bankruptcy of Lehman Brothers (Friðriksson 2009: 11), (4) free-market capitalism making bad bets with other people's money (Gumbel 2008), or (5) from a corrupt corporate culture making politically motivated instead of financially prudent investments (Vaiman *et al* 2010). While these are all appealing explanations, they mainly answer the question of "what went wrong in 2008?" rather than the more relevant question "what caused the events of 2008?"

I have thus far illustrated that the growth in the amount of credit was the result of three factors – wide-ranging investment guarantees, a loose monetary policy by the CBI, and an influx of foreign funding into the private banking sector. These factors created a private banking sector too large for the central bank to support, but they also created an unstable situation even if the global liquidity crunch failed to materialize.

Iceland's boom can best be defined as an unsustainable credit expansion along the lines of an Austrian business cycle (ABC) (i.e. a business cycle as described by the Austrian School of Economics). This type of business cycle occurs when a central bank artificially sets its policy rate below a sustainable level. Alternatively, institutions can reduce the perceived risk on investments, and thus exogenously push risk-adjusted rates below those that would otherwise obtain (Cowen 1997).

The results of an ABC are three-fold, with a common theme being economic unsustainability prone to increasing imbalances until finally succumbing to a rebalancing recession. This recession is important, becauseit allows investment and consumption preferences to realign in sustainable ways with resource and savings constraints.

Overconsumption occurs as consumers take advantage of low interest rates to increase their borrowing (Mises 1949: Garrison

2004). They are also demotivated from saving through either high inflation rates or low real returns. Malinvestment occurs whereby investment expenditure is skewed to longer-dated projects that will not yield a return until a further date in the future (Hayek 1935; Mises 1949; Garrison 2001, 2004). This shift should not to be confused with *over*investment (Salerno 2012). It is not a matter of too much investment taking place but rather that low interest rates motivate investment projects of longer duration such that the fruits of their labors will not materialize until a much later date. (e.g., research and development expenditures can take decades to create profits, while infrastructure expenditure such as highways can show their worth quickly.) Furthermore, not all long-dated investment projects are unsustainable. The key is to match the expected duration of the project with the availability of funding by savers (Bagus and Howden 2010). Any force which artificially lowers interest rates, such as loose central bank monetary policy, will have the effect of enticing investments to be undertaken not matched by a desire by consumers to save for an extended period. Lower interest rates push entrepreneurs to pursue longer-dated projects as their net present values increase relative to those on shorter-dated projects. Finally, as the financial sector is the initial beneficiary of any newly created credit, it will grow in size and importance relative to the real production-oriented sector (Howden 2010). The Icelandic economy from 2000-08 illustrates each of these effects.

As in the United States, the primary increase in private consumption was in real estate. This was facilitated by the HFF, as outlined above, though the HFF could only work within the confines of the base interest rate set by the CBI. While housing consumption increased dramatically as Icelanders went from a country of renters to home owners, the boom brought ostentatious displays of wealth.(Bagus and Howden 2011: 68-71).

Vacations to St. Tropez or Dubai became almost the norm. Elaborate birthday parties served expensive imported wines in place of the more traditional Icelandic schnapps, *brennivín***.** Social troubles brewed as the older generation, accustomed to Spartan lives and

thrift, was exposed to the younger nouveau riche:

> The older generation shook their heads as their children purchased jacuzzis, trampolines, and chocolate fountains. The sale of champagne increased 82%. The luxury electronics maker Bang and Olufsen sold more in its store in Reykjavik than in any other store worldwide except for Moscow. And amazingly, more Range Rovers were sold in Iceland in 2006 than collectively in the other Nordic countries combined! By the age of fifteen, I had been on a holiday abroad just once. . . . Now the typical family was going abroad once or even twice a year. Armani was doing such business in Iceland that they sent a tailor from Italy to make suits to measure. (Thorvaldsson 2009: 156)

While consumption expenditures increased, they remained relatively constant as a share of GDP. With strong economic growth came a commensurate increase in consumption. Investment increased dramatically, partly because of housing expenditure, and mainly funded through money flowing in on current account. The flip-side to this money inflow was that Iceland's trade deficit deteriorated as it continued borrowing from abroad. By 2006, 17 percent of GDP came from foreign lending on current account.

The primary malinvestment during the boom was the expansion of the aluminum smelting industry (Bagus and Howden 2011: 54-55). Aluminum smelting is a time-consuming process which is dependent in large part on low interest rates and high aluminum prices. Both were fostered during the boom as the CBI allowed for cheap borrowing while the global expansion of liquidity promoted high commodities prices. In 2003 plans were unveiled to build new hydroelectric and geothermal electrical plants to power the growing smelting business. Total investment amounted to almost $4 billion, roughly 35 percent of Icelandic GDP (Thorvaldsson 2009: 150).

Investments in long-duration projects like these electrical plants are not necessarily a negative for the economy. It is instead a question of how long Icelanders were willing to wait before the fruits of these investments paid off. The low interest rate environment made the financial outlook on the projects appear positive, though consumers

with their new shortsightedness were not willing to curtail consumption for a lengthened period to provide the necessary savings; there grew a disconnect between savings and investment.

As investments became ever more dependent on debt financing, a precarious situation was built whereby a lack of access to funding would destabilize all investments. Investment increased as a portion of GDP by more than 10 percentage points during the boom, though this would not have been a negative development had Icelanders increased their savings to fund it. As it turned out, the low interest rate environment continually discouraged savings throughout the decade, and by 2006 this rate turned negative (table 8). A nation of thrifty savers had been turned into a nation of debtors in less than a decade. Even if global liquidity did not evaporate in 2008 with the failure of Lehman Brothers, Icelandic investments would have remained solvent only until the next slowdown in credit growth.

Overconsumption and malinvestments can both be rectified in reasonably short order by shifting preferences and resources to a more sustainable array. Long-term investments can be liquidated and their newly freed resources reallocated to more sustainable uses. The financial shift that resulted in the growth of the banking sector was more damaging, both in terms of the magnitude of the shift and the resources necessary to return it to sustainability.

Construction employment averaged 6.6 percent annual growth from 2000-08, while the finance and real estate sectors each grew by 4 and 3 percent per year (figure 3). Over the same period, the more traditional income-generating sectors in the economy dwindled. The fishing industry, long a mainstay of Icelandic employment, lost almost 5 percent of its workers each year as they were attracted to the new economic miracle in Reykjavík.

The financial sector became so large that the best talent was poached from other areas of the economy. Young Icelanders turned away from learning about the traditional employment paths, such as fishing, and registered en masse in both domestic and foreign Universities to prepare themselves for a brighter future in finance.

Table 6: Deposit bank assets to GDP (Percent)

	´00	´01	´02	´03	´04	´05	´06	´07	´08	´09	´10	´11
Iceland	83.2	94.5	101.7	117.7	141.9	198	270.2	275.4	189.3	131.5	128.4	117.3
United States	55.4	57.3	57.6	57.8	58.4	59.9	62.3	64.9	70.7	70.5	62.5	63.7

Source: Federal Reserve Bank of St. Louis, series DDDI02ISA156NWDB, DDDI02USA156NWDB (accessed 5 Sept. 2013).

Table 7: Credit expansion in Iceland and the United States

	Bank credit to deposits (Iceland, percent)	Bank credit to deposits (U.S., percent)	M2 growth rate (Iceland, percent)	M2 growth rate (U.S., percent)
2000	228.0	77.5	-3.7	6.1
2001	230.5	76.3	11.0	8.6
2002	222.4	75.8	9.3	7.4
2003	231.6	78.0	18.4	7.0
2004	284.6	81.6	28.0	4.8
2005	364.7	83.2	25.6	4.3
2006	332.8	82.9	19.4	5.2
2007	284.1	80.2	78.6	6.2
2008	120.3	76.0	67.0	6.8
2009	109.0	71.3	-6.6	8.0
2010	120.3	73.9	-8.5	2.5
2011	104.6	69.6	7.8	7.3
2012	n.a.	n.a.	-9.4	8.5

Source: St. Louis Federal Reserve Economic Data, series DDSI04ISA156NWDB, DDSI04USA156NWDB, MABMM201ISA189N, M2NS (accessed 5 Sept. 2013).

Table 8: Icelandic saving and borrowing (percent of GDP)

	00	01	02	03	04	05	06	07	08	09	10	11	12
Saving rate	0.02	0.06	0.09	0.03	0.03	0.01	-0.01	0.00	-0.23	-0.23	-0.18	-0.11	-0.08
Net lending/ borrowing	-0.12	-0.05	0.02	-0.06	-0.12	-0.19	-0.30	-0.20	-0.39	-0.18	-0.12	-0.09	-0.08

Source: Statistics Iceland, national accounts data (accessed 7 Sept. 2013)

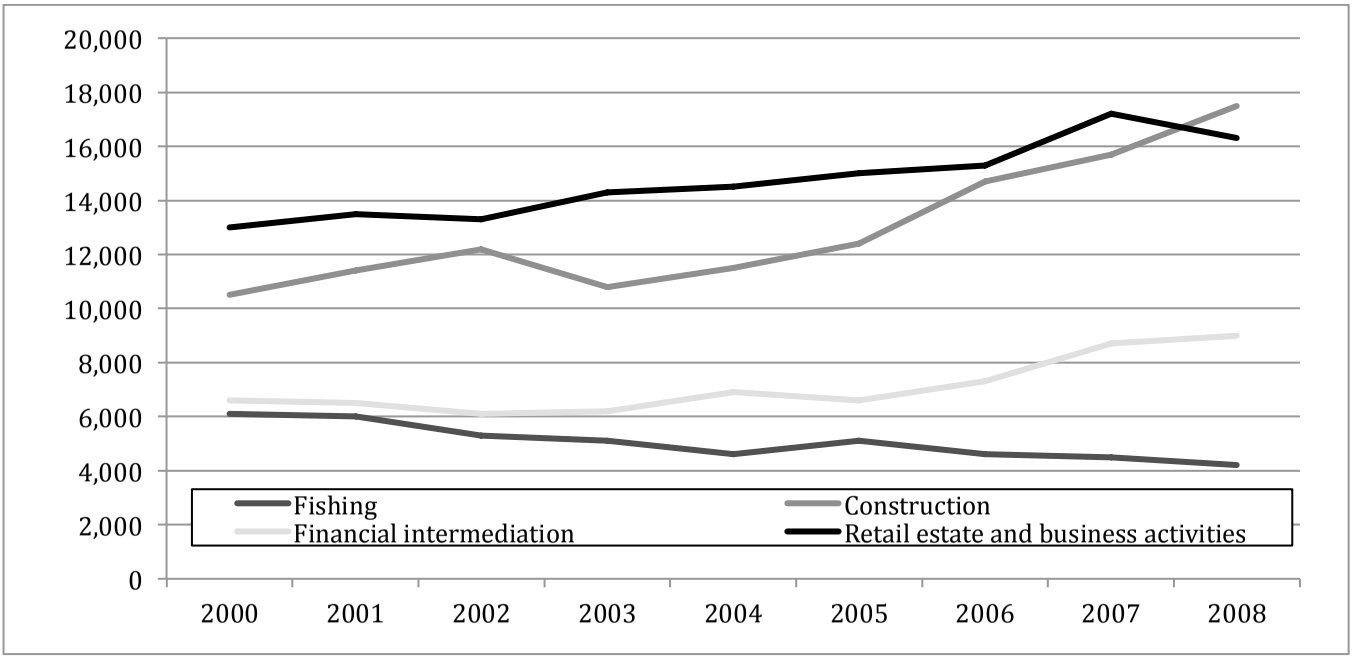

Figure 3: Employment by economic activity

Source: Statistics Iceland, labour market database (accessed 9 Sept. 2013)

> "Everyone was learning Black-Scholes"[6] (the option-pricing model), says Ragnar Arnason, a professor of fishing economics at the University of Iceland, who watched students flee the economics of fishing for the economics of money. "The schools of engineering and math were offering courses on financial engineering. We had hundreds and hundreds of people studying finance." (as quoted in Michael Lewis 2009)

Universities began changing their course offerings to focus on the new demands this shift created. New graduates found lucrative opportunities, some even before finishing their degrees. "An apocryphal story went that the car park at the university was so full of student cars that the professors had difficulties finding places to park their bicycles" (Thorvaldsson 2009, p. 147). Young men on the streets of Reykjavik could recite the Black-Scholes formula as well as the day's salmon prices.

One negative consequence of the employment shift into finance was the dearth of talent in the real sector. Not only were the best and brightest attracted to the financial sector, but as the number of workers in the real economy shrank, so too did the country's productive capacity. This productivity shock is important, as it helps to explain Iceland's growing reliance on imported goods and the related foreign indebtedness.[7]

The reallocation of labor from the real to financial sectors of the economy could not proceed unabated. At some point the current account deficit that the loss of export capacity created would result in bills that needed to be paid. Overconsumption had left the country with little savings (indeed, the rate was negative by 2006), and income

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[6] "Black-Scholes" refers here to a complex pricing formula for financial "options". An option allows one to have the opportunity to buy or sell another financial asset (e.g., a stock) in the future at a pre-determined price.

[7] This shift is also time-consuming to reverse. Time is required to retrain to learn the tools necessary to return the economy to sustainability. As one fisherman lamented, "I think it is easier to take someone in the fishing industry and teach him about currency trading than to take someone from the banking industry and teach them how to fish" (Lewis 2009).

growth was reliant on unsustainable patterns of investment. By financing its longer-dated investments by continually rolling over short-term financing, the Icelandic economy was able to survive but was fully dependent on the continual availability of cheap short-term credit (Bagus and Howden 2011: chap. 2).

The liquidity shock created by Lehman Brothers may have proved to be one cause of Iceland's collapse, though it was not the only one capable of doing so. Indeed, even in the absence of a "sudden stop" type end to liquidity, the Icelandic economy would still have floundered (although perhaps at a slower pace). The reason is that the debt buildups throughout the 2000s were not consistent with sustainable growth necessary to service these debts into the future. The disjointing of savings from investment gave rise to an unsustainable situation that could only persist in the era of the artificially low interest rates that begot it. Whether rates increased from an exogenous liquidity shock or endogenously by rising risk premia, or decreased by the continued lack of savings, the end result would have been the same: the failure of investments built upon a base of underpriced credit as risk-adjusted borrowing costs increased.

Conclusion

As we assess the causes of Iceland's collapse, there are four important lessons.

First, blanket investment guarantees sow the seeds of unintended consequences, some of which may not materialize until years into the future. The CBI promoted risk-taking while serving explicitly as a lender of last resort, and the FME's deposit insurance plan skewed depositors to entrust more funds to the banking sector than would otherwise be the case. International organizations such as the IMF worsened matters by removing sovereign default risk through their implicit pledges to intervene during times of crisis. The ambiguity of cross-border guarantees, such as how deposit insurance would work for Icelandic subsidiaries in Europe, complicated matters.

Second, central bank controlled interest rates impose an important price on the market which is potentially inconsistent with underlying savings and investment preferences. By setting this price

too low, the CBI induced a general underpricing of risk, demotivated consumers from saving and promoted malinvestments. The current recession will not end until the economy has a foundation of savings and has investment that is properly based on an interest rate reflective of underlying preferences.

Third, certain banking laws engender large amounts of credit creation which may fuel an unsustainable boom. In particular, the ability of the private banking system to use fractional reserves created a period of rapid credit growth. The access to and economization of funding through their reserves allowed banks to grow to sizes otherwise not possible. This factor in part explains how Icelandic banks could grow to such a seemingly oversized magnitude relative to the small economy.

Finally, credit-based booms such as Iceland's are not necessarily brought to an end because of liquidity shocks. They sow the seeds of their own destruction by breeding unsustainable consumption, production and financing plans. Increasingly over the 2000s, Icelandic businesses invested in projects that were only made possible through low interest rates. Since rates could not remain at their historic lows forever, eventually these investments would fail as rates rose. Lacking an exogenous shock such as Lehman Brothers, the increase in interest rates would most likely have occurred when investors reset their risk perceptions of the Icelandic economy higher, as was already the case briefly during the Geyser crisis of 2006.

Most importantly, while Iceland is illustrative of a small country falling prey to these follies, it is by no means the only country to do so. Similar factors exist in almost every developed economy. *The Economist* (2013) recently asked "Where's the next Lehman?" While such a question may be relevant, it ignores the more pressing fact. The next crisis may be precipitated not by a sudden stop of credit, but by a slowdown in credit availability coupled with declining growth rates that expose the previously unsustainable investments for what they are.

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