

The Icelandic banking crisis and what to do about it: The lender of last resort theory of optimal currency areas

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Short Abstract

Iceland has, in a very short period of time, created an internationally active banking sector that is vast relative to the size of its very small economy. Iceland also has its own currency. This paper argues that this 'business model' for Iceland is not viable. With most of the banking system's assets and liabilities denominated in foreign currency, and with a large amount of short-maturity foreign-currency liabilities, Iceland needs a foreign currency lender of last resort and market maker of last resort to prevent funding illiquidity or market illiquidity from bringing down the banking system.

Iceland therefore has two options. First, it can join the EU and the EMU, making the Eurosystem the lender of last resort and market maker of last resort. In this case it can keep its international banking activities domiciled in Iceland. Second, it keeps its own currency. In that case it should relocate its foreign currency banking activities to the euro area.

Long Abstract

Iceland, with its exceptional economic institutions, sustainable public finances and flexible labour markets, is often viewed as a model of economic virtue. Although miniscule and buffeted by external shocks, its per capita income is among the highest in the world. Unfortunately, Iceland has a problem. Its banking sector, following aggressive expansion during the past decade, has assets and liabilities that dwarf its GDP. While the banking sector's assets are believed to be of good quality, they are – in the manner of bank assets – of long maturity and illiquid compared to the banking sector's liabilities. Significantly, most of these assets and liabilities are denominated in foreign currency.

Regardless of the quality of the banking sector's assets, the Icelandic banks are vulnerable to a liquidity crisis. These banks are heavily dependent on wholesale financing, as well as on deposits. In a liquidity crisis, each creditor believes that other creditors will refuse to roll over existing loans and refuse to extend new credit and that this will cause the bank to fail. Thus, each creditor refuses to roll over his own loans or to extend new credit and the bank fails; the beliefs of the investors are validated.

The Federal Reserve can protect solvent, but illiquid, financial firms in the United States from a liquidity crisis by acting as the lender of last resort. That is, it can extend dollar loans to a troubled firm against collateral that would good if it could be held to maturity. As it can always issue more dollars, the Fed's ability to do this is unlimited. Likewise, as the issuer of euros, the ECB can protect any threatened financial firm in the Euro Area. The Central Bank of Iceland, however, is unable to act as an effective lender of last resort to Icelandic banks if their creditors refuse to roll over their foreign-currency loans or if they refuse to extend additional foreign currency credit. The central bank does not hold enough foreign currency to do this and it is unable to issue more. This means that, ultimately, a large internationally exposed banking sector is not viable in Iceland. Either the country must join the EU and become a full participant in the Eurosystem, so that its banks have borrowing privileges from the ECB, or its banks will almost surely eventually fail or move the bulk of their operations outside of Iceland.

In the short run, the Icelandic private banks might respond to their perilous situation by having their subsidiaries borrow from their host central banks. The government of Iceland might acquire contingent access to a sizable amount of liquid foreign assets by arranging swaps with foreign central banks, arranging a contingent credit line with the IMF or by mobilising collateral that would allow it to borrow from the market. Potential collateral includes the resources of the Housing Finance Fund and the Icelandic pension funds and claims to future energy revenues from Iceland's hydro and geothermal resources.

It has been suggested that, as an alternative strategy, the government could build up a large stock of liquid official foreign assets, sufficient to neutralise the risk of a liquidity crisis affecting the Icelandic banking sector. There are two problems with this. First, there may not be sufficient time. Second, by effectively undoing the maturity and liquidity structure of the banking sector, acquiring such a fund would destroy most of the social profitability of Iceland's international banking activities. It is questionable whether Icelandic banks could make a profit on their international activities if the authorities were to charge them the full opportunity cost of the liquidity insurance services provided by the authorities through their liquid foreign asset holdings.

Key words: financial stability, bank run, financial crisis, exchange rate regime.

JEL Classification System: E31, E32, E42, E44, E52, E58, F31, F32, F33, F34, F37, F41.

I. Introduction and Overview

Despite the high quality of its economic institutions, governance and policy making, the sustainability of its public finances, the flexibility of its markets and the quality of its labour force, Iceland is facing a potential, and possibly unnecessary, financial and economic crisis. The ratings agencies have down-graded its sovereign debt or put it on negative watch. The cost of the private banks' credit default swaps – a rough measure of the likelihood of default – are among the highest in the world. The underlying reason for this is that Iceland possesses both its own currency and a banking sector with vast assets and liabilities and with short-term foreign-currency liabilities that dwarf its foreign currency assets and credit lines. Given the country's tiny size, it is not surprising that most of its banks' business is done in foreign currency, rather than in Icelandic krónur.

The assets of the Icelandic banking sector, although generally believed to be of good quality, are – as is usual for banks – of relatively long maturity compared with its liabilities and they are illiquid. Thus, Icelandic banks face the possibility of a run on their liabilities and, if there were to be a run on their foreign-currency-denominated liabilities, there is no effective lender of last resort. In the current financial crisis, even fundamentally sound banks are threatened with illiquidity. In the United States, a solvent but illiquid bank can count on its central bank to make it a loan against its fundamentally sound, but illiquid or temporarily impaired assets; the same is true in euro area or the United Kingdom. But, an Icelandic bank has no such safety net: the readily available foreign exchange resources of the Icelandic authorities (the central bank and Treasury) are too small compared to the short-term foreign-currency exposure of its domestic banks. The market realises this, increasing further the likelihood of a crisis for Icelandic banks and thus, the Icelandic economy.

The appropriate policy response to the current situation is straightforward, if not politically or technically easy. First, the government must immediately secure contingent

emergency funding for its banks and the banks themselves should explore all available sources of liquid foreign exchange. Icelandic banks have subsidiaries in the euro area, the United Kingdom and elsewhere. The extent to which these subsidiaries are entitled to borrow from the host countries' central banks should be clarified. Foreign branches and subsidiaries of the Icelandic banks should try to raise foreign currency deposits. The Central Bank of Iceland should explore setting up swap arrangements - along the lines of the arrangements in concluded on May 16, 2008 with the Central Banks of Sweden, Norway and Denmark - with other central banks, such as the ECB, the Federal Reserve and the Bank of England.¹ The Icelandic government could approach the IMF for a (revived) contingent credit line. As a last resort, the government should try to borrow foreign exchange in the global capital markets by offering its natural resource wealth, mainly hydro and geothermal energy, as collateral.

The Icelandic government must also decide the extent to which it is willing to risk its tax payers' money in what might be an unsuccessful and expensive rescue attempt. A rescue attempt could be unsuccessful for two reasons. First, the authorities could fail to raise enough foreign exchange to deter runs on the Icelandic banks and to convince the markets to refinance the banks' assets until maturity. Second, the quality of the banks' assets could turn out to be of lower quality than is generally believed at present. If, however, the authorities think that the Icelandic banks are fundamentally sound, and most knowledgeable economists, including the authors of two recent reports on Iceland's economy and financial system (Miskin and Herbertsson (2006) and Portes et al. (2007)), believe this to be true, then it is likely to be worth the risk to attempt to avert a crisis that could result in the insolvency of one or more of the banks.

¹ The arrangements with the Central Banks of Sweden, Norway and Denmark were for euro/Icelandic króna bilateral swap facilities. In an earlier version of this paper, circulated in April 2008, we recommended the pursuit of swap arrangements with the three Scandinavian central banks, all three of which are outside the euro area.

Assuming the immediate crisis can be resolved, Iceland is faced with a choice between two alternatives. The first, favoured by us, is for Iceland to become, as soon as possible, a member of the European Union and then a full member of the Economic and Monetary Union. This would both ensure that Icelandic banks have a credible foreign currency lender of last resort and, we believe, offer a preferable monetary regime from the perspective of macroeconomic stability: low and stable inflation and no unnecessary real exchange rate volatility. The EU/EMU route is the only one that allows Iceland to have an internationally active banking sector domiciled in Iceland. The only alternative is to encourage the banking system to move the bulk of its foreign-currency-denominated activities and portfolio overseas, most likely into the euro area. This would leave a much smaller banking system, with a mainly domestic-currency-denominated balance sheet, domiciled in Iceland. The quickest way to do this is to move foreign currency assets and liabilities into the existing subsidiaries in the euro area and, if necessary, to turn euro area branches into subsidiaries or create new subsidiaries in the euro area. Unlike branches, subsidiaries can have access to the Eurosystem's discount window and can be eligible counterparties in Eurosystem repos.

In Section II of this paper we discuss how the current liquidity crisis and the potential for a bank run arose in Iceland. We discuss the conventional policy steps that a central bank can try to take to solve a banking crisis independently. In Section III we evaluate the Icelandic government's ability to solve this crisis by acting as a lender of last resort and we conclude that Iceland is too small to provide the necessary foreign-currency liquidity without extraordinary measures. In Section IV we discuss how Iceland might acquire additional external funding. In Section V we discuss the costs and benefits of Iceland retaining its own currency and conclude that, from an economic viewpoint, Iceland would be better off as a member of the euro area. Section VI is the conclusion.

II. The Icelandic banking crisis

In this section we discuss the possibility of a run on Icelandic banks and how the current international liquidity shortage has contributed to the likelihood of such a crisis. We describe the conventional policy tools for dealing with this crisis.

II.1 All banks are vulnerable to runs

There is no such thing as a safe deposit-taking bank on its own, even if its assets are of good quality and it has enough liquid assets to cope with normal variations in the net flow of deposits and other short-term liabilities. The events since August 2007, and in particular the demise of Northern Rock in the United Kingdom and Bear Stearns in the United States, have made it clear that any highly leveraged institution with assets that are mostly long term and illiquid and liabilities that are mostly short term can be subject to a catastrophic liquidity shortage.

In the case of deposit-taking institutions, the canonical liquidity crisis is a bank run. Deposits can be withdrawn on demand and those who wish to withdraw are paid on a first-come, first-served basis. A bank run can occur if it is believed – rightly or wrongly – that a bank is balance-sheet-insolvent (with assets worth less than liabilities) But, as assets are illiquid, a bank run that cripples the bank is always possible, even if the bank is not believed to be balance-sheet insolvent: if each depositor believes that all other depositors are going to withdraw their assets then each depositor's rational response is to withdraw his own. The outcome – a bank run – validates the depositors' beliefs: it is individually rational, but socially disastrous. The risk of cash-flow insolvency – inability to meet one's obligations including the obligation to redeem deposits on demand for cash – is always present when assets are illiquid.

For highly leveraged institutions that fund themselves mainly in the wholesale capital markets, including the asset-backed securities and asset-backed commercial paper markets,

an analogous event is possible: in the belief that other creditors will be unwilling to roll over their loans to a borrower whose obligations are maturing or to purchase the new debt instruments the borrower is issuing, each creditor finds it optimal to refuse to roll over his own loans or to purchase the new debt instruments the borrower is trying to issue, let alone to extend new credit. As with a classic bank run, this scenario can occur even when the assets of the bank are believed to be sound, if only they could be held to maturity.

II2. The current international liquidity crisis and Iceland

In the current international economic environment, the difficulty in valuing many repackaged collateralised debt obligations and the difficulty in determining the exposure of individual banks has increased counter-party risk and raised the global price of liquidity. This has had three implications for Icelandic and other banks. First, banks funding costs have increased, raising the likelihood that any bank will become insolvent. Second, by coordinating market beliefs about Icelandic and other banks it has made bank runs that are based solely on self-fulfilling expectations, rather than fundamentals, more likely. Third, it has made it more difficult for banks to insure themselves against runs. Any attempt by Icelandic banks to lower their risk of a bank run by selling their longer-term assets before their scheduled maturity dates would, at best, result in a severe discount relative to the value of the asset held to maturity. At worst, an attempted fire-sale in an illiquid market could realise next to nothing.

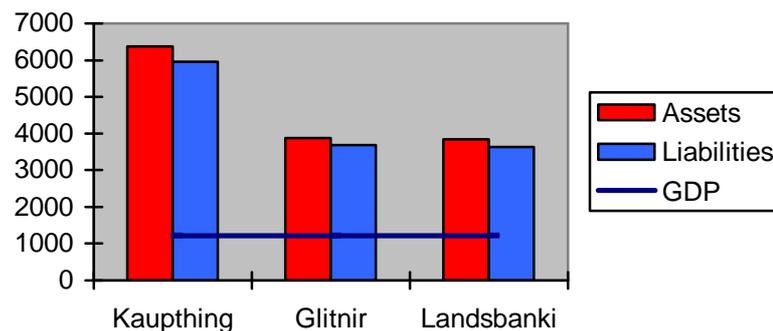
As a deposit run or a run on a bank's other short-term liabilities cannot be prevented or overcome by any individual financial institution faced with it, third-party support is necessary. Sometimes the banking sector collectively can effectively support an individual institution among their number faced with a run by providing the threatened bank with lines of credit and cash. But, when enough banks in the system are threatened, such private solutions are ineffective. In Iceland, there are only three internationally active banks,

Landsbanki, Glitnir and Kaupthing, and all of them have been affected by the international liquidity crisis since last September: no private solution is feasible.

II.3. The banking system and the crisis

Figure 1 shows the size of the three main Icelandic banks. Total assets of the three banks (including their foreign subsidiaries) at the end of the first quarter of 2008 amounted to 14,069,370 million krónur. This is almost eleven times the Ministry of Finance’s estimate of 2007 GDP of 1,319,200 million krónur and equals about \$176 billion at an exchange rate of 80 kr./\$. Total liabilities of the three banks amount to 13,265,311 million krónur, or roughly \$166 billion.

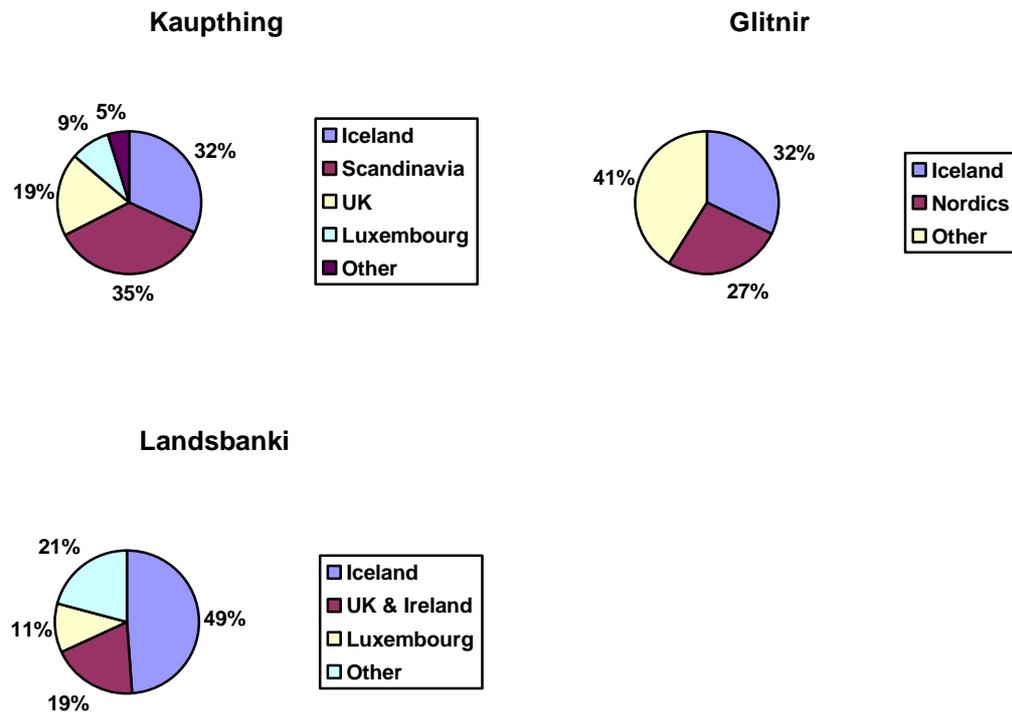
Fig. 1 Assets and Liabilities of the Three Main Banks Compared to GDP (m. kr.)



Source: Ministry of Finance, Interim Financial Statements

The spectacular internationalisation of the three internationally active banks is shown in Figures 2 and 3. Figure 2 depicts the geographical distribution of Icelandic banks’ assets. Roughly half of Landsbanki’s assets and two-thirds of the assets of Glitnir and Kaupthing are located outside of Iceland. Total bank assets located inside Iceland, however, still amount to a massive 5,160,475 million krónur, almost four times GDP.

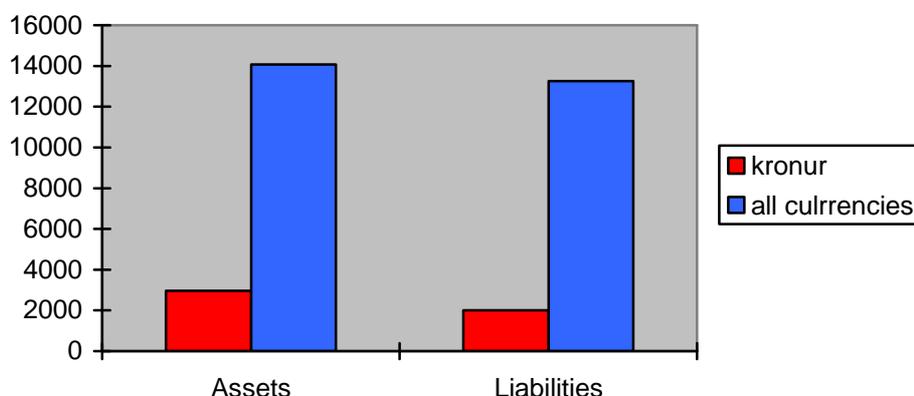
Fig 2. Geographical Breakdown of Icelandic Bank Assets, 2008Q1



Source: Interim Financial Statements

Figure 3 shows the currency composition of the assets and liabilities of the three large internationally active banks for 2008Q1. About 21 percent of all assets and 15 percent of all liabilities are in krónur. Thus, most of the Icelandic banks' business is done in foreign currency and there is a mismatch: the share of assets denominated in foreign currency is significantly smaller than the share of liabilities denominated in foreign currency.

Fig. 3 Assets and Liabilities of the Three Main Banks (b. kr.)



Source: Consolidated Interim Financial Statements

The Icelandic banks get about a third of their total funding from deposits. The remaining two thirds comes mainly from the international wholesale markets.² The proximate cause of the Icelandic banking crisis was not, however, a deposit run, but rather an extreme international wholesale liquidity shortage – a liquidity crunch. Icelandic banks were unable to borrow in the international financial wholesale markets despite having, by the usual metrics, more than adequate capital ratios, liquidity provisions, and profitability of their operations.

Evidence of the effect of the current financial crisis on Iceland is seen in Figure 4, which shows the path of the default risk spreads on Icelandic banks debt in the credit default swap markets between May 2006 and mid July. For comparison, the European benchmark for credit risk in the financial sector, the Itraxx Financial Europe index is also shown.

A credit default swap (CDS) is a derivative where one party makes periodic payments to another party in return for that other party making a payment if some specified third party defaults. If the CDS for a business trades at, say, 100 bps, then the annual cost of insuring 10

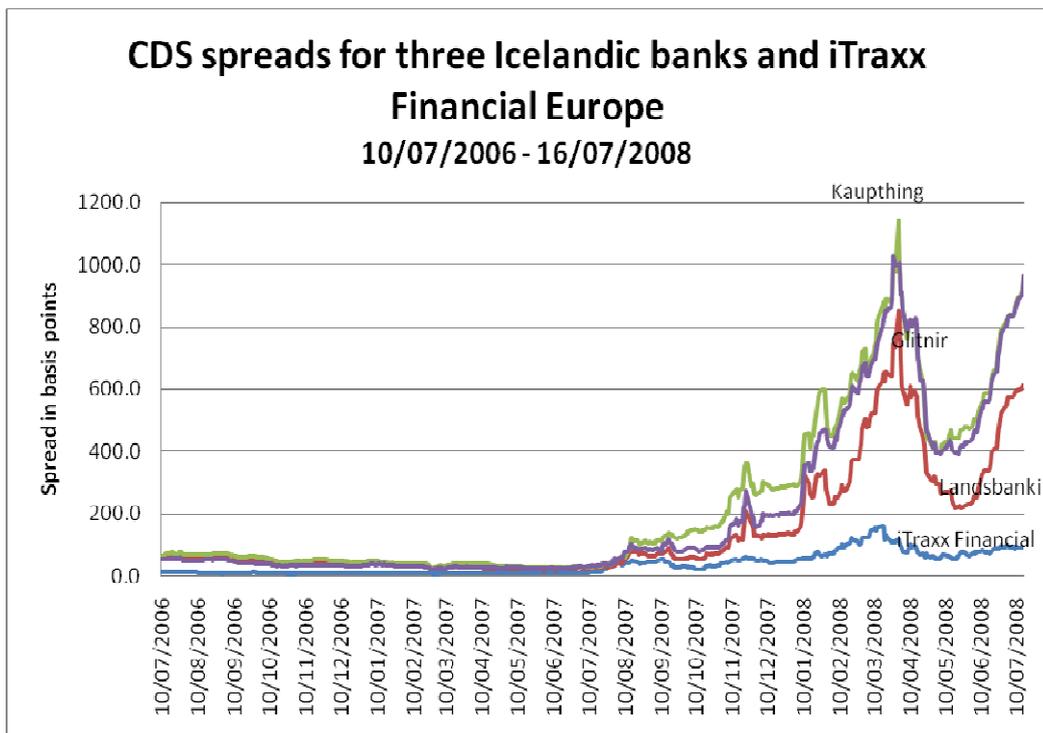
² Glitnir and Kaupthing each get about a quarter of their funding from deposits, the same fraction as Northern Rock. Landsbanki has raised its share of total funding coming from deposits to around 40 percent in July 2008 from 25 percent before the crisis started.

million euros of its debt is 100,000 euros, or one percent. Thus, credit default swaps are a rough measure of a bank's likelihood of default.

From Figure 4, it can be seen that in the beginning of 2007 credit default swap rates for Landsbanki, Kaupthing and Glitnir were a fairly unremarkable 18, 27 and 24, respectively. However, they began rising after that, fairly slowly at first but accelerating in 2008. They peaked at 850 (Landsbanki), 1140 (Kaupthing) and 1026 (Glitner) in late March/early April. The rates declined in May, but were back at 613 (Landsbanki), 961 (Kaupthing) and 960 (Glitnir) on 17 July 2008. Illiquidity – driven by fear and uncertainty – are no doubt distorting the CDS markets, and not just for Icelandic banks, just as it has distorted interbank markets and asset-backed securities markets around the world. It is also clear that the CDS spreads during the current phase of the crisis have ceased to reflect the marginal funding costs of the Icelandic banks.³ Nevertheless, these are some of the highest CDS rates in the world and compare with a 270bps CDS spread for the Icelandic sovereign (on July 17, 2008).

³ See e.g. Glitnir Bank (2008a).

Figure 4



Source: Central bank of Iceland

On 17 April 2008, Standard & Poor's lowered the long-term foreign-currency rating on the Republic of Iceland to 'A' from 'A+' and its long-term local-currency rating to 'AA-' from 'AA'. Moody's still maintains an 'Aaa' rating for the Icelandic Sovereign, but put it on a negative outlook on 5 March, as did Fitch on 1 April.⁴ The three main internationally active Icelandic banks were put on negative watch.⁵

Displaying unusual (and commendable) candour for a central bank, in its latest *Financial Stability* report, the Central Bank of Iceland says, “Critics have asserted that the Icelandic banks have grown too large. This might be true if a major financial crisis were imminent and the Icelandic Government were forced to resolve a critical situation affecting

⁴ Fitch affirmed the long-term foreign-currency and local-currency issuer default ratings at ‘A+’ and ‘AA+’, respectively.

⁵ On 1 April, Fitch placed Glitnir Banki hf.'s, Kaupthing Bank hf.'s and Landsbanki Islands' long-term and short-term issuer default ratings, senior and subordinated debt ratings and individual ratings on Rating Watch Negative. The long-term issuer default ratings and the senior debt ratings of all three banks were affirmed at 'A'.

banking operations both in Iceland and abroad.” (May 2008, p. 7) Unfortunately, it is this inability of the government to control a financial crisis that is likely to cause one.

In a bank run on a solvent bank, each depositor (or other lender) withdraws his money in the belief that all other depositors will withdraw their money and the bank will fail. A bank run is a classical coordination failure. But, it is not a usual outcome. Why would depositors all simultaneously choose to believe that other depositors are going to run if they believe that the bank is solvent? In normal times, bank runs are rare.

For a run on a solvent bank to occur, something must coordinate depositors’ beliefs. A failure of a similar bank might do this. The typical depositor has little idea about the health of his own bank. A failure of a similar bank increases his perception of the riskiness of his own bank and tells him something about what other depositors will do. In addition to providing information, a run on one bank can coordinate depositors at another bank on a bank run outcome. The obvious fact that Iceland has no foreign-currency lender of last resort could coordinate lenders. This fact both increases beliefs about the riskiness of Icelandic banks and provides information about what other depositors will do.

Perhaps more worrying, the government’s announced inability to deal with a crisis of significantly large magnitude might tempt a few large investors to coordinate deliberately – to collude to launch a speculative attack. This could be done through a range of markets, including short selling the banks’ equity, selling aggressively in the banks’ OTC credit default swaps markets or shorting the currency. The absence of an effective foreign-currency lender of last resort may make Iceland an attractive potential prey for hedge funds and other highly leveraged institutions able and willing to speculate against the Icelandic currency and banks. Even just a few of them acting in consort – and some acting individually – can achieve enough critical mass to move prices significantly in markets where the Icelandic banks are exposed.

Earlier this year, the stock of HBOS, a large UK clearing bank and mortgage lender, fell precipitously on rumours that it had requested assistance from the Bank of England. The FSA launched a formal enquiry into the source of these unfounded rumours. There is a danger that such unprincipled activity may be more damaging in the future. Unscrupulous traders using ‘trash and trade’ strategies, are already said to have shorted the króna or the stock or bonds of one or more of the Icelandic banks, while spreading rumours unfavourable to the currency or the bank’s prospects, and benefiting from the subsequent price movements.

II4. Conventional solutions to financial crises

Third-party support in the case of a bank run on deposits can take the form of a central bank or government loan to the bank or deposit insurance backed by a sovereign guarantee. For this to be effective against a worst-case scenario, the government must have access to a sufficient amount of liquid assets to meet any conceivable redemption demand from depositors or to recapitalise banks that are insolvent as well as illiquid. As long as the domestic banks’ deposits and short-term liabilities *are denominated in domestic currency*, this is always the case. The central bank has a potentially unlimited supply of domestic currency liquidity through its ability to issue legal tender at will.

If the government is credible in its commitment that it will insure a bank’s deposits or make available loans against illiquid assets, then this in itself may be sufficient to avert a bank run or solve a liquidity crisis. If not and the crisis recedes quickly enough, then fundamentally solvent banks will eventually cover their liabilities; the central bank will be repaid. If the loan was at a penalty rate, the central bank makes a profit. In this case crisis aversion requires neither inflation nor a change in fiscal policy.

However, if the deposit insurance does not convince the private sector that a bank is solvent or a bank turns out to be insolvent as well as illiquid, the bank may eventually fail and the central bank may not be repaid in full. As long as the central bank is not repaid in

full, the issuance of the base money to provide the insurance or loan will be inflationary. The government can prevent the ensuing inflation by undertaking offsetting open-market operations, selling some of its holdings of securities for the domestic currency. If the securities sold are government debt, then the government must repay the principal and interest to the private sector; if the securities are private securities, the government loses the principal and interest it would otherwise have received. Either way, the government must raise current or future taxes or, for given taxes, lower its current or future public expenditure. Ultimately, the tax payers or the beneficiaries from future public spending provide the funds for an unsuccessful rescue if inflation is to be avoided (see Buiter (2007) and Buiter (2008)).

If domestic banks have deposits and other short-term liabilities denominated in *foreign* currencies, a solution may not be possible, even if deposit insurance or a loan would be sufficient to avert a crisis. If a government wants to guarantee foreign-currency deposits or make a foreign-currency loan, it must possess or be able to acquire the needed amount of foreign currency. If, say, the United States wanted to provide a foreign-currency loan to a US bank it could do this by issuing home money, selling the home money for foreign money and then lending the foreign money to the bank.

The ability of a central bank to provide foreign currency loans, however, is limited by the foreign exchange market's willingness to exchange foreign currency for the central bank's domestic currency. This willingness is finite: as the central bank issues more base money, the value of a unit of base money in terms of foreign currency declines and, although this is an empirical matter, it appears likely that at some point issuing further home money lowers the value of the home money stock in terms of foreign currency. That is, there is a Laffer curve in the foreign-currency value of seigniorage. Unfortunately, the size of the foreign-currency liabilities of the Icelandic banking sector is sufficiently large that it is unlikely that the Icelandic government could provide full foreign-currency deposit insurance

or sufficient foreign-currency liquidity to replace maturing non-deposit short-term foreign currency liabilities to ward off a liquidity crisis simply by printing its own money.

III. Can Iceland Act as a Lender of Last Resort?

In this section we attempt to draw some conclusions about whether the government of Iceland has the necessary resources to act as a lender of last resort in the current crisis.

III.1 How much foreign currency does Iceland need

We will argue later on in the section that Iceland would not need to bail out the foreign subsidiaries of its domestic banks. Thus, in the event of a liquidity crisis affecting all three large private Icelandic banks, Iceland might need as much foreign currency as the required short-term foreign-currency needs of the parent banks and any foreign branches, less the liquid assets of these parent banks and any foreign branches. Unfortunately, precise data are not available to us, but we can make a very rough estimate.

As seen in Figure 2, the shares of assets located in Iceland are 51 percent for Landsbanki and 68 percent for both Glitnir and Kaupthing. We assume that all of the assets located abroad are subsidiaries and not branches; to the extent that this is not true (and it is indeed not true) our estimate may be too low. We also assume that liability shares are the same as asset shares. The shares of total assets held in krónur are 25 percent, 30 percent and 13 percent for Landsbanki, Glitnir and Kaupthing, respectively. The shares of total liabilities held in krónur are 19 percent, 20 percent and 9 percent for Landsbanki, Glitnir and Kaupthing, respectively.

We assume that all króna assets and all króna liabilities are held in Iceland. Thus, we estimate that foreign currency assets in Iceland as a percentages of total assets are 24 percent, two percent and 19 percent for Landsbanki, Glitnir and Kaupthing, respectively. We also estimate that foreign currency liabilities in Iceland as a percentage of total liabilities are 30

percent, 12 percent and 23 percent for Landsbanki, Glitnir and Kaupthing, respectively. We assume that these shares are constant across maturities.

As an imperfect measure of the difference between short-term liquidity needs and available liquid assets we use the difference between short-term liabilities and short-term assets. In particular we look at assets and liabilities with maturities up to three months and assets and liabilities with maturities up to a year. Using the percentage shares that we calculated in the previous paragraph and data on assets and liabilities of different maturities found in the three large banks' 2008Q1 interim financial statements, we find that the difference between short-term liabilities and short-term assets denominated in foreign currency and located in Iceland is 481,336 million kr. or \$6.0 billion if short-run is defined as three months and 534,056 million kr. or \$6.7 billion if short-run is defined as a year.⁶

Unfortunately, subtracting assets of a particular maturity from liabilities of the same maturity may yield an underestimate of the net liquidity deficit. Landsbanki publishes a table showing the cash flow payable by its group, classified by remaining contractual maturities. This yields a number that is about one and a half times as high as simply looking at assets and liabilities classified by maturities. If similar figures would result for the two banks that do not publish these numbers, then it may be that the central bank requires foreign reserves of \$10 billion or about 800 million kr. if the short run is defined as a year.

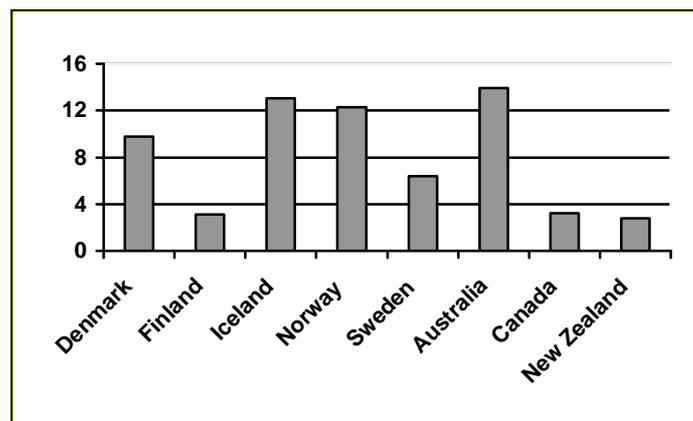
III.1 Does Iceland have adequate foreign exchange reserves to act as a foreign currency lender of last resort?

The government of Iceland's foreign assets are mainly the official foreign reserves of the Central Bank of Iceland. A typical central bank's official foreign reserves are mainly foreign exchange, typically acquired through foreign exchange intervention, but they also include gold, SDRs and the country's reserve position in the IMF.

⁶ See Glitnir (2008b), Kaupthing (2008) and Landsbanki (2008).

The Central Bank of Iceland has pursued a programme of regular foreign exchange purchases and on 11 July 2008, Iceland held foreign exchange reserves equal to \$2,567.56 million, or about 205 billion krónur. Almost all of it (over 96 percent) is in foreign currency reserves. To get an idea of the size of these official foreign reserves, we expressed them as a share of GDP and compared Iceland's position with that of the other Nordic central banks and the central banks of three other small open economies. As can be seen in Figure 5, with foreign assets equal to about 13 percent of GDP, the Icelandic central bank holds a relatively large amount of foreign reserves for a country of its size. No Nordic country's central bank holds more, nor do the central banks of Australia or Canada. Only the central bank of New Zealand, with reserves of just under 14 percent of GDP, holds only slightly more.

Fig 5. Official Foreign Reserves of the Central Bank as a Percent of GDP



Source: International Monetary Fund. Reserve data is from end June/early July and the GDP is projected GDP for 2008.

Note: The Norwegian data exclude investments for the government pension fund.

In addition to its official reserves, Iceland has entered into bilateral currency swap arrangements with Sweden, Norway and Denmark on May 16, 2008. Each arrangement provides access 500 million euros in exchange for krónur. Thus, at an exchange rate of 124 kr./euro there is access to about 186,000 million krónur worth of foreign currency. Thus, the Central Bank of Iceland has already acquired access to a total of 391 billion kr. or \$4.9 billion. Unfortunately, our estimates in the previous subsection suggest that this might be less than half of what it needs.

III.2 Could Iceland acquire enough additional reserves by issuing base money?

As mentioned in the introduction, a central bank might attempt to raise foreign-currency revenue by engaging in foreign exchange intervention, selling the domestic currency for foreign currency. As we mentioned in the previous subsection, Iceland has been pursuing this strategy. The amount of revenue that can be raised this way is not clear. However, to get a ballpark idea, we construct a simple model in Appendix 1 and demonstrate that an upper bound on the amount that can be raised is less than the value of the current domestic money supply at the current exchange rate.⁷

Our calculations, however, assume that the foreign exchange market is functioning normally and does not become illiquid. Unfortunately, this is no longer the case. The Central Bank of Iceland abandoned its attempt to raise additional reserves this way at the end of March 2008 because market conditions no longer permitted it. (*Financial Stability*, May 2008, p. 70)

III.3 Iceland must seek assistance from abroad

In addition to being ineffective, any attempt by Iceland to assist its banks on its own may be counterproductive. The reason for bailing out a bank, when one would not bail out a manufacturing company, is the fear of contagion that could spark bank runs on solvent banks.

As previously mentioned, a run on a solvent bank is an unusual event. It requires something that coordinates the beliefs of individual investors. An example is the visible failure of similar bank. The typical depositor may have little idea about the balance sheet of the bank in which he holds his money. A publicly observed failure of a similar bank both increases each depositor's perception of the riskiness of his own bank and tells the depositor

⁷ The upper bound is generous in that we assume that the market believe the increase is a one-off event and does not draw any negative conclusions about the future path of the Icelandic money supply or the state of the Icelandic economy from this action. In practice, a large sale of domestic currency by the Icelandic central bank might cause a change in sentiment that would significantly reduce the amount of foreign currency that the Icelandic authorities could raise.

something about what other depositors will do. Thus, in addition to providing information, a run on one bank can coordinate depositors at another bank on a bank run outcome.

Other things can coordinate depositors as well. One that we previously mentioned is the obvious fact that Iceland has no foreign-currency lender of last resort although its banks have large short-term foreign-currency liabilities. This publicly observed fact both increases individuals' assessment of the riskiness associated with his deposit and provides information about what other depositors will do, increasing the likelihood of a bank run. Another way to coordinate depositors – or to alert hedge funds of potential prey -- is for the government to make a frantic attempt to secure foreign exchange that is both observable and believed likely to be ineffective.

Iceland has limited foreign exchange reserves and limited means to obtain more through normal, unilateral foreign exchange operations. Currently, it has limited access to other foreign exchange resources, such as swaps and credit lines. Its massive mismatch between the currency of the lender of last resort and the foreign currencies of operation of the banking sector is unique, as far as we know.⁸ The Central Bank of Iceland cannot act as an effective lender of last resort for a domestic banking system whose lending, borrowing and investment activities are mainly in foreign currencies and whose balance sheet is largely foreign-currency-denominated. The scenario is an invitation to a bank run or a market strike. The government should move to secure foreign funding and, as soon as possible, an alternative lender of last resort.

IV. Obtaining External Funding

Only full participation in the Economic and Monetary Union of the European Union provides a long-term solution that will permit Iceland to maintain an Iceland-domiciled

⁸ The Switzerland-domiciled part of the Swiss banking system (this excludes the foreign subsidiaries of Swiss banks) derives an unknown but probably substantial part of its revenues and profits from the rents Switzerland creates and appropriates through its bank secrecy laws and its resulting position as a tax haven. We do not recommend that Iceland actively pursue tax haven status, both for practical and for ethical reasons.

banking sector of its current size relative to the rest of the Icelandic economy. This requires EU membership. Even under the most favourable conditions, EU membership for Iceland, let alone full EMU participation, is several years away. The only immediate solution is for the banks, directly or indirectly, through the government, to gain access to foreign exchange on a sufficient scale. In this section we make some suggestions about how this can be done.

IV.1 What the banks can do: using their subsidiaries abroad

Foreign branches of Icelandic banks do not have access to the discount window of the central bank in their host country, nor are they eligible parties in open market operations by their host-country central bank. Subsidiaries, however, can have both privileges. This is why we excluded them when we calculated the amount of foreign exchange that the central bank might need. The three Icelandic banks should use the discount windows accessible to their foreign subsidiaries to the maximum extent possible, and should also engage in collateralised open market transactions with their host country central banks to the maximum amount possible.⁹

A Kaupthing subsidiary in the UK, Kaupthing Singer & Friedlander Limited (KSF), is a participant in the Bank of England's Reserve Scheme and in its Standing Facilities. This means that KSF is an eligible counterparty in the Bank of England's open market operations and that it can borrow overnight, on demand against appropriate collateral, at the standing lending facility, the Bank of England's discount window, at a penalty over Bank Rate of 100 basis points. Kaupthing subsidiaries are also on the MFI (monetary financial institutions) list in Sweden, Finland and Luxembourg. In the last two countries they are subject to the Eurosystem's minimum reserves and are, therefore, eligible counterparties at the marginal lending facility and for open market operations.

⁹ Appendix 2 contains a list of subsidiaries of the three internationally active private Icelandic banks.

A Landsbanki subsidiary is on the MFI list in the UK, although it is not on the Bank of England's list of eligible counterparties at its Standing Facilities or for its open market operations. A Landsbanki subsidiary is an eligible counterparty at the Marginal Lending Facility and for open market operations with the Eurosystem in Luxembourg. A Glitnir subsidiary is an eligible counterparty for the Eurosystem in Luxembourg. We have not been able to verify the eligibility for discount window access or the open-market operation counterparty eligibility of Glitnir's Norwegian and US subsidiaries. Icelandic banks should, where possible, turn their euro area and UK branches into subsidiaries with access to Eurosystem, respectively Bank of England, liquidity.

Euro area and US subsidiaries of UK banks have borrowed since last August from the ESCB and the Federal Reserve System, respectively, both through the discount window and through open market operations. It is not clear, however, that the ECB, the Fed or the Bank of England would be happy to see Icelandic parent banks borrow on a large scale from them, using their euro area, US or UK subsidiaries as intermediaries or vehicles. Because of possible contagion effects, these central banks would not like to see the Icelandic parent banks fail. But, it is possible that the governments in the euro area, the United States and the United Kingdom would believe that it is politically costly to bail out foreign banks and that funding foreign parent banks through subsidiaries is a violation of the spirit of the law.

IV.2 Government borrowing from other central banks and the market

It is clear that the Central Bank of Iceland must borrow additional foreign exchange. The most attractive option is probably to attempt to establish additional contingent foreign-currency credit lines or overdraft facilities besides the ones that they have established with three Nordic central banks. Swaps are a common arrangement among central banks. In Dec 2007 the Fed and the ECB agreed to a \$20 billion swap facility and the Fed and the SNB agreed to a \$4 billion swap facility. Unfortunately, Iceland is at a disadvantage for swaps,

because few foreign central banks would naturally wish to take a significant long position in the Icelandic króna. However, the threat of the global contagion fallout from an Icelandic bank failure is likely to be quite persuasive and the ECB, the Bank of England and the Fed may be willing counterparties.

The government of Iceland could also borrow from the markets. It no longer has a triple A credit rating, and on 1 April 2008, Fitch Ratings revised the Outlooks for the Republic of Iceland's long-term foreign-currency and local-currency issuer default ratings to Negative from Stable. The long-term foreign-currency and local-currency issuer default ratings are 'A+' and 'AA+' respectively. Iceland also possesses some excellent collateral, even if using it might prove politically unpalatable.

We believe that neither the country's recent large current account deficits, nor its (misreported and overstated) negative net external investment position should be an obstacle to the Icelandic authorities borrowing abroad. The details of the argument are in Appendix 4. In a nutshell, the end of the aluminium investment boom will dramatically lower the country's cyclically-corrected current account deficit. The cyclical downturn will further reduce the external deficit. The marked-to-market net international investment position of the country is much less negative than the commonly reported book or historic cost measure of the net international investment position (see Svavarsson (2008)).

One option is for the government to use the assets of the publicly owned Housing Financing Fund as collateral for loans from the market, or indeed for loans from other central banks. The HFF has roughly ISK 500 billion of assets on its books, or about \$6.6 billion at current exchange rates. There are two problems with this. First, these assets are mortgages or residential-mortgage-backed securities, and the global popularity of such assets is at an all-time low. Standard & Poor's on April 17, 2008, lowered the long-term foreign-currency rating on HFF, alongside that of the Sovereign, to 'A' from 'A+', and its local currency ratings

to 'A+/A-1' from 'AA-/A-1+'. HFF's short-term foreign currency rating of 'A-1' was affirmed. These assets are 'Aaa'-rated by Moody's, but were placed on a negative Outlook on 5 March 2008. The second problem is that the HFF is already being enlisted to lend the commercial banks up to 30 billion krónur (\$380 million) to allow them to refinance mortgages.

The assets of the privately owned (by the social partners) pension funds of Iceland could also be mobilised by the government to lower the financial pressures on the country and the banks. At the end of January 2008, the assets of the pension funds stood at ISK 1622 billion, or approximately \$21.6 billion worth. Of that, about ISK 442 billion were foreign securities – about \$5.9 billion worth. The pension funds could be encouraged to use their liquid foreign assets, or foreign exchange obtained by borrowing against their illiquid foreign assets, to buy back some of their long-term debt to the Icelandic banks, write credit default swap (CDS) insurance for the banks or engage in a range of other measures that either provide the banks with liquid foreign assets or discourage speculative attacks against them in the CDS, stock and bond markets. If the banks are indeed solvent provided they can hold their assets to maturity, and if the market 'strike' is indeed mainly a liquidity phenomenon, it ought to be possible to offer terms to the pension funds that compensate them fully for their increased risk exposure yet at the same time help take the pressure off the banks. Nevertheless, using pension funds to back banks that have expanded as aggressively as the Icelandic banks might be a political hard sell.

From the perspective of the international financial community, the most promising form of collateral for official borrowing from abroad is Iceland's natural resources. Iceland is rich in hydro and geothermal energy resources that are currently only exploited for exports indirectly, by being embodied in the exports of aluminium smelted and refined in Iceland. Before too long, however, there may be a power cable linking Iceland to Scotland and possibly to other countries as well. This valuable resource could be used today by borrowing

against it. In particular, exploration rights and exploitations options could be auctioned off to foreign enterprises. Future foreign currency energy revenues of the Icelandic Treasury could be securitised today, with bonds that will only start paying a coupon in the future, when the exports and taxes are actually flowing. While also possibly politically unappealing, tens of billions of dollars could be mobilised through this channel.

IV.3 the International Monetary Fund

Iceland, with its strong fiscal position and sound economic policies, is not the usual candidate for IMF funds. However, a look at the IMF's lending position, shown in Table 1, below, suggests that Iceland and the IMF may be an excellent match: the IMF is desperate to lend to worthy and credit-worthy borrowers.

Table 1.
IMF Lending 2008

LOANABLE FUNDS	\$209.5 BILLION
LOANS OUTSTANDING	\$16.1 billion

Source: IMF

Iceland currently has access to IMF resources in the IMF's General Resources Account (GRA). The two IMF facilities that would be available to the Icelandic authorities are the Stand-By Arrangements (SBA) and the Supplemental Reserve Facility (SRF). The SBA is designed to help countries with short-term balance of payments difficulties. The length of an SBA is typically one to two years and repayment is normally expected in two and a quarter to four years. There are surcharges for high access levels.

The SRF provides sizable loans on a short-term basis. This facility was introduced in 1997 after the crises in emerging markets during the 1990s. Emerging market economies suffered massive capital outflows after sudden losses in market confidence and their governments required much larger loans than they had previously been able to get from the

IMF. The Fund expects SRF loans to be repaid in a year to a year and a half and they carry a substantial surcharge of three to five percentage points.

The maximum amount that a country can borrow varies and is different for different types of loans. It typically depends on a country's IMF quota, but in exceptional circumstances some loans may exceed the usual limits. Access is typically limited to an annual amount equal to the country's quota and a cumulative amount equal to three times the country's quota. The IMF's willingness to extend exceptional loans depends on a country's balance-of-payments needs, its ability to repay, its current indebtedness to the Fund and its track record. Iceland's current IMF quota is about \$193 million. Iceland already has access to \$25 million of this, it is part of Iceland's official reserve assets; none of the rest has been drawn on.

Unfortunately, the most obvious IMF loan facility for Iceland, the Contingent Credit Line (CCL) no longer exists. The CCL was introduced in 1999 as part of the IMF's response to the Asian crisis of 1997-8. It was intended to provide a precautionary line of defence for countries with sound policies that were at risk of a capital account crisis because of contagion effects from other countries. A country had to meet four criteria to access this facility. First, it must not otherwise have needed IMF lending; second, its policies must have been progressing towards internationally accepted standards; third, it must have had constructive relations with its private creditors and been making progress toward limiting its external vulnerability; fourth, it must have had a satisfactory macroeconomic and financial programme and a commitment to adjustment. Funds were available for up to a year on a standby basis. There was no formal limit on the amount available, but it was generally expected that commitments would be about three to five times a country's quota. Repayment was expected in a year to eighteen months and there was a surcharge of 1.5 to 3.5 percentage points.

The CCL was never used and it was allowed to expire in 2003. However, the Directors of the IMF emphasised during the debate on the CCL's expiration in 2003, that the IMF stands ready to respond quickly and flexibly to approve the use of Fund resources. It seems reasonable to believe that Iceland would have been allowed to borrow five times its quota under this facility – almost one billion dollars – and that it might still be able to arrange similar IMF financing. One billion dollar may not seem like a lot, but even before the current systemic crisis started in August 2007, there was at least one occasion in 2006 where one of the Icelandic banks found itself in considerable difficulty having to come up with just over 600 million dollars at short notice, when faced with a short-lived market liquidity shortage. A billion dollars of additional liquidity would come in handy when total foreign exchange reserves are around 2.8 billion dollars.

Borrowing from the IMF or resurrecting its contingent credit facility may be hard to swallow for a country that is not an emerging market or a developing country. It is also possible that there is so much 'stigma' attached to a country requesting even a contingent credit line with the Fund, that it could end up harming the country's access to funding from the markets. The rating agencies, for instance, may take an (unjustified) dim view of a country seeking even contingent assistance from the IMF, and the markets might react negatively. But if, as we believe, at least \$1bn could be made available through this channel, and quite possibly a lot more, it is a line of defence that ought to be given serious consideration.

IV. Can Iceland raise what it needs in the short run?

We have argued that a ballpark figure of what Iceland might need in the short run is \$10 billion of foreign currency. It already has almost \$5 billion. It should be possible to for the Icelandic authorities to raise, at short notice, say, \$1 billion from the IMF and perhaps \$2.5 billion from other central banks. The private banks might be able to raise the remaining

\$1.5 billion through their foreign subsidiaries. Any shortcoming could be made up by the central bank borrowing from the markets using the assets of the Pension Funds, the assets of the HFF, or claims against its natural resources as collateral. With a bit of luck, the banks and the rest of the financial system ought to be able to survive the current crisis.

However, in the longer run, if Icelandic banks were to be taxed for the costs of the foreign exchange liquidity insurance mechanisms that reduce the likelihood of a future liquidity crunch to an acceptable level, this would put Icelandic banks at a competitive disadvantage relative to banks domiciled in jurisdictions whose currency is a serious global reserve currency.

The concerns we express about the competitiveness and even the viability of an internationally active banking sector domiciled in Iceland with the Icelandic króna continuing as the country's currency, therefore apply not only to Iceland but, albeit to a lesser degree, to other countries with internationally active banking sectors that are large relative to the rest of the economy, but without a domestic currency that is also a serious global reserve currency.

There are now only two serious global reserve currencies, the US dollar and the euro. The list of countries with internationally active banking sectors that are potentially vulnerable to funding- or market-liquidity crises due to the absence of a foreign currency lender of last resort and market maker of last resort includes Switzerland and the UK, but not Luxembourg, which is part of the euro area.

The Switzerland-domiciled part of the Swiss banking system owes its continued profitability to a significant extent to its banking secrecy and its associated status as a tax haven. Those subsidiaries of the internationally active Swiss banks that are located in the Euro area or in the US are eligible for liquidity support from the Eurosystem and the Fed, respectively. As we noted, the subsidiaries of the Icelandic banks domiciled in the euro area (mainly Luxembourg at the moment) are eligible for access to the Eurosystem's marginal

lending facility and are eligible counterparties in Eurosystem repos. The UK has, in sterling, a second-class global reserve currency (see Appendix 3). While this represents a competitive disadvantage compared to Eurozone and US-domiciled banks, it is better than nothing, which is the condition Iceland finds itself in.

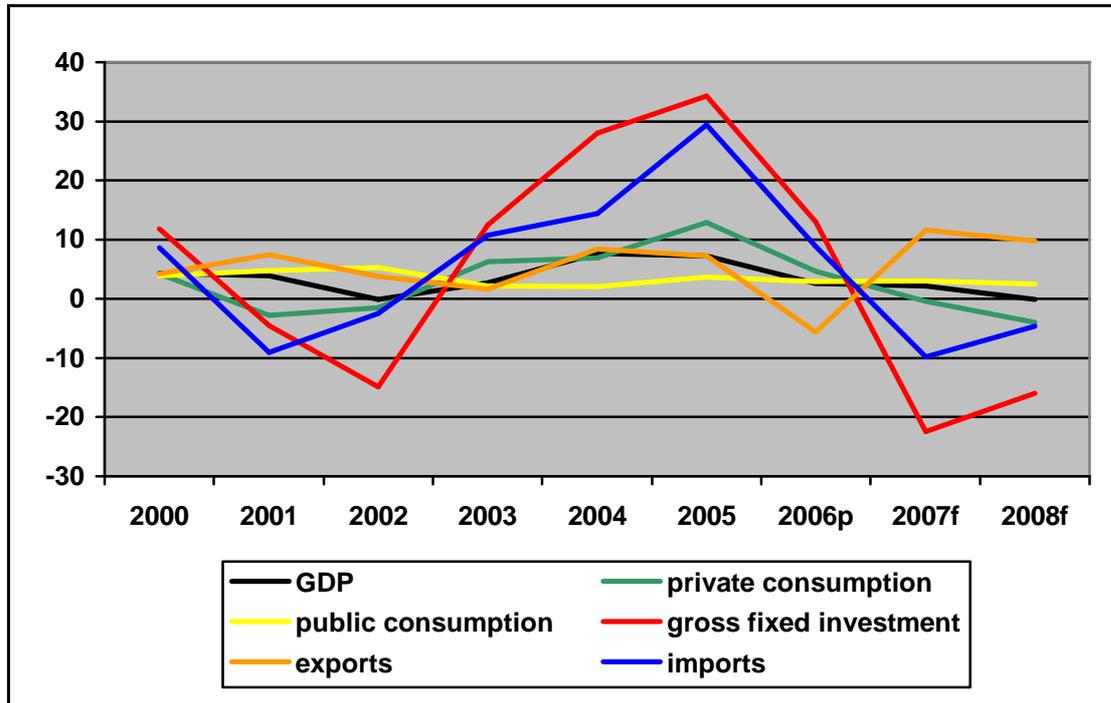
V. Should Iceland Join the Euro Area?

As we have argued, if Iceland wishes to maintain an internationally active banking sector domiciled in Iceland that is as large as the current one, relative to the Icelandic economy, it is only sensible for it to join the euro area. This is the only way to guarantee a permanent foreign-currency lender of last resort. In this section we argue that joining the euro area would also result in a more sensible monetary regime – a precondition for macroeconomic stability.

V.1 Making monetary policy in Iceland is too difficult

One reason for Iceland to contemplate abandoning its national currency is the difficulty it has had in making monetary policy. To illustrate the problems, we consider Iceland's recent aluminium investment boom.

Figure 6
Icelandic National Accounts at Constant Prices (Percentage Change)



Source: IMF

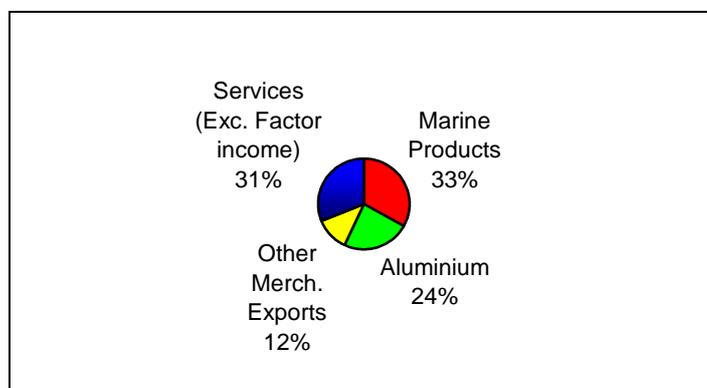
Source:

In 2004 and 2005 Iceland had an externally financed investment boom in aluminium projects; this is seen in the spike in real gross fixed investment in Figure 6 above. In 2004 gross fixed investment increased by 28 percent; it rose by nearly 35 percent in 2005. The prospect of favourable future growth, coupled with lower income taxes, led to a sizeable, if less impressive, growth in domestic consumption: almost seven percent in 2004 and nearly three percent in 2005.

An obvious lesson from the boom is that a shock affecting a single industry can have a large effect on an economy as tiny as Iceland's. As seen in Figure 7, below, aluminium already makes up about a quarter of Icelandic exports, a number expected to grow much larger in years to come, as additional capacity comes on stream. There are only two other export industries of significant size: marine products and services each accounting for about a third of Iceland's exports. Given Iceland's size, we conjecture that three large export industries is a sensible amount of economic or real diversification. But, on its own it is not

enough to adequately insure Iceland against sector-specific shocks having a substantial impact on the economy as a whole.

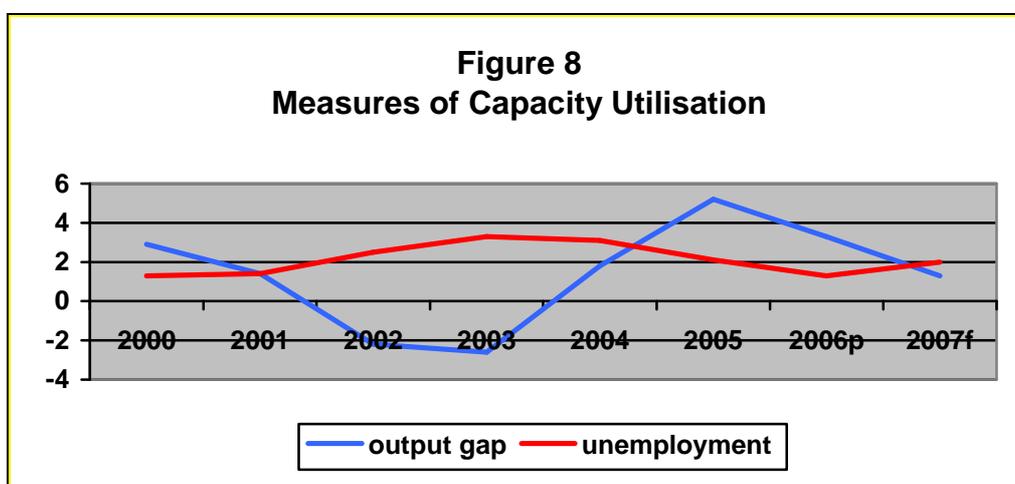
Figure 7
Export Composition (Exc. Income) 2007



Source: Finance Ministry, Iceland

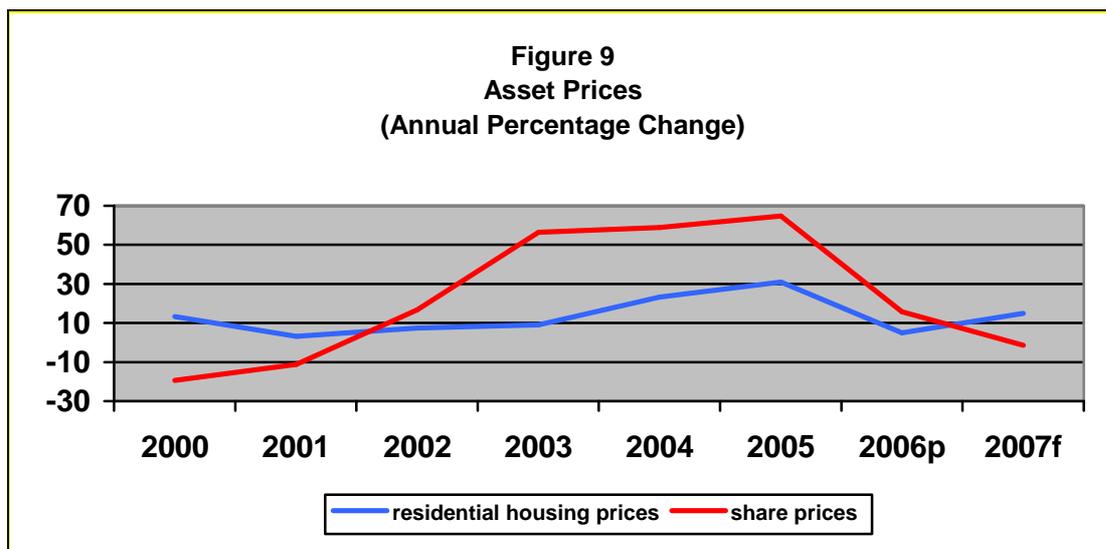
The aluminium boom was associated with large swings in domestic investment demand and domestic consumption demand and, as a result, there were significant changes in capacity utilisation. Two measures of this are unemployment (an inverse measure) and the output gap, defined as the difference between actual output and estimated potential output as a percentage of estimated potential output. These measures are shown in Figure 8 below. The output gap swung from -2.6 percent in 2003 to 5.2 percent in 2005 and then fell to 1.3 percent in 2007. Unemployment fell from 3.4 percent in 2003 to 1.3 percent in 2006, before rising to 2.0 percent in 2007.

Figure 8
Measures of Capacity Utilisation



Source: IMF

The boom was also associated with extreme swings in investor sentiment, as shown in Figure 9. Residential housing prices, which had increased at an average rate of about six and a half percent per year in 2001, 2002 and 2003, rose by over 23 percent in 2004 and by 31 percent in 2005. Share prices, fell by nearly 20 percent in 2000 and rose an average of 60 percent per year in 2003, 2004 and 2005. Clearly, these swings in capacity utilisation and mood resulted in nominal and real volatility and made monetary policy challenging.

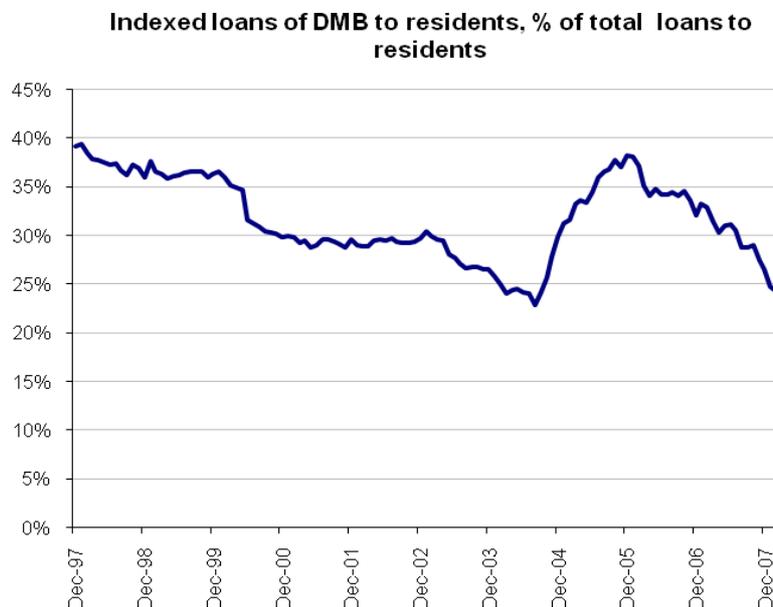


Source: Central Bank, Iceland

Further problems for monetary policy have resulted from another startling feature of the Icelandic economy: roughly three quarters of the total domestic-currency lending of the credit system is index-linked to the CPI. About a quarter of the domestic currency loans of the Icelandic depositary monetary banks are index-linked, as shown in Figure 10. Roughly 50 percent of non-exchange-rate linked loans are indexed to the CPI. Mortgages from the State Housing Financing Fund are all indexed as is most Pension Fund lending to residents. This means that the overwhelming majority of bank lending is either foreign-currency denominated or index-linked to the domestic CPI. Therefore, the interest rate channel for monetary policy, which works through changes in short-term domestic nominal interest rates, is effectively emasculated. Monetary policy therefore works almost exclusively through the

exchange rate. The extreme swings in the nominal and real exchange rate of the Icelandic króna are consistent with this.

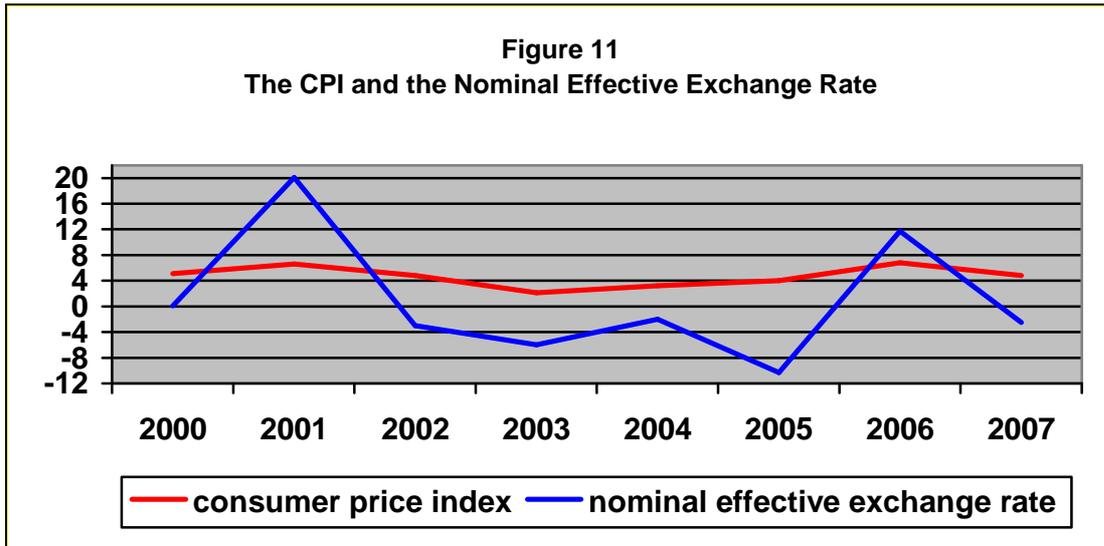
Figure 10



Source: Landsbanki

The CPI and nominal exchange rate are seen in Figure 11, below. The over-riding goal of the Icelandic central bank is to keep the rate of inflation on average as close to its target of two and a half percent as possible. However, inflation was volatile and well above target during the period 2000 – 2007. The central bank last attained a year-over-year percentage change in inflation below target in 1998 when inflation was 1.7 percent.¹⁰ In March 2008, inflation has edged toward nine percent -- despite a policy rate of 15.5 percent!

¹⁰ There are some obvious things that Iceland could do to make monetary policy easier. The first is for the government to change the way it subsidises housing and to exit the home lending market. Currently, the HHF competes with private banks in the mortgage market. It funds its lending by issuing government-guaranteed long-term index bonds, making its costs insensitive to monetary policy. Firms in the oligopolistic private banking sector have an incentive to squeeze their profit margins, rather than raise their rates when the policy rate increases. Another thing that Iceland could do is to rethink the way that house prices are included in the price index, so that what is measured is the user cost of house prices and so that the price index is not distorted by house price volatility.

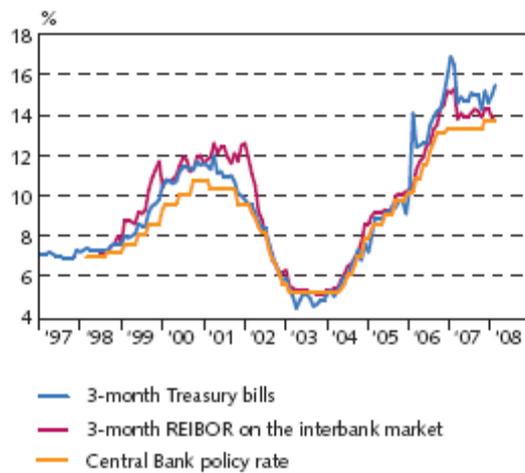


Source: Central Bank of Iceland

Figure 12 shows the behaviour of short-term domestic nominal interest rates up to the end of 2007. It does not include the most recent rate increases, which brought the official policy rate to 15.5 percent. These extremely high rates (motivated during the past year also by the need to defend the currency and the rest of the financial system against speculative attacks, were not enough to stop inflation rising steadily, reaching 8.7 percent year-on-year in March 2008.

Figure 12

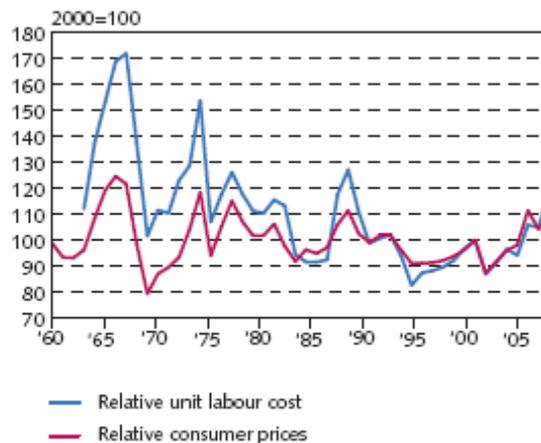
Short-term interest rates
January 1997 - February 2008
At end of month



Source: Central Bank of Iceland.

Figure 13

Real effective exchange rate
of the Icelandic króna 1960-2007¹



1. Preliminary 2007.
Source: Central Bank of Iceland.

The volatility of the nominal exchange rate and, as shown in Figure 13, above, of the real exchange rate, and the persistent failure of the central bank to come close to meeting its inflation target suggest that Iceland may be just too small and too internationally exposed to gain from having its own currency.

The fact, noted earlier, that most of the lending of Icelandic financial institutions to the domestic economy and most borrowing by the Icelandic non-financial private sector from any source is either denominated in foreign currency or index-linked (an extreme version of ‘original sin’), means that the Central Bank of Iceland’s interest rate ‘hammer’ has but a tiny anvil to hit.

Despite its pride in having a national currency that goes back over two hundred years, it is probably time for Iceland to consider the costs and benefits of alternative arrangements. These costs and benefits are the subject of the next subsection of this report.

V.2 New optimal currency area criteria

The study of the costs and benefits of common-currency areas goes back to the seminal work of Mundell (1961). Conventionally, the major cost of a joining a common currency area is the loss of one’s own monetary policy – the ability to set the short, risk-free nominal interest rate or the nominal spot exchange rate. This loss is harmful for two reasons. First, if there are asymmetric shocks in different member countries of a common currency area, then the common central bank cannot smooth output and employment in individual countries, even if there are persistent nominal price and/or cost rigidities. Second, if countries have different consumption baskets and if relative prices are changing, then even with a single monetary policy there will be different inflation rates in different countries. If, say, two and a half percent inflation per year is optimal then a central bank may be able to attain something close to this for the currency area as a whole, but not for individual countries.

The old literature on optimal currency areas looked at how various attributes of a country affected these costs. For example, if countries have flexible labour markets or there is labour mobility across countries, then this tends to offset not having a country-specific monetary policy to counteract the effect of idiosyncratic shocks affecting labour demand. If there are no material nominal wage or price rigidities, then monetary policy is ineffective in

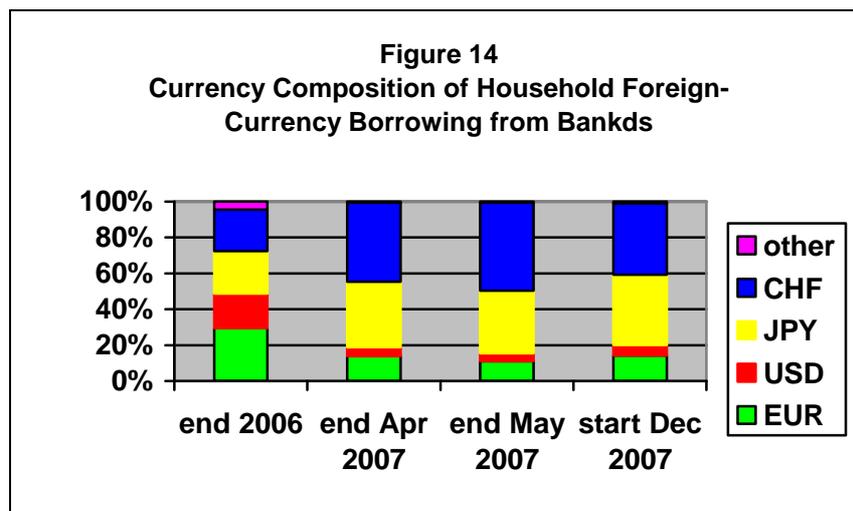
offsetting asymmetric shocks. If countries consumed similar consumption baskets, then even a one-size-fits-all monetary policy would produce similar rates of inflation across countries.

We argue, however, that these old optimal currency area criteria are not particularly relevant to the case of Iceland. It is true that cultural differences, language barriers and geography ensure that labour is unlikely to be especially mobile between Iceland and continental Europe. Although there have in recent years been quite sizeable labour flows between Iceland and both the Nordic countries and the Baltics, and although Iceland's internal labour market is flexible compared with much of continental Europe, it is not as flexible as those in the United States and New Zealand. The Icelandic consumption basket is unlikely to be similar to the Italian one. However, Icelandic monetary policy is certainly not delivering optimal inflation for Iceland and even if the central bank had a policy of offsetting shocks to the real economy in their own right (that is, as distinct from what shocks to the real economy imply for inflation), it clearly has not been effective and it is hard to believe that it would be effective in the future.

For these reasons, Buitert (2000) concluded that even on the conventional macroeconomic stabilisation criteria for an OCA, it made sense for Iceland to adopt the euro. With the spontaneous euroisation of much of the economy that has taken place since then, the ability to conduct an independent monetary policy - even the best-practice form of inflation targeting with a flexible exchange rate - has been further impaired. National monetary independence today makes no sense for Iceland today, even apart from the financial stability considerations we have emphasized in this paper.

A conventional benefit of a common currency area is the reduction in transactions costs. While transactions costs in the financial wholesale markets are miniscule per transaction, volume is high. The European Commission (1990) estimated that these costs were .25 – 0.40 percent of the total European Community GDP.

The króna, as measured by variations in the nominal and real effective exchange rates, is volatile relative to that of other advanced economies.¹¹ Moreover, the openness and small size of the Icelandic economy makes its inhabitants particularly vulnerable to foreign exchange volatility. Every business and household in Iceland is in the position of having to be a foreign exchange speculator.



Source: Central Bank of Iceland, borrowing from Kaupthing, Landsbanki and Glitnir

There is evidence to support the view that not all households have been wise speculators. Around 80 percent of the foreign currency loans to households, for instance, were denominated in the two currencies with the lowest interest rates, the Japanese yen and the Swiss franc (see Figure 14, above). Iceland's households have therefore been enthusiastic proponents of the 'carry trade', borrowing where the interest rates are lowest, and forgetting about currency risk.

¹¹ See Kallestrup (2008) for a recent study.

The real resource cost of this must be substantial and it leads to redistributions of income and wealth that are typically regarded as unfair: the wealthy and the educated gain at the expense of the poor and the unsophisticated.¹²

V.3 Is there a third way? Temporary suspension of capital account convertibility or a Sovereign Wealth Fund for Iceland.

V.3a Temporary suspensions of capital account convertibility

Other small countries with supposedly open capital accounts, including Latvia, have discouraged speculation against their currencies by not authorising large transactions involving domestic currency borrowing, if these large amounts were not justified, in the opinion of the private banks and the Bank of Latvia (the central bank), by the needs of trade and normal financial transactions, but were instead part of an attempt to short the lats and cause the currency peg with the euro to collapse. Effectively, therefore, the Latvian commercial banks and the Bank of Latvia restricted the capital account convertibility of the lats. This clearly is against the letter of the *Acquis Communautaire*, but appears nevertheless to have been common practice during recent speculative attacks on the lats. We have off-the-record confirmation of this from sources in the Bank of Latvia, private Latvian banks and would-be lats borrowers who were sent away empty-handed.

This course of action – the *de-facto* temporary and selective suspension of capital account convertibility - is not open to Iceland, if it wishes to retain its international banking business. In Latvia, about 80 percent of the banking system is foreign-owned, mainly through subsidiaries of Swedish and other Nordic banks. These subsidiaries don't themselves

¹² It should also be noted that having an independent monetary policy is not costless. The central bank employs 115 persons and the payroll and other operating costs last year were 1,334,290,000 kr. With a population of only 312,872 and at an exchange rate of 74 kr/dollar, this amounts to a cost of almost \$57 per person per year.

engage in significant foreign banking business, other than funding themselves through the parents.

V.3b A Sovereign Wealth Fund for Iceland?

Recently there have been proposals that Iceland should establish a sovereign wealth fund to bolster its volatile economy's defences against outside threats. An example is the proposal reported in the Financial Times of Thursday, April 24 2008, by Björgólfur Gudmundsson, owner and chairman of Landsbanki. These proposals are quite distinct from our recommendation that the Icelandic authorities (and banks) acquire as many liquid foreign currency resources and establish as many foreign currency credit lines as possible. We view this as a short-term, emergency measure. When order is restored, the country will, in our view, have to choose between an internationally active banking sector and its national currency. The 'Sovereign Wealth Fund proposals' are presented as a way for Iceland to retain both its internationally active banking presence and its national currency. It is meant to be a long-term solution.

We believe that the Sovereign Wealth Fund terminology and the references to Norway's oil fund are rather misleading. We can distinguish three kinds of funds: sovereign wealth funds, stabilisation funds and reserve funds, corresponding to investments made, respectively, for the long run, the medium run and the short run.

Sovereign Wealth Funds save, invest and disburse to smooth income and consumption across generations. Since they invest for the ages, they often invest in illiquid assets with long maturities. They are relevant especially for countries with exhaustible resources such as oil and natural gas. Norway is a country with large non-renewable resources. Intergenerational equity requires a sovereign wealth fund or some other public sector institutions for transferring resources among generations if private intergenerational concerns are not sufficiently strong.

Iceland does not have non-renewable resources that require a sovereign wealth fund to manage intergenerational equity. Its hydroelectric and geothermal energy resources are, for all practical purposes, renewable.

Stabilisation funds aim to smooth cyclical fluctuations in real income and consumption, due to changes in the external terms of trade. They tend to be used by producers of renewable commodities for which the relative price in terms of the domestic consumption basket can swing wildly for reasons beyond the control of the country. Agricultural commodity producers are an example. Stabilisation funds tend to be invested in rather liquid assets, as the timing of commodity price cycles is unpredictable. Iceland fits this category quite well, and will do so even more in the future when it may engage in direct exports of power via a cable to Scotland.

Reserve funds aim to provide liquidity for everyday transactions needs in the markets for internationally traded goods and services and for financial instruments. They also provide emergency liquidity to defend the currency, the stock market or the banks against speculative attacks or against the consequences of liquidity crises that are not due to reasonable concerns about the long-term solvency of the banks or other institutions of the country. Reserve funds have to invest in highly liquid foreign assets, as a crisis may strike at any time, and the availability of liquidity exactly when it is needed is key.

Given enough time, Iceland could build up a stock of liquid foreign exchange reserves large enough to compensate for any conceivable interruption in the supply of external credit to its banks and for any illiquidity in the markets for the banks' foreign currency assets. Building up a stock of reserves large enough to discourage speculative attacks on its stock market or on its currency would be more difficult, if the authorities maintain a truly open set of international financial markets. As long as it is possible for a would-be speculator to borrow from the Icelandic banks any amount of krónur and to invest these krónur in foreign

currencies, it is not possible to build up a stock of reserves so large it cannot be exhausted in a speculative attack. Of course, domestic interest rates can be raised to make this expensive, but even a small depreciation of the exchange rate over a short time interval swamps the cost of high interest rates over that time interval.

So building up a stock of liquid foreign assets large enough to prevent large swings in exchange rates and in the stock market driven by speculative attacks is not a realistic possibility. It is, however, possible to build up a stock of liquid foreign assets large enough to ensure the survival of the banking system when this is faced with a liquidity crunch that prevents it from borrowing abroad and from selling its foreign currency assets at acceptable prices. There are two problems with this “third way”, however.

First, it would take time to build up a sufficient stock of liquid official foreign assets. Iceland may not have enough time to get to the point that it can self-insure against interruptions of international funding liquidity and of international market liquidity. Second, even if there were to be, following the current crisis, a period of tranquillity long enough to permit the necessary stock of foreign assets to be accumulated, it is likely that the venture would be unprofitable. The fund would be quite unlike a sovereign wealth fund. It would have to be held in the most liquid possible form, to ensure its immediate availability in case of a crisis. By effectively undoing the maturity- and liquidity transformation of the banking sector, this large investment in liquid assets could destroy the social profitability of Iceland’s international banking activities. It is questionable whether these international banking activities would be privately profitable, if the authorities were to charge the banks the full opportunity cost of the liquidity insurance services provided by the authorities through their liquid foreign asset holdings.

VI. Conclusion

Iceland's economy is highly vulnerable to financial shocks. Iceland's banks have recently been exposed both to interruptions of funding liquidity and to interruptions of market liquidity in key markets for their assets. As regards shocks to funding liquidity, although Iceland's banks have not experienced classical bank runs (a sudden withdrawal of deposits), they have been subject to its credit market counterpart – the refusal by the bank's creditors to roll over maturing credit, secured or unsecured. As regards shocks to market liquidity, there have been wholesale financial market 'strikes' - liquidity shortages in the wholesale financial markets in which banks and other highly leveraged financial institutions fund themselves to a growing extent. Exchange rate volatility and instability, the huge spreads in the Icelandic banks' CDS markets and the de-facto exclusion of these banks from the international wholesale financial markets, are but the most visible manifestations of the financial difficulty Iceland finds itself in.

In the years leading up to the crisis, there were indeed speculative inflows of capital, followed by sudden reversals, and these have been associated with large swings in the nominal and real exchange rates. There is also a quite familiar story of structural reform and financial liberalisation leading to a massive investment boom (first in aluminium smelting and then in residential and commercial construction) which resulted in an overheating economy, a very large current account deficit and a growing negative net international investment position.

But these fundamental distortions are not capable of explaining the magnitude of the financial disturbances that have been part of Iceland's economic landscape for the past few years. The massive financial dislocation can only be explained by considering Iceland's spectacular growth as a financial intermediary, with gross foreign assets and liabilities rising eight and nine-fold as a share of GDP in less than a decade. Iceland has indeed become a highly leveraged financial institution with massive asset-liability mismatch - a 'hedge fund'

in tabloid language. The North Atlantic financial crisis hit the country, not because its investments had been of poor quality – its subprime exposure is quite limited - but because the liquidity crunch and disorderly financial markets in North America and Europe are making it difficult if not impossible for the internationally active Icelandic banks to refinance their maturing obligations.

While there has not been a deposit run on any of the Icelandic banks, the seizing up of the interbank markets, the ABS markets, ABCP markets and other sources of wholesale funding have created a crisis. The Icelandic banks need a foreign-currency lender of last resort. Unfortunately, the Central Bank of Iceland cannot print foreign currency, so its undoubted competence and good intentions are not enough to cope with the crisis. The short-term solution is to seek funding abroad: from other central banks, the market and the IMF. The best medium-term solution is for Iceland to join the EU and to adopt the euro as soon as possible. The only alternative is to move its foreign-currency banking activities to the euro area.

The reason Iceland is no longer a viable currency area has nothing to do with the familiar trade and normal capital flows-based OCA arguments – although these arguments also suggest that Iceland would be better off in the euro area. Unilateral euroisation would deliver macroeconomic stability benefits, but would not provide Iceland with a lender of last resort and market maker of last resort capable of creating euros at will. It would therefore do nothing to enhance Iceland's financial stability. Iceland's business model, operating internationally in the financial markets with high leverage, is not compatible with its currency regime.

A convincing case for Iceland becoming a full member of the euro area as soon as possible can be based solely on financial stability arguments: only the ECB and the

Eurosystem can act as a viable lender of last resort and market maker of last resort for Iceland.

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Appendix 1; The Upper Bound on Foreign-Currency Revenue From Money Expansion

In this Appendix, we use a simple open-economy version of the Cagan model to demonstrate that there is only a finite amount of foreign-currency revenue that a country can raise from printing base money, even when the foreign exchange market is liquid, and that this amount is less than the foreign-currency value of the existing money stock.

We assume that there is a small open economy with a single tradable good. By *small* we mean that the foreign-currency price of the good and the foreign nominal interest rate are taken as given. It is assumed that purchasing power parity holds. $M_t / P_t = L(Y_t, I_t)$, There are three financial assets: home money, home bonds and foreign M_t bonds. It is assumed that home money is held only by home residents and that home and foreign bonds are perfect substitutes, that is, uncovered interest parity holds. Output is assumed to be an exogenous and constant.

We assume that that the supply of real balances is equal to the demand for real balances and the demand for real balances is increasing in income and decreasing in the nominal interest rate:

$$M_t / P_t = \ell(I_t, Y_t) \quad (1)$$

where M_t is the time- t money supply, P_t is the time- t price of the good in terms of home currency, Y_t is a multiple of output and I_t is one plus the nominal interest rate between period t and period $t+1$. We assume a particular functional form for the L function so that equation (1) can be rewritten as

$$M_t / P_t = Y_t^{-\alpha}, \alpha > 0. \quad (2)$$

Let small letters denote the logarithms of capital letters, so that, for example $m_t = \ln M_t$.

Using this notation, equation (2) becomes

$$m_t - p_t = y - \alpha i_t. \quad (3)$$

It is assumed that purchasing power parity holds. Thus,

$$P_t = E_t P_t^*, \quad (4)$$

where E_t is the home-currency price of foreign currency and P_t^* is the foreign-currency price of the good. We assume that the foreign-currency price is exogenous and constant. Then by picking the units in which the good is measured we can normalise the foreign-currency price to one. Then, equation (4) becomes $P_t = E_t$. Taking logarithms yields

$$p_t = e_t \quad (5)$$

With perfect foresight, uncovered interest parity implies

$$I_t = I_t^* E_{t+1} / E_t.$$

In logarithm form this is

$$i_t = i_t^* + e_{t+1} - e_t. \quad (6)$$

Assuming that the foreign nominal interest rate is a constant a and substituting equations (5) and (6) into equation (3) yields

$$m_t - e_t = y^* - \alpha(e_{t+1} - e_t). \quad (7)$$

where $y^* \equiv y - \alpha i_t^*$. Solving the first-order linear difference equation and ignoring outcomes with bubbles yields

$$e_t = \frac{1}{1 + \alpha} \sum_{s=0}^{\infty} \left(\frac{\alpha}{1 + \alpha} \right)^s m_{t+s} - y^*. \quad (8)$$

Suppose that the money supply is constant and that the government plans to increase the money supply at some point to generate foreign-exchange revenue. We assume that the government's plan is initially secret, but that at some point - perhaps minutes or hours before it enters the market, market participants learn that the increase will occur at time T .

Algebraically we can represent the path of the money supply by

$$m_t = \begin{cases} m & \text{if } t < T \\ m + \Delta & \text{if } t \geq T \end{cases}$$

Substituting this into equation (8) yields that between the time that market participants learn about the central bank's plans and the instant that the jump occurs,

$$e_t = m + \Delta \left(\frac{\alpha}{1 + \alpha} \right)^{T-t} - y^*.$$

At $t = T$, all of the adjustment has taken place and $e_t = m + \Delta - y^*$. Thus, the (logarithm of the) foreign-currency revenue that the central bank can raise is $\Delta - e_t = y^* - m$.

Before the market participants learned about the future jump in the money supply they believed that the money supply would remain constant at m . Thus, equation (8) implies that the exchange rate was given by $e_t = m - y^*$ and the foreign currency value of the (logarithm of the) money stock was $m - e_t = y^* > y^* - m$. Thus, the central bank cannot generate an amount of revenue that exceeds the value of the foreign currency value of the existing money stock.

Appendix 2; Subsidiaries of the three internationally active Icelandic banks

Glitnir

Finland – Subsidiary

Luxembourg – Subsidiary

Norway – Subsidiary

Russia – Subsidiary (?) (CJSC Glitnir Securities; LLC Glitnir Asset Management)

Sweden – Subsidiary

USA – Subsidiary (Glitnir Capital Corporation)

Kaupthing

Belgium – Subsidiary of Kaupthing Luxembourg

Denmark – Subsidiary

Finland – Subsidiary & Branch

Isle of Man – Subsidiary (Singer & Friedlander)

Luxembourg – Subsidiary

Norway – Subsidiary & Branch

Sweden – Subsidiary & Branch

UK – Subsidiary (Singer & Friedlander)

US – Subsidiary

Landsbanki.

Landsbanki Kepler (Continental Europe)

Landsbanki Securities (UK)

Merrion Landsbanki (Ireland)

Landsbanki Heritable Bank (UK)

Landsbanki Luxembourg

Landsbanki Guernsey

Appendix 3

Global currency reserves													
	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07
US dollar	59.00%	62.10%	65.20%	69.30%	70.90%	70.50%	70.70%	66.50%	65.80%	65.90%	66.40%	65.70%	63.30%
Euro					17.90%	18.80%	19.80%	24.20%	25.30%	24.90%	24.30%	25.20%	26.50%
German mark	15.80%	14.70%	14.50%	13.80%									
Pound sterling	2.10%	2.70%	2.60%	2.70%	2.90%	2.80%	2.70%	2.90%	2.60%	3.30%	3.60%	4.20%	4.70%
Japanese yen	6.80%	6.70%	5.80%	6.20%	6.40%	6.30%	5.20%	4.50%	4.10%	3.90%	3.70%	3.20%	2.90%
French franc	2.40%	1.80%	1.40%	1.60%									
Swiss franc	0.30%	0.20%	0.40%	0.30%	0.20%	0.30%	0.30%	0.40%	0.20%	0.20%	0.10%	0.20%	0.20%
Other	13.60%	11.70%	10.20%	6.10%	1.60%	1.40%	1.20%	1.40%	1.90%	1.80%	1.90%	1.50%	1.80%
Sources: 1995-1999, 2006-2007 IMF: Currency Composition of Official Foreign Exchange ReservesPDF (80 KB)													
1999-2005, ECB: The Accumulation of Foreign ReservesPDF (816 KB) v • d • e													
Source: Wikipedia													

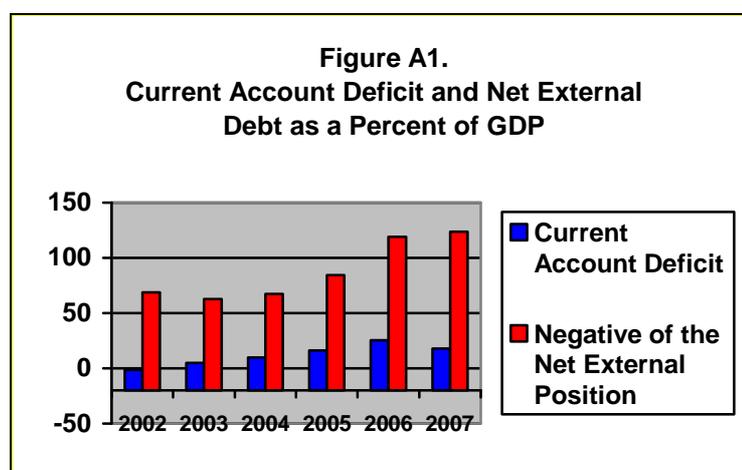
Appendix 4: The current account and net foreign investment position of Iceland

In this Appendix we consider two features of the Icelandic economy that have been argued to lie at the root of the current crisis but which we believe not to have been a major factor. They are the recent large current account deficits and Iceland's supposed large negative net international investment position.

The Icelandic economy's external accounts

Iceland is a wealthy but miniscule country, with just over 300,000 inhabitants and a GDP (at market exchange rates) of about \$17 billion in 2007, or around \$56,000 per capita. As we argue in Section V, its small size means that external and domestic shocks can cause large swings in its national and balance of payments accounts.

For many years, Iceland has run an external current account deficit. During the recent construction boom associated with the aluminium projects and the residential housing boom that followed, the current account deficit peaked at over 25 percent of GDP in 2006, as shown in Figure A1. This has resulted in Iceland, according to the most commonly used statistical measure, being a large net external debtor, with a net foreign investment position of minus 125 percent of annual GDP at the end of 2006, also shown in Figure A1.



Source: Central Bank of Iceland

We shall argue below, that this measure, which records foreign direct investment (FDI) at book value, represents a significant overstatement of the true net external liabilities of Iceland. However, our argument that Iceland's financial business model is not viable does not depend to any significant degree on the *net* external investment position of the country, or of its banks. It depends instead on the presence of a large stock of *gross* external assets denominated in foreign currency, part of which is illiquid, and a large stock of short-maturity foreign-currency-denominated *gross* external liabilities.

As the International Monetary Fund's 2007 Article IV Consultation staff report (IMF (2007)) emphasises, Iceland's international investment position data must be treated with caution. Iceland's outward measured direct investment (the purchase of over ten percent of the stock of a foreign entity) is unusually large: about 90 percent of GDP and about 20 percent of Icelandic gross foreign assets. It exceeds inward measured direct investment by an amount that is over 30 percent of Icelandic GDP. This is important because in computing the net international investment position, direct investment is measured at book value while portfolio investment is measured at market value. As book value is typically (but not always) less than market value, the act of direct outward investment usually lowers, at the instant it takes place, the *measured* net international investment position, even though the actual investment position has not changed. Moreover, over time, if equity prices rise, then the value of portfolio investment that is in the form of equity rises, while direct investment does not. A careful study by Svavarsson (2008) estimates that Iceland's end-of-third quarter 2007 international investment position at market value might have been only -27 percent of GDP – about 100 percent of GDP larger than the -125 percent of GDP estimate commonly reported.

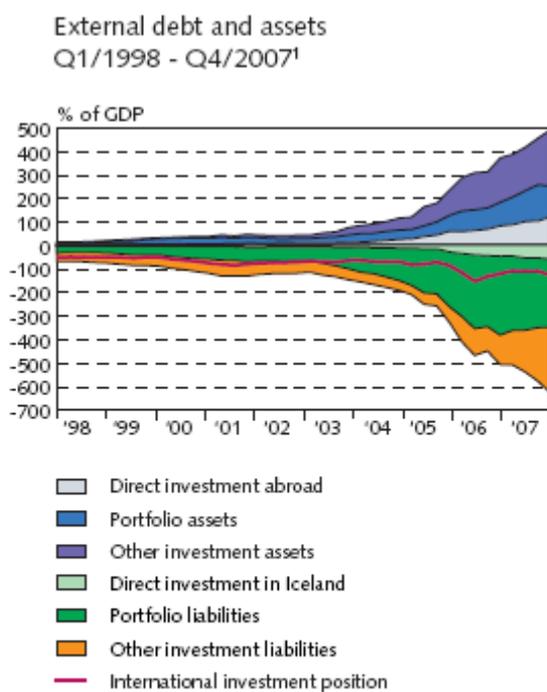
Two remarks are in order. First, given the size of net outward Icelandic direct investment, the marked-to-market international investment position is highly sensitive to swings in the exchange rate or global equity prices. A small fall in the króna would lead to a

significant improvement; a small decline in global equity prices to a significant worsening. No doubt the current marked-to-market net foreign investment position of Iceland would show a larger negative position than -27% of GDP. Second, while Iceland's external position is undoubtedly far better than the numbers suggest, it has little implication for the current financial crisis. Our view of the Icelandic financial crisis is that it represents a liquidity crisis, not a solvency crisis. The finding that the net external investment position of Iceland is significantly stronger with FDI assets and liabilities marked-to-market rather than reported at book value, strengthens the argument that it is not a solvency crisis. However, as we have argued earlier, even solvent entities can become the victims of a liquidity crunch if there is no lender of last resort/market maker of last resort.

The stronger net external investment position of the country ought to mean that the Icelandic authorities should be able to borrow from foreign official entities (national and international) on a larger scale than they would have been able to if the true net external investment position had indeed been -125 percent of GDP. Through its ability to tax, the Icelandic fiscal authorities can, given enough time, mobilise all domestic and net external resources of the country as collateral for foreign borrowing.

Gross external assets (with FDI valued at book) have ballooned, at the end of the third quarter of 2007, to 507 percent of annual GDP and gross external liabilities to 626 percent of annual GDP, as seen in Figure A2. According to Svavarsson (2008), marked-to-market gross external assets were 674 percent of annual GDP at the end of the third quarter of 2007, and marked-to-market gross external liabilities 701 percent. Both book values and marked-to-market valuation support the common observation that Iceland can be characterised as a hedge fund – a highly leveraged economic entity whose (external) assets are of longer maturity and less liquid than its (external) liabilities.

Figure A2



¹ Latest data are preliminary.
Source: Central Bank of Iceland.

We believe that the net international investment position of Iceland and the likely sharp reduction in the future current account deficit due to the end of the aluminium investment boom (and the cyclical slowdown) should not be an obstacle to external borrowing by the government or the central bank.