FINANCIAL STABILITY

2007

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By Alex Bowen

Financial stability means that the financial system is equipped to withstand shocks to the economy and financial markets, to mediate credit and payments, and to redistribute risks appropriately.

The purpose of the Central Bank of Iceland's *Financial Stability* report is:

- To promote informed dialogue on financial stability, i.e. its strengths and conceivable weaknesses, the macroeconomic and operational risks that it may face, and efforts to strengthen its resilience;
- To provide an analysis that is useful for financial market participants in their own risk management;
- To focus the Central Bank's work and contingency planning;
- To explain how the Central Bank carries out the mandatory tasks assigned to it with respect to an effective and sound financial system.

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Icelandic letters:
ð/Ð (pronounced like th in English this)
þ/Þ (pronounced like th in English think)
In *Financial Stability*, *ð* is transliterated as *d* and *þ* as *th* in personal names, for consistency with international references, but otherwise the Icelandic letters are retained.

The Central Bank's assessment

The commercial banks are more resilient

In its analysis published in *Financial Stability* at the beginning of May 2006, the Central Bank of Iceland's finding was that the financial system was broadly sound, but more challenging waters lay ahead. Two main causes of concern were identified: macroeconomic imbalances and uncertainty about the commercial banks' refinancing of their foreign borrowing. Refinancing was successfully completed. However, macroeconomic imbalances increased. A year ago the focus was on short-term risks on the liabilities side of the financial companies' balance sheets, but now it has shifted more to long-term asset quality.

Macroeconomic imbalances remain a cause for concern ...

The most pressing economic policy task is to restore stability. The conclusion of large investments in the aluminium and power sectors will automatically reduce imbalances, but other adjustment has been slower than expected. Increased foreign debt service has delayed the unwinding of the current account deficit, which will hardly be brought down to a sustainable level without a substantial contraction in demand. The latest forecast in *Monetary Bulletin* in March 2007 indicates that such a contraction lies ahead, as growth of investment and private consumption slows down. As discussed in this report, a depreciation of the króna coinciding with a fall in asset prices – possibly originating in tighter global financial conditions – could amplify the forecast contraction.

The necessary reduction of pressures in the economy will squeeze businesses and households, many of which are vulnerable due to heavy debt. They could withstand a short-lived reversal, but a lasting contraction would be difficult to weather.

... but the banks' financing is in better order

In late autumn 2005, after a surge in borrowing by Icelandic banks in international bond markets, investors revised their risk assessments of the banks. CDS spreads and secondary market yields on their issues increased. The banks deferred further borrowing in the European bond markets, which had been their main source of funding. Foreign analysts and agencies published negative reports about the banks and the state of the Icelandic economy. The climate turned most adverse at the end of February 2006 after Fitch Ratings changed Iceland's sovereign outlook from stable to negative, claiming *inter alia* that the banks' tight financing could have implications for the Treasury.

This situation and its aftermath squeezed the banks for a while, forcing them to respond firmly to the uncomfortable position that had arisen. The Icelandic banks made efforts to explain their structure and organisation. They adjusted certain aspects of their operations and cross-ownership in response to relevant criticisms, and refuted what was less relevant with both communication and successful business

performance. Temporarily they needed to look beyond their traditional markets for funding, with issuance in the US and Japan. The problem that loomed around this time a year ago is a thing of the past and terms in the secondary market are more favourable again.

The Central Bank underlines that global market conditions can take a sudden turn for the worse and it is important to be on the alert and prepared for such a contingency.

When liquidity risk declines ...

The current episode of ample liquidity and lower interest rates which has been ideal for risk-seeking investors may change unexpectedly. Short-term interest rates have been rising in most markets recently and capital costs are no longer so favourable. The Icelandic banks are better equipped for such a reversal than a year ago, because experience has taught them to extend and disperse their borrowing, and build up substantial liquid reserves in foreign currency. In 2006 the spotlight was on the banks' liquidity risk. Now that this risk has ebbed, the focus has shifted to credit risk and the potential impact of higher interest rates and a depreciation of the króna.

... the spotlight moves onto credit risk, ...

Amidst the turbulence of 2006, the banks slowed down their credit growth and expansion of their balance sheets. No major foreign financial companies were acquired and equity exposures were reduced. Nonetheless, it is natural to consider their credit risk and vulnerability towards a fall in asset prices.

Icelandic households' debts with credit institutions have soared in recent years, especially average-income and young households. Debt service has not risen by the same proportion, due to rising incomes and easier credit terms, and arrears are at a low. However, some borrowers have stretched their capacity to the limit and the most indebted group has seen its debt grow substantially as a proportion of income and assets in recent years. Conditions will not need to change much to cause them serious difficulties. The bulk of household debt is in the form of CPI-indexed mortgage loans, making low inflation critical. Household debt in foreign currency was very low, but has been increasing. High levels of foreign currency-denominated debt could prove questionable for households with no income in foreign currency. Since house prices are currently buoyant, they are likely to rise by less than general inflation or even fall in nominal terms. Household equity could shrink under such conditions.

Business profitability appears to have been strong in 2006, in spite of a massive increase in financial expenses from exchange rate losses on foreign borrowing, higher interest expenses and a substantial increase in interest-bearing debt. Debt of listed companies grew as a ratio of equity and the same is probably true of other businesses. Higher debt levels leave them more vulnerable to a contraction in the economy.

Equity prices have soared in Iceland in recent years. One explanation for the increase may be that Icelandic companies were undervalued by the markets, for example by international comparison, and another that bold investment ventures have driven up their value. But

risk and high yield often go hand in hand and it must be assumed that equity prices can fall just as easily as rise.

The Central Bank has assessed the banks' credit portfolio quality on the basis of geographical and sectoral distribution. It is no longer enough to focus solely on activities in Iceland, because three-quarters of the banks' total lending on a consolidated basis was to non-residents, especially in the other Nordic countries and the UK. The assessment indicates that the banks' loss provisioning is more than adequate to meet expected losses. However, this view must be tempered by hefty credit growth in recent years and the large increase in leveraged buyouts and forward contracts connected with them. House prices are at a historical peak in real terms and may unwind. Equity prices reflect expectations of ongoing rapid output growth, but such sentiment can quickly reverse, as recent experience has shown. Arrears and impairment are minimal, but both may be expected to increase in the coming years.

... interest rates ...

One major vulnerability of the Icelandic economy at present is the risk of a rapid and unforeseen rise in international interest rates and premia. Short-term rates have already risen widely and may go up further. Long-term rates have not changed much but could begin to climb. Premia are prone to change at short notice due to shifts in investors' risk assessments or risk-seeking.

... and the exchange rate

The Icelandic economy has never been so sensitive to changes in global markets, which could significantly affect it. It is critical to achieve some redress of imbalances before external conditions tighten.

Strange as it may sound, the banks' efforts to hedge against the effect of a conceivable depreciation of the króna on their equity ratios has increased the market risk on their foreign exchange exposures. Credit institutions fulfil the Central Bank's rules on foreign exchange balance, but have been permitted to maintain separate additional currency balances. Thus the banks' capital positions are well hedged against a conceivable depreciation of the króna, but a short-term appreciation cannot be ruled out. The banks' customers, on the other hand, are less protected against shocks from a depreciation, although data from the banks show that borrowers of the bulk of foreign currency-denominated loans also have substantial currency earnings and thereby a natural hedge against exchange rate movements.

The worst-case scenario

Financial Stability 2006 reported on a Central Bank stress test of the impact of a serious shock involving a simultaneous large rise in global interest rates, depreciation of the króna and fall in asset prices. This simulation has now been repeated using new data and assuming an even larger depreciation and decrease in house prices. Were all these shocks to coincide, estimates show that the contraction in national expenditure could prove considerably greater than in the Central Bank's most recent macroeconomic forecast in *Monetary Bulletin* in March 2007. The pressure on the financial sector will be determined to some

extent by the pace of the adjustment and the banks' own responses to it. Although the adjustment would ultimately be greater if it occurred slowly, a very rapid contraction would deliver such a jolt to the finances of many households and businesses that loan losses would result.

Risks are present ...

It is likely that a range of risks will have to be faced, but efforts must be made to minimise the probability of a financial crisis that could harm potential output and living standards. In the final analysis, the critical factor is how strong and well equipped the financial system is to withstand shocks, i.e. its resilience.

... but resilience has grown

The crucial factor behind the Central Bank's assessment that the financial system is now more resilient to shocks is the banks' stronger liquidity and equity positions than a year ago. The major commercial banks have a diversified income base that extends to many countries. Another advantage is the somewhat different business models they have used in their expansion. Their diversified assets give less reason to fear the consequences of an unexpected strain on the financial system.

Iceland's strong fiscal position underpins the banks' international credit ratings. Other important factors have been the strengthening of Iceland's foreign reserves and the Central Bank's capital. Both measures represent natural responses to changes caused in the Central Bank's operating environment by the very rapid expansion of the commercial banks, especially abroad.

Although the main function of a financial stability report is to highlight risks, factors conducive to strengthening the long-term economic outlook should also be duly noted. Iceland's economy is advanced, transparent and dynamic. The population is relatively young, well educated and quick to adapt to technological and scientific innovations. A strong fully funded pension system has been built up and, unlike other countries, there is no reason to fear for its sustainability. GDP per capita ranks with the highest in the world, and the economic and social infrastructure is solid. The openness of the economy results in a smaller effect from a contraction in domestic demand on employment than might be expected.

Institutional framework and supervision are also important

The authorities shape the framework in which businesses and the financial system operate. Through its membership of the European Economic Area, Iceland enjoys similar operating conditions to those within the European Union. Nonetheless, it retains various features that influence economic advancement, such as a rather business-friendly tax environment, efficient public administration and flexible labour market. Extensive and rapid transformation of the financial sector puts supervisory agencies under pressure. The Financial Supervisory Authority (FME) has been granted an increasingly wide remit in recent years and its activities have been strengthened. One task is to monitor the banks' transactions with major shareholders and executives.

Payment and settlement systems are a key component of an efficient and sound financial system. Steps have recently been completed towards bringing their regulatory framework into line with international best practice. Although such work tends to go relatively unnoticed, it is crucial for enhancing security of settlements and reducing technical risks.

The financial system is broadly sound

The main financial sector vulnerabilities are presented in Table 1 below. The first three relate to macroeconomic imbalances that could cause a further widening of the current account deficit, higher external debt and a depreciation of the króna. Vulnerability on these counts is no less than a year ago, and higher global interest rates and premia could have widespread repercussions. On the other hand, much of the uncertainty about the banks' access to financing has been dispelled and they have built up ample liquid reserves. Under such conditions, the focus shifts to asset quality. The second table highlights factors that contribute to financial system resilience. The most noteworthy development is the banks' stronger position in the form of ample liquidity and capital adequacy ratios which are very comfortable and historically high.

On the whole, the Central Bank's finding is that the financial system is broadly sound. It is equipped to withstand shocks to the economy and financial markets, to mediate credit and payments, and to redistribute risks appropriately. In other words, it is capable of performing its function in an orderly and efficient way. Iceland's banking system meets the demands made of it and performs well on stress tests conducted by the Central Bank and FME.

Table 1 Main vulnerabilities

Risk	*Explanation*
Exchange rate development	Macroeconomic imbalances are pronounced. The current account deficit poses the risk of a depreciation of the króna. Shifts in carry trades and other exposures could catalyse a sudden turnaround. The FX market relies on three market makers and is still relatively thin. Some borrowers from the commercial banks have little or no hedge against exchange rate movements.
Global interest rates and premia	In recent years, interest rates and premia have been at a historical low. Interest rates have begun to climb and sooner or later premia will rise again, increasing corporate financing costs.
Terms of trade	Export prices could drop and oil prices rise. Unfavourable developments could widen the current account deficit and erode national income. The Central Bank's macroeconomic forecast assumes a deterioration in the terms of trade.
International market funding	High dependence on market funding and deposits on call makes credit ratings and global market conditions crucial for the commercial banks. Experience shows that credit assessment can shift suddenly.

Asset quality of commercial banks	Rapid credit growth often eventually leads to poorer loan quality. Loans with equities as collateral are substantial. Prices of equities and real estate are buoyant. Although arrears and impairment are at a low, they are unlikely to remain so over the next few years.

Table 2 Resilience

Resilience	*Explanation*
Economy	The economy is flexible and in the past has shown itself capable of tackling cyclical swings through adjustment of imports. Investment and output growth have been robust. The long-term economic outlook is favourable.
Strength of the commercial banks	The commercial banks' liquidity and capital ratios have never been higher. They have built up liquidity in foreign currency and secured refinancing into 2008. Profitability is strong from the bank's diverse operations and assets are diversified.
Institutional and supervisory framework	Iceland's framework is the EEA Agreement and its guidelines are international best practice and transparency. Economic and social infrastructure is sound. Financial supervision has been boosted and extensive cross-border cooperation is in place.
Payment and settlement systems	Payment system infrastructure is largely electronic and efficient. Steps have been taken to enhance security and contingency plans. Systems meet international standards.
Fiscal position	The Treasury's position is strong with consecutive fiscal surpluses. Net external Treasury debt, including foreign reserves, is virtually zero. No pension gap is foreseeable.

Purpose, presentation and context

Purpose of the report

This *Financial Stability* report is the third edition since it was launched by the Central Bank of Iceland as a separate annual publication. The purpose of the report is to indicate the risks that the financial system may face and assess its resilience to conceivable shocks. *Financial Stability* 2007 should be seen in the context of the previous reports.

Presentation of material

The Central Bank strives to give a clear presentation of its assessment and the highlights of the underlying analysis. The Central Bank's overall assessment is presented on the preceding pages with tables summarising the main vulnerabilities and resiliences of Iceland's financial system. In the following sections, the main points are summarised in an introduction. Short boxes and longer appendices discuss specific issues that are connected with and reinforce the main coverage of the report.

Main sections

Three main sections form the backbone of the report. First is an analysis of the macroeconomic environment and financial markets. It assesses the outlook for global and domestic economic developments in the coming years. The probability of shocks is considered, together with their potential impact on household and corporate operations and balance sheets, and thereby on the financial sector. The next section discusses the position of the most important financial companies by analysing the commercial banks' and savings banks' accounts and identifying their main strengths and weaknesses. The final section covers recent steps towards boosting the efficiency and security of payment and settlement systems.

Appendix on household debt, assets and debt service

It is important to assess the position of households for its conceivable impact on financial stability. Although their overall position appears fairly strong, it is worthwhile to dwell upon the rapid expansion and changes in the household balance sheet and examine more closely how certain groups would be placed in the event of an economic contraction. New data from the Internal Revenue, pension funds and commercial banks have been used to disaggregate household debt and assets into income and age groups. These data enable a more thorough analysis than before of the development of debt service and distribution of debt. The findings give a useful view of the position of households after the growth in their debt in recent years.

Appendix on loan portfolio quality

Credit risk is a major risk factor in banking operations. Stress tests are commonly made to estimate financial companies' resilience to shocks. The Financial Supervisory Authority (FME) regularly publishes the results of stress tests on the banks, calculating the impact that

given changes in their asset and liability positions would have on their capital ratios. In *Financial Stability* 2006, a regression analysis was used to estimate potential loan losses to households in the event of an economic shock. The findings were well consistent with those of the FME's stress tests. In this *Financial Stability* report, loan portfolio quality is estimated using data supplied by the commercial banks on the geographical and sectoral breakdown of their lending. In light of their extensive operations outside Iceland, it is interesting to examine their consolidated accounts from this angle. Resources included databases on expected default frequency and international studies of recovery rates, and the findings were tested against loan impairment provisioning. The impact of a deterioration in the assumptions was also tested.

Review by Alex Bowen

For an objective assessment of its financial stability work, the Central Bank commissioned a review by one of the pioneers and leading experts on financial stability reporting, Alex Bowen, Senior Policy Fellow at the Bank of England, who edited the Bank of England's Financial Stability Report for many years. He has also reviewed Norges Bank's Financial Stability report and advised central banks such as Banque de France, de Nederlandsche Bank and People's Bank of China before the launch of their reports.

In his review, which is printed as an Appendix, Alex Bowen first considers in general the role of financial stability reports in central banks' work to promote financial stability and then examines the Central Bank of Iceland's *Financial Stability* 2006 on that basis. Alex Bowen makes a number of recommendations, including possible topics to explore in the future and clearer ways of presenting probable risks and analysis of them. Alex Bowen's broad finding is that the Central Bank's *Financial Stability* report attains a high standard by its own objectives, by general criteria for FSRs and by international comparison.

Box 1

Financial soundness analysis 2000-2007

The Central Bank of Iceland's financial stability reports began in February 2000 with the publication of its first analysis of the strengths and weaknesses of the financial sector in *Monetary Bulletin*. In 2005, *Financial Stability* was launched as a separate publication.

The development of this analysis has been outlined at press conferences and presentations following publication. Reports are summed up with a key phrase from the Central Bank's conclusions and symbols are used to indicate whether the position has strengthened or weakened or is broadly unchanged since the previous report, based on risks posed to the financial system and its resilience for facing them. As Table 1 below shows, assessments of financial stability have shifted quite sharply, which inevitably reflects the economic cycle and the transformations that major financial companies have undergone.

Table 1 Financial soundness analysis 2000-2007

2000	Feb.	▶	Positive evaluation with warnings
	Nov.	▼	Growing instability
2001	May	▼	Increased risk and decreased ability
	Nov.	▼	Situation worse – positive reactions
2002	May	▲	Positive turnaround
	Nov.	▲	Improved but repercussions
2003	May	▲	Well acceptable position
	Nov.	▶	Satisfactory
2004	Mar.	▶	Satisfactory but concerns over credit expansion, external debt and asset prices
	Sept.	▶	Satisfactory but growing uncertainties
2005	April	▶	Imbalances but broadly sound
2006	May	▼	Challenging course ahead
2007	April	▶	The commercial banks are more resilient

Adjustment ahead under tighter external conditions

The Icelandic economy has probably never been as sensitive to changes in global markets as it is today. One reflection is the close relationship between the exchange rate of the króna, other high-interest currencies and global financial conditions. Part of the explanation for this interaction is Iceland's large current account deficit, which leaves the exchange rate and economic developments in general dependent upon foreign investors' incentives or willingness to finance it. The wide interest rate differential between Iceland and main currency areas attracts risk-seeking investors who target high-interest currencies around the world. Iceland's external debt and assets have also grown rapidly and other financial links across borders have become much closer. The global glut of saving in recent years has forced down interest rates and helped many countries to fund large current account deficits. These conditions could change, although the timing and speed of the adjustment is unclear. Much of the impact on the Icelandic economy will depend on whether current imbalances can be eased before conditions in international financial markets turn downwards. Imbalances became even more pronounced in 2006, although domestic demand growth slowed down. The following analysis aims to assess the development of global and domestic economic conditions over the coming years with respect to their impact on financial stability in Iceland.

Macroeconomic conditions for financial stability

International conditions of the financial sector remain favourable

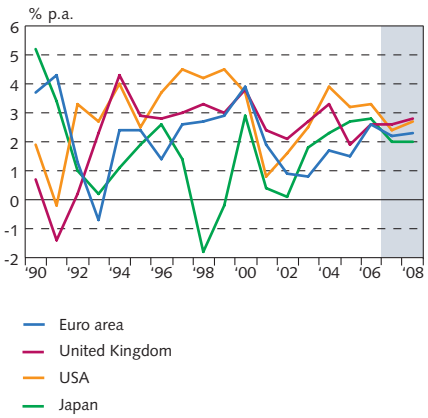
Global economic developments have both a direct and indirect effect on Iceland's financial sector. They have a direct impact on financial companies' funding in international markets and indirectly affect the economy in Iceland and other countries where domestic financial companies operate, and thereby the operations and balance sheets of their customers there. In recent years, Icelandic financial companies have expanded abroad. Their foreign operations now account for a large share of their activities. A significant share of domestic lending is also made to investors with extensive activities abroad. Thus domestic and international economic developments are becoming increasingly connected.

In *Financial Stability* 2006, global conditions for financial stability were deemed quite favourable. Growth was expected to continue in major market areas and pick up in Europe. This scenario has by and large materialised and the outlook has not changed significantly over the year since the last report was published. Output growth has gained momentum in Europe, Iceland's most important market area, but slowed down in the US. Japan saw fairly robust output growth in 2006, but growth prospects and interest rate developments are still rather uncertain. Although Japan is not a major market for Icelandic exports, developments there could have a significant effect on the Icelandic economy, because it has been a major source of capital to finance global carry trade. The same applies to many other countries that have little or no direct economic links with Iceland but have attracted investors who are prepared to take exchange rate exposure in the hope of gaining from wide interest rate differentials.

Chart 1

International economic developments 1990-2008[1]

Economic growth in main trading areas



1. Data for 2006-2008 are OECD estimates and forecasts.
Sources: OECD Economic Outlook (80), Reuters EcoWin.

Upbeat outlook in financial companies' main market areas

Icelandic financial companies' activities are no longer confined to the domestic market, as pointed out above. Economic developments in the other Nordic countries and the UK, where Icelandic financial companies have been establishing themselves in particular, have been broadly favourable. However, inflation has been creeping up in the UK and house prices are buoyant, which could affect Icelandic companies' lending there. Real estate prices in the Nordic countries are also extremely high.

Output growth picked up in the UK in 2006. GDP grew by an estimated 2.8%, up from 1.9% in 2005, and most forecasters expect similar growth in 2007. Growth was led by the services sector, especially financial intermediation, which has witnessed a sustained period of high profitability. Inflation rose quite markedly in 2006 and was 0.7 percentage points above target in February. Sizeable inflationary pressures are still perceived, but inflation is forecast to slow down over the year and return to target at the end of 2007.

The Scandinavian economies were strong in 2006. All the Nordic countries experienced robust GDP growth, driven by domestic demand. Private consumption grew briskly and exports rose substantially as well. GDP growth in the other Nordic countries in 2006 was in the range 3-5½%, led by Finland and Sweden. Output is forecast to keep growing firmly for the next two years (see Table 1). In spite of rising demand, inflation was low in the other Nordic countries. It gained pace during the year, but remained below target in Norway and Sweden, as it has for some time. Medium-term inflation prospects are bright in spite of robust growth. The Nordic central banks[1] have gradually tightened their monetary stances and raised their policy rates over the past twelve months. Nonetheless, their stances are still accommodative and policy rates are expected to rise in measured steps in the coming years, until as far as 2010 in Sweden's case.

Table 1 GDP growth and inflation in the Nordic countries and the UK

	2005	*2006*	*2007*	*2008*
GDP growth				
Denmark	3.1	3.2	2.4	2.0
Finland	3.0	5.5	3.0	2.6
Norway	4.7	4.6	3.7	2.8
Sweden	2.9	4.7	3.7	3.0
UK	1.9	2.8	2.6	2.3
Inflation				
Denmark	1.8	1.9	2.0	2.1
Finland	0.6	1.6	1.7	1.8
Norway	1.5	2.3	1.1	2.1
Sweden	0.5	1.4	1.7	2.0
UK	2.1	2.3	2.2	1.9

Source: Consensus Forecasts

1. The Bank of Finland is a member of the Eurosystem and the ECB has raised its minimum bid rate by 1.75 percentage points since the current cycle of hikes began in December 2005. Denmark's Nationalbank, which is a member of the ERM, tracks ECB policy rate changes very closely.

Increased household debt and high house prices are the main long-term concerns

Notwithstanding the upbeat economic outlook in Scandinavia, certain aspects of economic developments there need to be watched closely as they unfold in the near future. As in much of the world, real estate prices in many cities have soared and household debt has grown. In 2006, house prices in Stockholm rose by more than in any other EU capital apart from London and Paris. Household debt as a proportion of disposable income is at a record high in Norway. The position of businesses in all the Nordic countries is broadly sound, with low bankruptcy rates. Financial companies are also solid and impairment is at a low, despite hefty credit growth.

Global imbalances still present

Global risks remain broadly as described in *Financial Stability* 2006. Substantial imbalances are still present, reflected in particular in the wide current account deficit in the US and several other countries and a corresponding trade surplus in oil-exporting countries and Asian emerging market economies. No end to these imbalances is in sight and they are likely to persist for as long as ample liquidity is available to keep global interest rates down and facilitate funding of current account deficits. Iceland, for example, depends critically on a gradual rather than a sudden adjustment of imbalances.

Global liquidity is still ample, even though short-term interest rates have been inching up. Since *Financial Stability* was published in May 2006, the policy rate in the euro area has risen by 1.25 percentage points to the current 3.75%. Other European central banks have raised their policy rates as well, including the Nordic central banks and the Bank of England, which hiked to 5.25% at the beginning of 2007. The Federal Reserve has kept its federal funds rate unchanged at 5.25% since June 2006 and the Bank of Japan still maintains a very low uncollateralised overnight call rate at 0.5%, after raising it in February 2007. Long-term interest rates have not tracked the rise in short-term rates as rapidly as often before, but Treasury bond yields have been quite volatile and rose fairly sharply from late 2005 to summer 2006. Carry trades were dampened as a result, but picked up in the autumn when bond yields stopped rising or in some cases unwound.

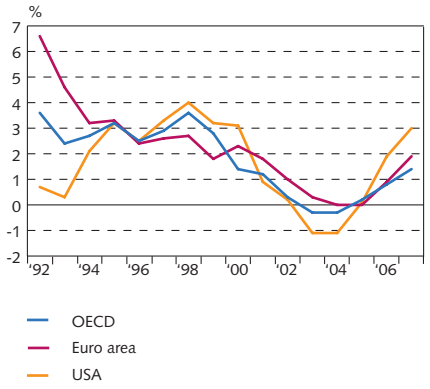
Higher global interest rates still one of the main threats faced by Iceland's economy and financial sector

A rapid and unexpected rise in international interest rates probably represents one of the main threats to Iceland's economy and financial sector at present. The probability of a broad and significant rise in international interest rates in the medium term is difficult to estimate. Higher short-term rates can impact long-term rates with some lag. Thus the effect of last year's rise in short-term rates may not yet have been transmitted. Another crucial factor will be the manner and pace of the adjustment of current global imbalances, which are characterised by excessive saving in some countries contributing to lower interest rates and insufficient saving in others. However, the causes of

Chart 2

Average real interest rates in the OECD,[1] the USA and the euro area 1992-2007

Annual data for three-month money market interest rates, deflated by the CPI



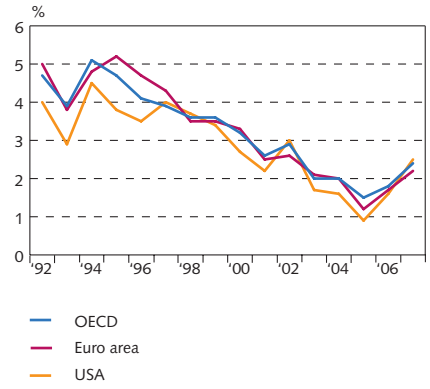
1. Weighted average for OECD countries, weights based on GDP in 2000 and purchasing power parities. Data for 2007 are based on OECD forecast.

Sources: OECD, Central Bank of Iceland.

Chart 3

Average real long-term interest rates in the OECD,[1] the USA and the euro area 1992-2007

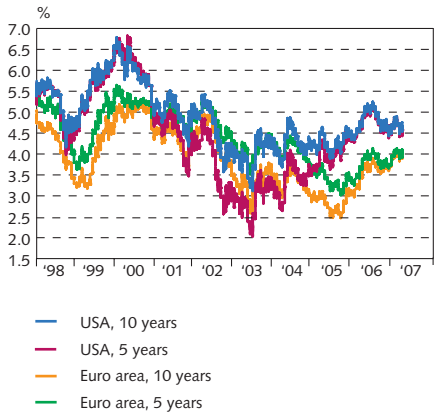
Annual data for ten-year Treasury bond interest rates, deflated by the CPI



1. Weighted average for OECD countries, weights based on GDP in 2000 and purchasing power parities. Data for 2007 are based on OECD forecast.

Sources: OECD, Central Bank of Iceland.

Chart 4
Yield on 5- and 10-year goverment bonds
Daily data January 1, 1998 - April 10, 2007



Source: Reuters EcoWin.

low global interest rates are probably more complex. Inflation premia are low, reflecting a low perceived risk. Business investment has been subdued in developed economies relative to profits and investors have shown risk aversion towards equities after the bubble burst at the turn of the century. The propensity to save increased in emerging market economies following the financial crises in Asia and elsewhere in the 1980s, and their central banks have built up massive foreign exchange reserves which are invested in bonds issued by developed countries. Finally, windfalls from rising global prices have also been invested by oil-producing countries in bonds issued by developed countries, especially US bonds.

The probability that surplus saving will suddenly dry up and financial conditions tighten depends on the likelihood of a swift change in any of the drivers of low interest rates. This could take the form of higher inflation premia, increased investment, less risk aversion towards equities and slower building of foreign reserves by oil exporters and emerging market economies. To some extent these underlying factors may have become entrenched, making interest rates unlikely to return to the levels of just over a decade ago, and even less so to the exceptional historical high of the 1980s. That said, even a relatively modest and short-lived rise in interest rates could deliver a substantial shock to countries with the largest trade imbalances, including Iceland. While no attempt will be made here to estimate that probability, financial companies ought to base their risk management on the assumption that interest rates will rise considerably over the coming years.

Króna vulnerable to changes in global financial conditions

In recent years the exchange rate of the króna has been vulnerable to changes in international financial conditions. A probable contributing factor has been that even relatively modest shifts in expectations can significantly affect carry trades. Volatility has not been particularly noticeable, though, around the issuance and maturity dates of króna-denominated Eurobonds (glacier bonds). Nonetheless, the fact that a large group of foreign investors now stand to gain or lose on exchange rate movements may provoke volatility when international financial conditions change, or are simply expected to.

Carry trade volume has fluctuated widely. The sharp decline in the first half of 2006 undoubtedly contributed to the temporary slide of the króna then. When carry trades picked up in the autumn, the króna appreciated. A similar correlation has been noted between the exchange rate of the króna and yields in international bond markets, because changes in global interest rates affect potential margins and gains on carry trades. This mechanism aligns the exchange rate of the króna with other high-interest currencies such as the New Zealand dollar, even though other economic links are negligible. The most likely explanation is that these countries' current account deficits are funded by a relatively homogenous group of international investors, who react in a similar way to changed international financial market conditions.

Adjustment phase has begun

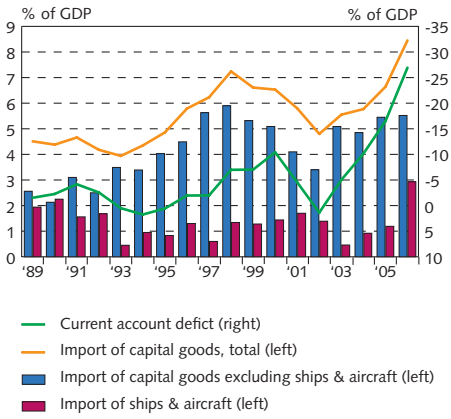
When *Financial Stability* 2006 was published in May last year, demand growth was still robust, real estate prices soaring and the current account deficit widening, despite a sizeable depreciation of the króna in the preceding months. The depreciation in the first half of 2006 subdued household and business expectations, at least temporarily, and private consumption growth slowed down later in the year. Credit conditions also tightened as mortgage loan ceilings and loan-to-value ratios were reduced. Nonetheless, sentiment picked up towards the end of the year, as reflected in rallying housing and labour markets and high confidence index measures.

The recent spurt in the Icelandic economy can be explained by a substantial appreciation of the króna and slight reduction in inflation. Large wage rises in 2006 postponed the necessary and inevitable adjustment even further. In the second half of the year, real wage growth leapt as a result. Real disposable income increased by an estimated 6.5% over 2006. Unemployment was negligible – in fact, labour shortages were persistent. Firm disposable income growth and ample employment kept house prices buoyant, even when interest rates inched up and loan-to-value ratios were temporarily lowered last year. Thus household and business conditions have improved in the recent term, after a temporary setback in the first half of 2006. Outstanding household and corporate debt soared in 2006, although new lending by deposit money banks decreased.

However, the adjustment cannot be avoided for ever. The upswing at the end of 2006 will probably prove short-lived, because real disposable income has grown in recent years to a level that appears unsustainable in the long term. Large wage rises in 2006 increase the likelihood of a hard landing when the current episode of overheating comes to an end. Indications are emerging that the Icelandic economy faces a tough adjustment of demand to potential output, as shown in the Central Bank's most recent macroeconomic forecast, in March (see *Monetary Bulletin* 2007/1). Private consumption is forecast to contract by roughly 10% in total in 2008 and 2009, with real disposable income eroded by growing unemployment and debt service. If the króna depreciates by more than assumed in the baseline forecast – for example in line with the alternative scenario also presented in *Monetary Bulletin* – an inflationary spike could whittle real wages down even further.

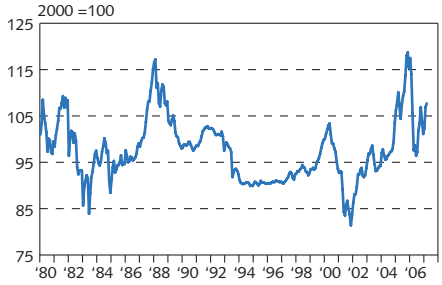
The sharpest contraction will be in gross fixed asset formation, however. Investment in the aluminium and power sectors will begin to contract in 2007, after peaking last year. Since these investment projects have mostly employed foreign labour, the multiplier effect will be smaller than otherwise. However, the contraction in investment is likely to be more broad-based in 2008 and 2009. Investment was also intense outside the aluminium and power sectors in 2006. High real estate prices encouraged heavy residential and business investment. For example, residential investment accounted for 6.6% of GDP in 2006, compared with 3.5% in 1999. Business and household investment in 2006 were both far above recent historical benchmarks and aggregate investment accounted for roughly one-third of GDP.

Chart 5
Import of capital goods and
the current account 1988-2006



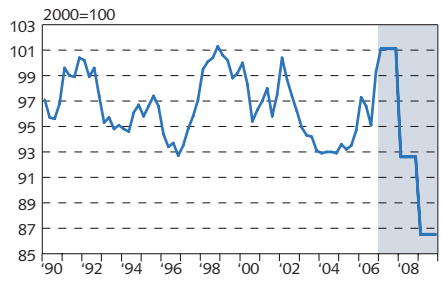
Sources: Statistics Iceland, Central Bank of Iceland.

Chart 6
Real effective exchange rate of the króna
January 1980 - March 2007
Monthly data, deflated by relative consumer prices



Source: Central Bank of Iceland.

Chart 7
Terms of trade for goods and services
Quarterly data 1990-2006, forecast for 2007-2009



Sources: Statistics Iceland, Central Bank of Iceland.

The adjustment over the next few years could therefore reverberate extensively through the economy. According to the macroeconomic forecast in the March *Monetary Bulletin*, investment will contract by roughly half over the period 2007-2009.

A sharp rise in unemployment is also forecast, to almost 5% in 2009. Combined with a glut of housing from residential investments in recent years, these conditions are likely to drive down house prices, at least in real terms. Since peaking in April 2006, house prices in real terms have fallen back by 1.6%,[2] although they have been creeping back up in recent months. Exchange rate developments may prove crucial for how quickly real house prices fall. A depreciation of the króna could induce a much more rapid decrease in real terms than was witnessed in 2006.

A significant contraction in demand is necessary to achieve a sustainable external balance

The current account deficit in 2006 was equivalent to 27% of GDP. Most episodes of large deficits have ended with a contraction in domestic demand or a substantial depreciation of the króna, or both. It is important for Icelandic financial companies to realise the need for an adjustment implied by the current account deficit, even disregarding any possible overestimate caused by the current methodology for calculating the balance of payments. Roughly half of the current account deficit is likely to disappear automatically when aluminium exports increase and investment in power plants and smelters contracts. Even excluding this part of the adjustment, the remaining deficit is still too large to be considered sustainable. According to the Central Bank's March macroeconomic forecast, the current account deficit will be equivalent to 11% of GDP in 2009, notwithstanding a sharp reduction in domestic demand and increased exports of aluminium. Most of the deficit forecast for 2009 will lie in the balance on income, in particular net interest payments abroad. This implies that a surplus equivalent to at least 5% of GDP is probably needed on the trade account to prevent the net external position from continuing to deteriorate. Conceivably, the combined effect of a depreciation of the króna and higher interest rates may prompt a faster adjustment. A longer adjustment process would entail an increase in debt, a less favourable balance on income and, ultimately, a greater overall adjustment.

Significant improvement in the terms of trade in 2006, but outlook for a deterioration over the next years

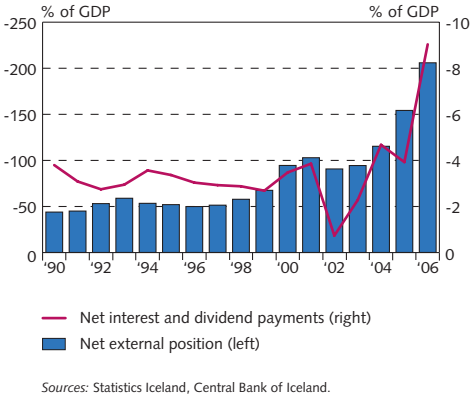
The relative strength of the króna in the second half of 2006 is not explained solely by the wide interest rate differential with abroad. The terms of trade also improved significantly as export prices rose and oil prices fell. At a rough estimate, the terms of trade improved by 2% between Q1 and Q4/2006. They are currently very favourable in historical terms, in spite of high energy prices (see Chart 7). Offsetting this, last year's total fish catch was on the poor side.

2. Based on three-month moving averages.

Because the terms of trade are currently favourable in historical terms, they can probably be expected to deteriorate in the long run. Firming demand in Europe, however, does not suggest much risk that marine product prices will slump. If global growth remains robust, it could also sustain high commodity prices. High aluminium prices coinciding with high energy prices, as has broadly been the case in the past few years, will offset each other to dampen fluctuations in the terms of trade. However, futures prices indicate weaker aluminium prices over the next few years, when China steps up its production. In its March 2007 macroeconomic forecast, the Central Bank assumes that the terms of trade will deteriorate by 15% in all in 2008 and 2009.

This marked deterioration could impact the pending adjustment process quite strongly. Given that fluctuations in the profits of foreign aluminium producers are unlikely to have much effect on output, the impact will be more limited than might have been expected, but export revenues from aluminium production – and energy prices that are linked to aluminium prices – will still be affected. Higher international interest rates coinciding with a deterioration in the terms of trade could exacerbate the problem, because they would both widen the trade deficit and at the same time make it more expensive to fund.

Chart 8
Net external debt and net interest payments to abroad 1990-2006



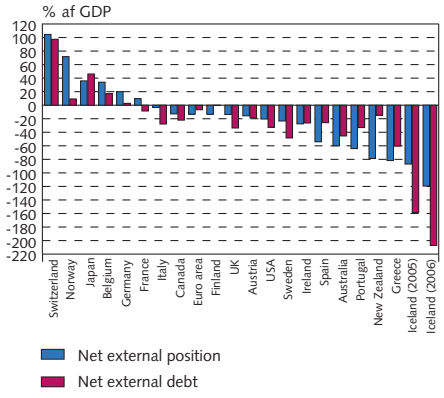
Sources: Statistics Iceland, Central Bank of Iceland.

The contraction may have been underforecast in March

Higher international interest rates are likely to weaken the króna and squeeze down asset prices. *Financial Stability* 2006 presented an estimate of such a scenario using the Central Bank's macroeconomic model. If asset prices fell by 15% more than in the baseline forecast and equity prices by 50%, with the exchange rate index rising to 140 and international interest rates returning to their average in the 1990s, GDP growth was projected 2 percentage points lower than in the baseline forecast, with a correspondingly greater contraction of the economy. This simulation has been repeated using new data and the baseline forecast presented in *Monetary Bulletin* in March 2007. It assumes that, in Q4/2007, the króna depreciates to the historical low in real terms that it reached in 2001. House prices are also assumed to fall in real terms over three years to the average for the past ten years. Other assumptions are unchanged. It should be underlined that these scenarios are hypothetical and not forecasts. They may even describe rather unlikely developments. Be that as it may, risk assessments must take into account developments that are unlikely but nonetheless conceivable, no less than the most likely scenario at any given time. Historical values such as those used here are a natural choice for such a scenario. Based on all these assumptions, domestic demand could contract by roughly 5 percentage points more than in the baseline forecast, and GDP by roughly 3 percentage points at the peak of the impact. However, the initial effect would be higher GDP growth, because exports would increase and imports decrease by more than in the baseline forecast.

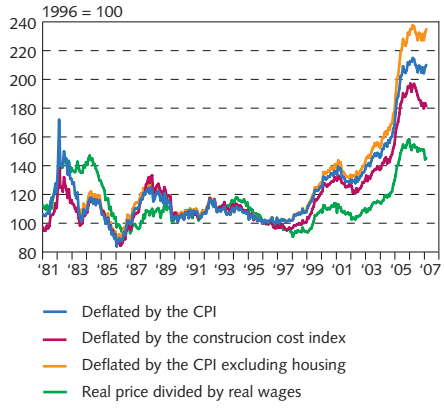
The impact of such shocks may be underestimated, however, because the model does not capture in full the effect that a major

Chart 9
Net external debt of selected advanced economies at end-2005[1]



1. Data for Iceland for 2006.
Sources: International Monetary Fund, central bank websites, Central Bank of Iceland.

Chart 10
Price in real terms of detached residential housing in the Greater Reykjavík Area
January 1981 - February 2007



Sources: Land Registry of Iceland, Statistics Iceland, Central Bank of Iceland.

contraction can have on household and corporate balance sheets. A corresponding shock to the financial sector would be likely, reflected in tighter lending policies by financial companies. Thus the credit system may have an amplifying effect that is extremely difficult to estimate using models based on historical data.

Domestic borrowers

Household and business balance sheets alike have swollen rapidly in recent years. The risk posed to the financial sector by macroeconomic instability depends on the resilience of households and businesses to shocks in the coming years, for example of the kind described above. The resilience of household and business balance sheets is not easy to estimate in the wake of an episode of economic overheating. An apparently sound balance sheet can be quickly destabilised by significant disruptions to income flows or debt service, by other unexpected increases in expenditure, or in the event of sharp changes in asset prices and exchange rates. It may also be questionable to focus on aggregates or averages for given sectors, if the distribution of debts, assets and income has shifted substantially. Timely data are quite limited, especially with regard to a large proportion of Icelandic businesses. Data collection for household debt service has been improved substantially (see Appendix 1 on p. 33).

Changed environment in 2006

Much has changed since the commercial banks began providing mortgage loans in autumn 2004. Housing market conditions altered and households' access to mortgage financing underwent a sea change. When *Financial Stability* was published in May 2006, the outlook was for a deterioration in household operating conditions, a cooling of the housing market and a credit squeeze. Unease in the financial and currency markets provoked a considerable depreciation of the króna, a jump in inflation and downbeat consumer sentiment. The twelve-month rise in house prices at that time measured 18% and there were grounds for expecting them to unwind in real terms if conditions changed. The policy rate was raised in rapid steps over the year, with a direct impact on interest rates on short-term household borrowing. The banks also raised rates on new indexed mortgage loans. Thus household operating conditions appeared to be tightening.

However, the turnaround was not as pronounced as seemed likely for a while. Large wage rises in excess of current settlements around the middle of 2006 delayed the economic adjustment, and the króna rallied when the outlook for international financial conditions turned brighter. Nonetheless, a deterioration in operating conditions of households and businesses is inevitable when the adjustment signalled by the current account deficit begins to kick in. An adjustment of the kind forecast in *Monetary Bulletin* this March would have a substantial effect on them. More unfavourable exchange rate developments than in the baseline forecast would expedite the adjustment – the pace of which will partly determine the strain put on the financial sector. Although the overall impact of a slow adjustment is ultimately greater, a very sharp contraction – e.g. in the wake of a

depreciation and inflationary spike of the kind described in the macroeconomic model simulation above – could deliver such a shock to the balance sheet of many households and businesses that some loan losses would be unavoidable.

Household assets and debts kept rising in 2006

The household balance sheet continued to swell in 2006. There was no letup in the growth of household debt, although banking sector credit growth did slow down. Higher mortgage rates and higher inflation do not appear to have curbed household credit demand as much as was hoped. At the end of 2006, the household debt stock exceeded 1,320 b.kr., up by 240 b.kr. year-on-year. At the same time, real and financial assets of households – excluding pension reserves, household effects and equities – increased by 391 b.kr. Thus the net asset position of households improved slightly over the period.

The composition of households' debt with the credit system did not change much in 2006. Although high short-term interest rates subdue demand for nominal loans, the inflation to which the interest rates are a response drives up the stock of indexed debt as well.[3] Loans indexed against the CPI still account for 85% of total household debt. Households have also taken foreign currency-denominated loans on an increasing scale recently. Foreign currency-denominated lending by deposit money banks (DMBs) have more than tripled since January 2006. Their share of total household debt grew to 5½% at the end of 2006 from 2.6% a year earlier. The relatively stable exchange rate of the króna in recent months and general confidence that stability will continue make foreign currency-denominated borrowing an attractive option on first impression.

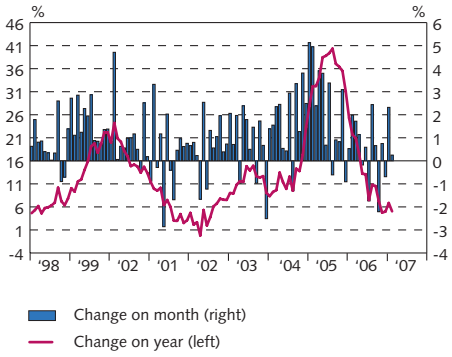
It is uncertain whether households are fully aware of the risks involved in borrowing in foreign currencies when their incomes are in Icelandic currency. The risk must be assessed in terms of the size of the loan as a proportion of income and the preconditions for continued stability. Given how sensitive the króna is towards shifts in international financial conditions, heavy foreign-denominated debt could pose a severe exchange rate risk for households and an indirect risk for their creditors. Debt service fluctuates more on foreign currency-denominated loans than on indexed borrowing, even though a depreciation of the króna also fuels inflation. Foreign currency-denominated loans do not yet weigh heavily enough in household debt to be critical for debt service. However, certain households may be heavily indebted in a given currency but have no income in it, so the risk may be greater than it appears. If many households take foreign loans to the threshold of their payment capacity, they could face serious problems if the króna depreciates and foreign interest rates rise. The customary use of floating interest rates on foreign loans poses a further risk that many households may underestimate.

3. As a proportion of total household debt, overdrafts – which are extremely expensive, carrying average interest rates of almost 24% – have remained virtually unchanged from a year earlier. Households which use overdrafts extensively incur very heavy debt service, which leaves them more vulnerable to economic shocks.

Chart 11

Price in real terms of residential housing in the Greater Reykjavík Area

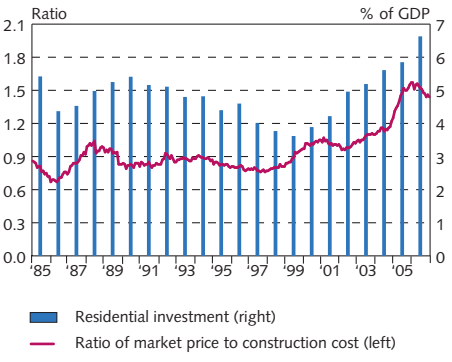
January 1998 - February 2007



Source: Land Registry of Iceland.

Chart 12

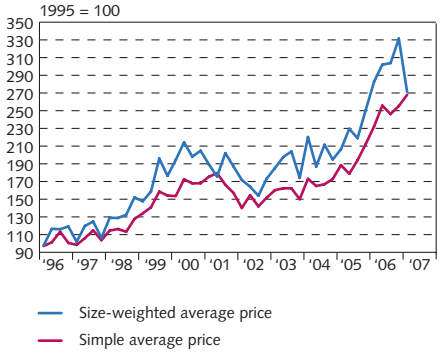
Housing market prices, construction cost and residential investment 1985-2006[1]



1. The red line indicates the ratio of market prices of apartments in the Greater Reykjavík Area to construction cost. Both indices are normalised to the average for 1985-2004.

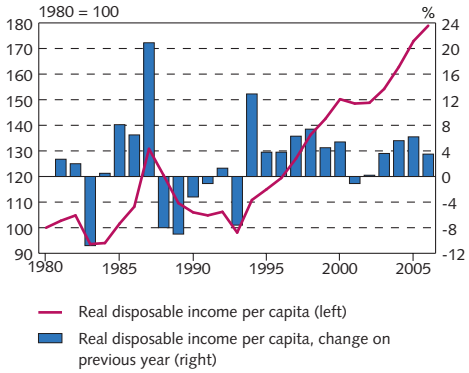
Sources: Land Registry of Iceland, Statistics Iceland.

Chart 13
Price of business premises in the Greater Reykjavík Area, in real terms[1]
Q1/1996 - Q1/2007



1. Deflated by the CPI. Based on few and heterogeneous measurements.
Source: Central Bank projections.

Chart 14
Real disposable income per capita 1980-2006[1]



1. Estimate for 2006.
Source: Central Bank of Iceland.

Debt-to-disposable income ratio has risen most among average-income households and the youngest age groups

Debt growth in recent years has been fairly evenly distributed, according to the study based on tax returns described in Appendix 1 on p. 33. As a proportion of disposable income, debt has increased among almost all income groups, but to varying extents. The greatest increase has been among average-income households. This finding was foreseeable, because households with medium or high incomes in particular were likely to have been constrained by the Housing Financing Fund's (HFF) mortgage ceilings before the commercial banks entered the market. Assuming that job security improves with age and higher income, there is less risk of illiquidity or arrears with the banking system if conditions worsen than if debt had largely grown among the lowest income groups. Hence no firm conclusion can be drawn from this particular finding.

Changes in mortgage loan arrangements in 2004 greatly influenced the borrowing capacity of young people. It is therefore not surprising that the debt-to-disposable income ratio should have increased most among the youngest age groups. A positive aspect of this development is that many members of this group are starting out on the housing ladder and would otherwise have resorted to rented accommodation. An increase in this group's stock debt therefore need not imply a greater payment burden if rent is taken into account. Although this group's disposable income is relatively low, most members of it can expect their incomes to grow later in life, which reduces the risk of illiquidity provided that their employment is secure. During an economic contraction, however, this group could be rendered vulnerable by diminishing job security. Indebted households in the oldest age groups, who may face illiquidity when their disposable income is reduced, generally have more assets to sell in such a contingency. Relative to disposable income, debt in the middle-age group has not grown much in recent years either. However, average figures may be misleading, by ignoring outliers.

As discussed in Appendix 1 on p. 33, fewer households and individuals with debt equivalent to more than double disposable income have negative equity as well, on account of soaring house prices. Nonetheless, the volume of debt in this group has grown much faster than average, relative to disposable income. The average debt ratio of individuals and households with negative equity and debt of more than double disposable income has increased by the equivalent of almost their entire annual disposable income from 2004 to 2005. Their debt at the end of 2005 was 550% of disposable income for individuals and 450% for couples. Thus debt relative to income and assets has increased by much more among the most indebted house-buyers than among the rest.

Household debt service as a proportion of disposable income decreased from 2004 to 2006

Due to extended mortgage loan maturities and refinancing of a large part of the debt stock at lower interest rates, the increase in household debt in recent years has not produced a correspondingly greater debt

service burden. Household debt service is relatively immune to short-term interest rate movements, since roughly 84% of the total stock is CPI-indexed at fixed interest rates with relatively long maturities. When the commercial banks began competing with the HFF in the mortgage loan market, households had the opportunity to refinance a large part of their outstanding debt at much lower interest rates. In many cases, the banks review their mortgage rates every five years. Although interest rates on new mortgage lending went up in 2006, this has had little impact on average debt service so far, since the new loans account for only a small part of total household debt. Higher inflation in 2006 also drove up nominal debt service, but because of long maturities on the indexed loan stock (up to 40 years), the indexation factor is spread over a long period. Thus higher instalments and interest payments do not weigh as heavily as if these had been nominal loans with floating interest rates, which adjust to the inflation rate immediately.[4]

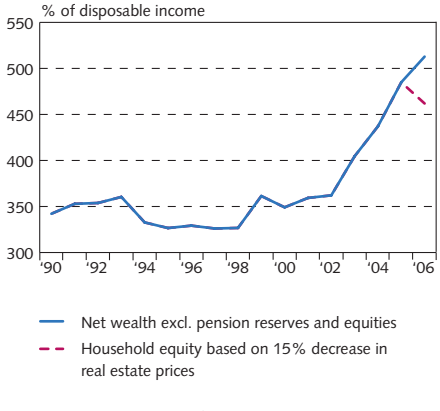
In 2006, household disposable income had risen by 28% since 2004, but instalments and interest on loans by just over 15%. As a proportion of disposable income, household debt service therefore decreased by two percentage points since 2004, from just over 22% to 20%. This does not imply an improvement in the long-term position of households, however. Unchanged average debt service may conceal a substantial increase by households that took on the most debt to finance their housing or private consumption. Long maturities also tend to prolong such a situation. High loan-to-value ratios, however, could make assets more difficult to sell when payment problems need to be tackled.

Household balance sheet more sensitive to shocks

While household debt service has not outpaced disposable income in recent years, this development does raise questions about the vulnerability of the balance sheet to various shocks. Although household equity has not diminished, because the greater debt is offset by higher asset prices and investments, a larger balance sheet leaves the equity position and debt service more exposed to unexpected shocks.[5]

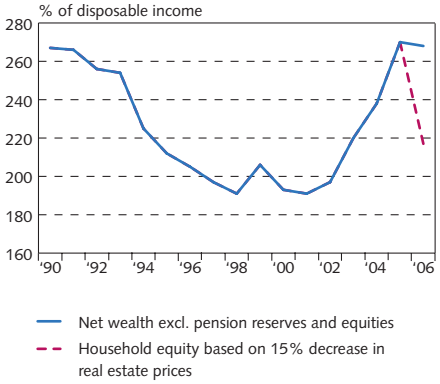
Higher inflation is one potential balance sheet shock. Inflation plays a significant part in debt developments in Iceland through its effect on the stock of indexed debt. For example, when inflation measured 6.8% in Iceland in 2006, it accounted for roughly 74 b.kr. of the 240 b.kr. increase in household debt that year. Had inflation been on target, the debt stock would have grown by 195 b.kr. Because house prices rose by broadly the same over the year, at roughly 5% in and around Reykjavík, the overall impact on household equity was only slight. When *Financial*

Chart 15
Net wealth of households including pension reserves 1990-2006[1]



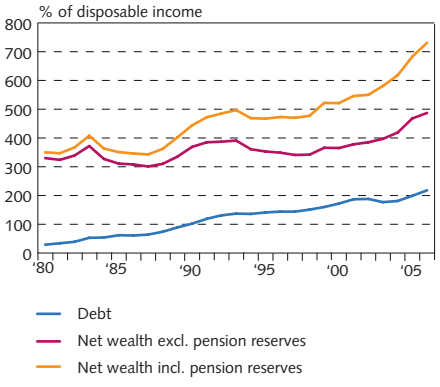
1. Excluding equities. Data for 2006 are estimates.
Source: Central Bank of Iceland.

Chart 16
Net wealth of households excluding pension reserves 1990-2006[1]



1. Excluding equities. Data for 2006 are estimates.
Source: Central Bank of Iceland.

Chart 17
Household assets and debt 1980-2006[1]

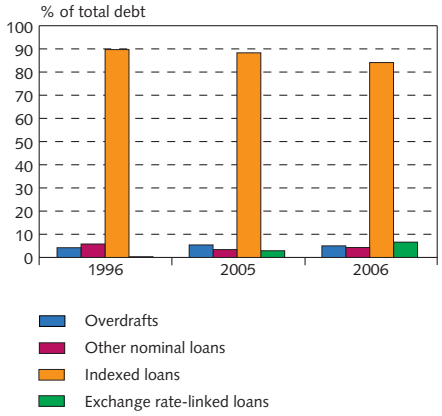


1. New classification of lending from 2003.
Source: Central Bank of Iceland.

4. If interest rates on nominal loans track inflation to remain unchanged in real terms, the principal is paid off faster, the higher the rate of inflation. Indexation is equivalent to the borrower in effect taking a new loan on each due date to cover the interest indexation factor added to the principal. The loan is therefore paid back much more slowly, which results in higher total interest payments over the term of the loan.

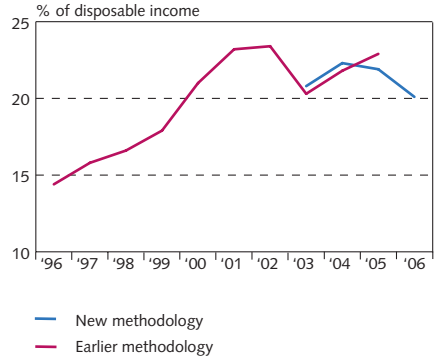
5. An illustration would be two households which both have equity of 10 m.kr. Household A owns assets worth 10 m.kr. but owes nothing. Household B owns 100 m.kr. worth of assets but owes 90 m.kr. If asset prices fall by 10%, household A will have assets of 9 m.kr. but household B zero equity. The difference between the two households' positions will be even greater if the debt service burden is assumed to increase as well.

Chart 18
Composition of household debt with the credit system in 1996, 2005 and 2006



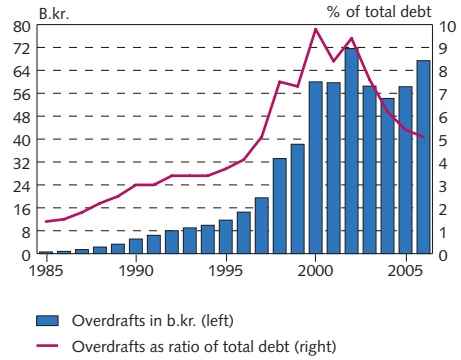
Source: Central Bank of Iceland.

Chart 19
Household debt service 1996-2006[1]



1. Earlier and recent Central Bank estimates.
Source: Central Bank of Iceland.

Chart 20
Household overdrafts at end of year 1985-2006



Source: Central Bank of Iceland.

Stability was published in May 2006, twelve-month house price inflation measured 18%, which boosted household equity even after equity withdrawal on some of the new mortgage borrowing. Although house prices have turned downwards rather later than was widely expected, they began to fall in real terms in 2006 and look likely to lag behind rises in the general price level in the long run. Household equity will therefore probably shrink over the coming years. This could have a marked effect on the equity of indebted households. Other things being equal, inflation also erodes real incomes and real disposable income, which drives up debt service when accrued indexation on household borrowing increases.

Because the bulk of household debt is price-indexed, it is largely irrelevant to the effects on the balance sheet whether house prices fall in nominal terms or by less than other prices. The heavy weight of owner-occupied housing in the Icelandic CPI may dampen the effect of such a development on the household balance sheet. This is an important argument against excluding owner-occupied housing from the index on which the inflation target is based, or from the index on which indexed loan terms are based.

Interrelated risks

What makes the household balance sheet particularly vulnerable is that most of the risks to it are interrelated. One consequence of a downturn in global financial conditions and subsequent depreciation of the króna could be a sharp economic contraction coinciding with a jump in inflation (excluding house prices) and a fall in real house prices. This would erode the value of household assets at the same time as debts grew and real disposable income diminished. In a worst-case scenario, the equity of many households could turn negative. Such a position could be problematic for Icelandic credit institutions, even though experience shows that negative equity does not necessarily imply arrears and insolvency. However, were this to coincide with higher unemployment, the position of these households could severely deteriorate. Since roughly 16% of mortgages have a loan-to-value (LTV) ratio of more than 90% and half of them a ratio of more than 70%, the collateral for a sizeable share of the loan stock might prove insecure during serious economic shocks.[6] That said, there is reason to caution firmly against the policy of raising the LTV ratio again.[7]

The conclusion of the above analysis is that, in spite of surging debt in recent years, household debt service has not increased significantly. Nonetheless, the household balance sheet has become more vulnerable. The main reason is that it has swollen (irrespective of net equity) relative to expected income flow, as well as more unequal distribution of debt, a massive increase in debt among the most indebted homebuyers, more exposed composition (with an increased share of foreign currency-denominated loans at floating interest rates) and less

6. Admittedly these figures may underestimate the collateral worth because of inflation after the loans were taken, so that prices would need to fall by considerably more than the LTV ratio implies before equity drops below zero.

7. See e.g. Gudmundur Gudmundsson, Risks in higher loan-to-value ratios of housing, *Monetary Bulletin* 2005/2, pp. 57-62.

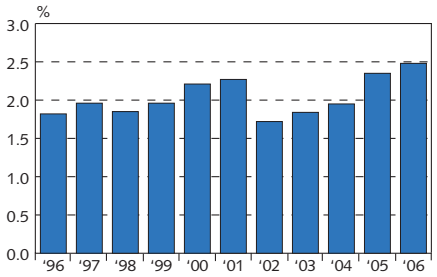
secure collateral after a sharp rise in real house prices in recent years. These weaknesses will not emerge, however, unless a severe reversal occurs. On the surface the position appears sound. Common indicators of difficulties, e.g. unsuccessful distraint actions or bankruptcies, corroborate this. Nonetheless, current indicators also reflect economic conditions that are likely to turn worse in the next few years.

Generally strong business profitability over the past year

Apart from listed companies, data on the position of businesses are much less complete and more difficult to interpret than for households. The following picture is therefore somewhat fragmentary. However, available data do suggest that business operating conditions have been favourable recently, so their position is strong in that respect. On a longer-term view, businesses display the same signs of weakness as households: meteoric balance sheet growth for many companies, uncertain asset prices and the prospect of an adjustment of the economy that will probably cause the operating conditions of most companies to deteriorate. A sharp depreciation of the króna could hit some businesses hard, but strengthen others.

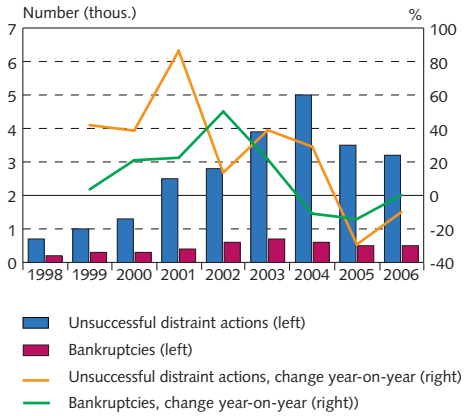
Annual reports are only available for listed companies, which are in a different league from most non-listed ones. Most listed companies have substantial operations outside Iceland, or export income. Their turnover grew by 54% and their EBITDA ratios were broadly unchanged from recent years. However, they incurred sizeable exchange rate losses on foreign debt. This eroded their profits from 7% in 2005 to 4% last year. The exchange rate only has a limited impact on the profit and loss accounts of companies earning the bulk of their income in foreign currencies. But there is reason to pause over their increased general indebtedness. At the end of 2006, interest-bearing debt of listed companies was equivalent to roughly half of their assets, compared with 40% at the end of 2005. As a proportion of equity capital, liabilities rose from 2.35 to 2.48 at the same time. Thus their equity ratio has been eroded in recent years. Increased debt must also be seen in the context of rapid corporate growth and the asset quality risks that this poses.

Chart 21
Total corporate debt as % of net equity
1996-2006



Sources: OMX Nordic Exchange, Central Bank of Iceland.

Chart 22
Unsuccessful distraint actions and bankruptcies of businesses 1998-2006



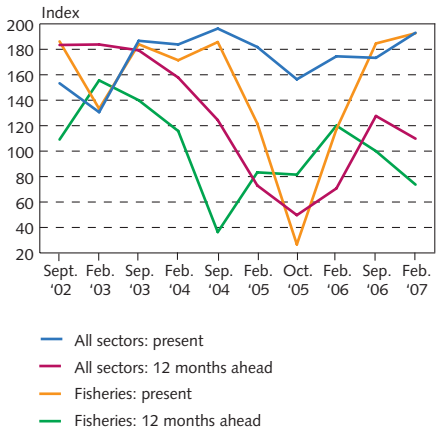
Source: Lánstraust.

Table 2 Profitability and performance of listed non-financial companies 2005-2006[1]

% of turnover except for equity ratio	*EBITDA 2005*	*EBITDA 2006*	*Working capital from operations 2005*	*Working capital from operations 2006*	*Net profit 2005*	*Net profit 2006*	*Equity ratio 2005*	*Equity ratio 2006*
Fisheries	17.6	22.9	9.7	15.4	11.2	0.6	29.2	24.2
Manufacturing	16.2	15.3	15.1	13.2	5.6	7.6	31.9	28.7
Marine product marketing	3.3	4.1	4.4	1.0	0.9	0.1	26.0	29.1
Transport	9.4	8.2	5.4	4.9	6.3	18.1	25.2	35.9
ICT	6.3	8.6	10.5	7.0	4.7	4.3	31.1	19.4
Other	10.9	7.4	13.8	6.8	1.0	2.1	38.6	20.8
Total	10.5	11.1	9.3	8.3	4.0	7.5	29.8	28.7

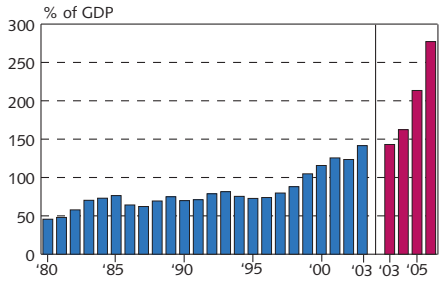
1. Sampled companies: 26.
Source: Central Bank of Iceland.

Chart 23
Business sentiment surveys
September 2002 - February 2007



Source: Capacent Gallup.

Chart 24
Corporate debt 1970-2006[1]



1. New classification of lending from 2003. Two columns are shown for that year: blue for the older classification and red for the new one.
Source: Central Bank of Iceland.

A survey of Iceland's 400 largest companies conducted by Capacent for the Central Bank, Ministry of Finance and Confederation of Employers also indicates a generally good business position. The profit index, for example, was at a high in the most recent survey in February 2007. Arrears are also low. No signs of tightening have emerged so far. The main concerns involve the impact of these companies' large debts on their resilience to economic shocks, especially if a deterioration in international financial conditions coincides with a sharp contraction in domestic demand. As in previous *Financial Stability* reports, the domestic services and construction sectors deserve special scrutiny. A contraction in the Icelandic economy could hit these sectors particularly hard. It is difficult to estimate the impact of domestic economic shocks on the operating risk of companies with extensive operations outside Iceland. This may leave them less exposed to economic upheavals in Iceland. Rapid outward investment growth, on the other hand, always tends to increase operating risk, which is difficult to assess when empirical evidence is lacking about operating under tighter financial conditions than the present. Economic difficulties could also conceivably affect their credit terms.

Corporate balance sheets more sensitive due to high levels of debt and asset prices

No estimate of total business sector assets is available. Results from annual reports of non-listed companies have only been compiled until 2004. However, data from credit institutions provide a fairly reliable picture of total corporate debt. At the end of 2006 this amounted to 3,138 b.kr., equivalent to 275% of GDP. The year-on-year increase was equivalent to 61% of GDP. Roughly 17% of this debt (542 b.kr.) originated with listed companies, 8% (250 b.kr.) in the power sector and almost 10% in fisheries. At a rough estimate, debts of companies with significant operations outside Iceland or foreign currency income therefore accounted for one-third of total debt. This figure is in fact similar to the fisheries sector's share of total debt a decade or more ago. Debt of all other companies increased by broadly the same.

Like households, businesses have increased their share of foreign currency-denominated debt, but not on the same scale. At the end of February, just over 58% of corporate debt with DMBs was denominated in foreign currency, while foreign-denominated borrowing accounted for roughly 40% of total corporate debt. The share of foreign debt has grown substantially in the services sector excluding holding companies, and in retail and construction. While the foreign currency income of companies in these sectors is unknown, it may be assumed that the greater part of their activities is domestic. The debt of companies in the construction and contractor sector deserves special consideration. Their share of foreign currency-denominated debt has gone up over the past twelve-months from one-quarter to 27%. Some of the growth in foreign currency-denominated debt has been at the expense of overdrafts, which nonetheless still account for roughly one-quarter of their total debt. Such a debt structure implies that indebted companies in the construction and contractor sector could suffer considerable setbacks if the króna depreciated sharply

Box 1

Intangible assets of listed companies

Scope

At the end of 2006, total goodwill on the books of listed companies in Iceland exceeded 500 b.kr. and had grown by more than 200 b.kr. year-on-year.[1] Other intangible assets to the value 150 b.kr. were also entered in their accounts and had grown by 50 b.kr. over the year. Total book value of intangible assets was therefore almost 700 b.kr. at the end of 2006. It is not only the actual amount involved that is striking, but also proportion of assets. The study cited here reveals that the book value of goodwill amounted to 1.2% of total assets of Iceland's four largest listed financial companies. The book value of goodwill among the other 20 companies on OMX Nordic Exchange in Iceland accounted for 23% of their total assets, which appears rather higher than the norm elsewhere. It should also be pointed out that intangibles accounted for more than 20% of the total assets of 15 out of the 24 listed companies, and for 6 of them more than 50% of total assets.

Impairment tests

Another noticeable point is that there has been virtually no amortisation of goodwill on the basis of impairment tests by companies in the OMXI15 index over the two years since rules on impairment tests were introduced in Iceland in 2005. There may be valid reasons for not doing so, primarily strong profits on these companies' operations. It is beyond question that the profitability of many companies in the index has been exceptionally robust over this period, which is definitely an indication that there are no grounds for amortising goodwill from their books. However, this is only an indication and not a direct proof, because as a rule companies do not disclose information about the outcome of operations in which goodwill is involved – which is regrettable, given how significant it has become for companies listed on the Icelandic equity market.

Will the timing of write-downs amplify problems?

The above implies that investors and other stakeholders in the equity market have ample reason to keep a close watch on the development of goodwill in the near term. If the operating conditions of listed companies turn downwards, as tends to happen, they will be obliged under IFRS to write down the goodwill on their books, which will amplify the reduction in their profits. This could have strong repercussions on equity prices and even more widespread effects. Paradoxically, however, there have been examples in other countries of such write-downs not leading to a fall in equity prices but driving them up. This could also be the case in Iceland in certain instances, although the opposite effect seems more likely.

1. Einar Gudbjartsson, Assistant Professor at the University of Iceland, in a paper presented to a seminar organised by the Faculty of Economics and Business Administration, March 27, 2007.

and the policy rate had to be raised to counter the resulting rise in the inflation rate. This development is a particular cause for concern given the surge in growth in the sector in recent years and the risk of a fall in real estate prices. Many construction companies and contractors, in fact, may have built up ample equity that should enable them to weather sizeable shocks.

Higher proportion of foreign currency-denominated debt

The lack of reliable data on the balance sheets of non-listed companies invites the use of GDP as a yardstick for estimating the risk posed to the economy and financial system by the growth in corporate foreign currency-denominated debt. Corporate foreign currency-denominated debt with credit institutions is equivalent to roughly 85% of 2006 GDP, while the corresponding ratio was 68% a year ago. However, this is only part of the picture, since part of the debt may be linked to foreign investment. Preferably the position should be assessed with reference to the scope and quality of these foreign investments, but this is difficult in practice. A sectoral breakdown of debt indicates strongly that the foreign exchange risk to the economy has increased.

Asset prices are buoyant and intangibles weigh heavily in equity pricing

The asset side of the corporate sector as a whole is difficult to estimate, but it is clear that real estate prices soared in 2006. The same is probably true of other assets, in light of strong business investment. In real terms, the price of business premises was 50-60% higher at the end of 2006 than a decade before. Price rises on such a scale entail the risk that they will unwind. It is more problematic to estimate the value of various intangible assets such as goodwill. Fishing quota prices also rose substantially in 2006. Market capitalisation of listed companies soared, but in many cases intangible assets weigh heavily in their value. According to a recent survey, the combined goodwill of companies on OMXI15 exceeded 500 b.kr. at the end of 2006, having risen by 200 b.kr. year-on-year, and the book value of total intangible assets was 700 b.kr.[8] Given the high value of intangibles by international comparison, a considerable risk could be involved for these companies, their shareholders and domestic credit institutions, which have lent to both the companies and their owners and also hold sizeable stakes in them.

International financial markets

Record level of gearing

As described elsewhere, financial markets remain highly liquid and demand for attractive investment opportunities is running high. Low interest rates have stimulated innovation and risk appetite. At the same time, supply of financial products has increased and investors have more hedges or more effective ways of isolating risks. Insistence on high returns has also increased investors' propensity to gearing. This development is clearly visible in the exponential growth of hedge funds and more leveraged buyouts, either direct takeovers or backed by venture capital funds.

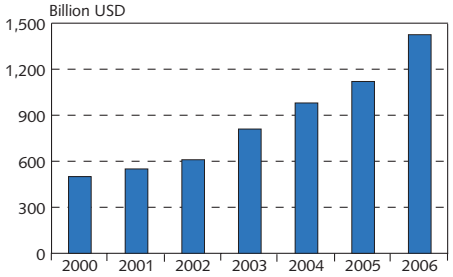
Increased gearing, i.e. funding of investments with credit rather than equity, implies a profit opportunity for investors but also more risk. A fall in the price of an investment initially depletes the equity

8. See Box 1, Intangible assets of listed companies, p. 27.

in it, with increasing risk the higher the gearing. A successful investment that drives up the asset price generates a proportionally higher return if it is highly geared. Gearing can also be achieved by trading of financial products such as options and swaps.

The current financial market climate of low interest rates and surplus liquidity is ideal for gearing. The upbeat global economy has reduced sovereign creditor risk, also with respect to emerging market economies and developing countries. Treasury issuance has declined in pace with smaller fiscal deficits. Issuance of corporate securities – both bonds and equity – has flourished at the same time, reflecting ample demand. This climate has prevailed for almost six unbroken years, as testified to by the growth in hedge funds and venture capital funds. Total assets of hedge funds today are estimated around 1,500 billion US dollars. They are now estimated to account for roughly one-third of global market trading.[9]

Chart 25
Total assets of hedge funds 2000-2006



Source: Banque de France.

Hedge funds rely on unhindered access to capital. As a rule their funding is short-term, which exposes them to movements in interest rates and spreads. In the US in 1998, the capital of LTCM (Long-Term Capital Management) was quickly wiped out by unforeseen developments in emerging market economies and market liquidity dried up. Herd behaviour and panic in the markets are relatively common. In light of subsequent trends, persistent liquidity drought in the markets would probably have had far wider repercussions than then. On the upside, advances in analysis and risk management have boosted gearing capacity.

Volatility in major markets, such as the equities and FX markets, has abated in recent years as they have deepened. Turnover in global FX markets is estimated to have doubled over the past three years, which may explain some of the stabilisation. However, volatility may easily return, heightening risks. Spreads would increase from the historical lows of recent times.

A recent study by the Bank for International Settlements points out a strong correlation between hedge fund returns and expected profits on carry trades. This implies that carry trades constitute a large part of their investments. There are also strong indications of a surge in carry trades in recent times concomitant with hedge fund growth. Increased investment in the króna for carry trades has created some surprise in Iceland, but it is part of a global pattern.

Main risks in international markets

In its most recent *Global Financial Stability Report*, the IMF identifies four threats to financial stability in the short run (p. ix):

1. The subprime segment of the US housing market is showing signs of credit quality deterioration and fallout could deepen and spread to other markets, possibly to structured mortgage credit products held by a variety of global investors.
2. A rise in leverage in acquired firms potentially makes such firms more vulnerable to economic shocks. This could trigger a wider

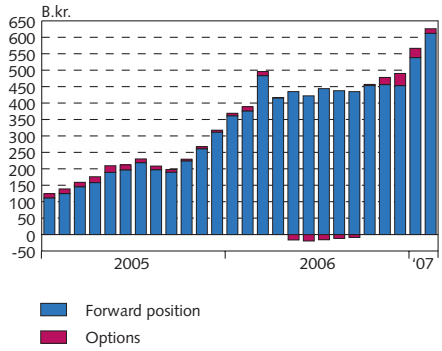
9. International Monetary Fund, *Global Financial Stability Report* 2007.

appraisal of the risks involved by intermediaries that provide financing to leveraged-buyout transactions.

3. Capital inflows to some emerging markets have risen rapidly, in part reflecting improved economic fundamentals but also the search for yield in most mature markets, which could show that foreign investors are taking more risk.
4. The downside risk from a possible disorderly unwinding of global imbalances has receded somewhat, but cannot be ruled out.

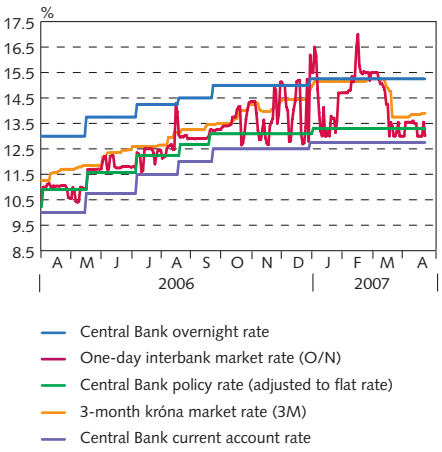
As pointed out above, the Icelandic economy is more closely integrated with global economic conditions than before. The above risks are therefore just as pertinent in Icelandic markets as international ones.

Chart 26
Forward currency position of commercial banks
January 2005 - February 2007



Source: Central Bank of Iceland.

Chart 27
Interest rates in the króna market and Central Bank policy rate
Daily data April 3, 2006 - April 18, 2007



Source: Central Bank of Iceland.

Domestic financial markets

Position-taking in the króna has picked up since autumn 2006

Appetite for position-taking in the króna appeared to wane after its sharp depreciation early in 2006. Carry trades picked up from the end of summer 2006 until February 2007, when investors seemed to hold back again. Equity prices dropped worldwide after a market slump in China, but the impact was short-lived and prices began to climb back. The króna depreciated slightly during this unease, but began strengthening afterwards.

Króna exposures have grown since autumn 2006 and the banks' forward position reached a record 628 b.kr. at the end of March. Glacier bond issuance has also been brisk since the autumn, with the outstanding stock currently 350 b.kr. Maturities are generally short, at one or two years. Just over one-third of this amount will mature in 2007, including 83 b.kr. in September. Hitherto, large maturities have not had a noticeable impact on the exchange rate of the króna, which is consistent with the experience of other countries such as New Zealand. All issuers have strong credit ratings, so investors are clearly focusing on the interest rate differential and avoiding credit risk.

Carry trades with the króna have developed along broadly the same lines as for other high-interest currencies. Króna volatility has followed a similar pattern but it has been relatively immune to domestic economic news. For example, publication of new data on a record current account deficit and mounting macroeconomic imbalances may be just as likely to cause the króna and equity prices to strengthen as to weaken, even though such reports generally herald a long-term currency weakening. Because the domestic market is so closely integrated with international markets, developments in it will be determined no less by global economic events, e.g. the strength of the Japanese economy, developments of low-interest currencies and access to funding in capital markets.

Trade builds up in domestic financial markets

Trading in domestic markets has grown substantially in recent years. All markets have deepened, but especially the equity and FX markets. However, the bond market has been characterised by high volatility and interest rates in the króna market temporarily moved above

the Central Bank's overnight lending rate. Thus the króna and bond markets failed to function as an efficient channel for monetary policy. Volatility can increase financing risks for financial companies.

The Treasury's build-up of deposits in the Central Bank and reduced issuance of bonds eligible as collateral in the Central Bank created a temporary shortage of the króna in the market. Treasury bond issuance is low, outstanding maturities are small and price formation inefficient. The longest outstanding maturities are currently only six years. Structural changes in the housing market have also cut back HFF bond issuance.

Commercial banks' smaller portfolios of eligible securities have prevented them from making full use of Central Bank credit facilities. The Central Bank responded by extending the range of securities that are eligible as collateral. The króna market has become more liquid as a result and price formation more efficient. Interest rates there have come down and normalised with respect to the Central Bank's policy rate.

Increased participation by foreign investors and speculators in the FX market

While the Icelandic FX market has always been relatively thin, it is noteworthy that turnover has mushroomed in recent years. The main factor at work is growing participation by non-residents in króna trades, mostly against the euro.

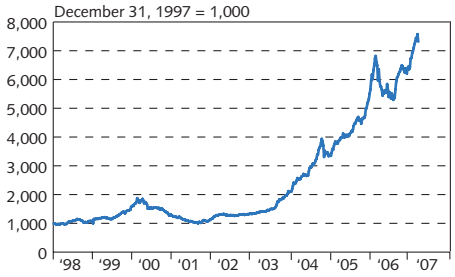
The domestic market now resembles international FX markets more closely in that an ever-smaller share of trade is connected with actual merchandise trade. Foreign investors and speculators have become more active, both through position-taking and in order to manage or hedge against risks. Speculation may induce exchange rate volatility, but has significantly deepened the market to create more active price formation. Nonetheless, the small size of the króna market remains its greatest weakness. Only three market makers are active and it is difficult to see how it could function normally if their number falls.

Illiquid bond market

In spite of brisk issuance of and demand for glacier bonds, only limited demand by non-residents for króna-denominated bonds has been directed towards Treasury notes and HFF bonds. There are two possible explanations. First, the foreign investors are conceivably not permitted to take Icelandic counterparty risks despite their positions in the currency. Global investors tend to define credit limits for individual countries as a precondition for buying bonds from their residents. An equally plausible explanation is that the small outstanding maturities of Treasury notes makes it difficult to take large positions in them without moving the market. Likewise, it could prove expensive to close positions quickly.

In Brazil in April 2006, foreign investors held large positions in local government bonds. Market volatility began to increase following an interest rate hike and signs of a downturn in the US economy. Foreign investors began to unwind their positions. The market dried up when domestic investors such as pension funds held back, and

Chart 28
The OMXI15 equity price index
Weekly data January 5, 1998 - March 16, 2007



Source: OMX Nordic Exchange.

bond prices slid rapidly. Indexed bonds fell by 11% in May 2006 and the Brazilian Real depreciated by 13% over the same period. Bond market turnover shrank by half from February to May that year. The thin market was deemed one of the main reasons for the scale of the slide in bond prices. Eventually the Brazilian authorities intervened to hinder further volatility and made buying and selling bids in the market.

A similar scenario could easily develop in the Icelandic bond market. It is thinner than Brazil's, with large issues locked inside portfolios such as pension funds and mutual funds, reducing its depth even further. On the other hand, Iceland's economy is far more advanced than Brazil's in terms of organisation, political stability, transparency and institutional infrastructure, which definitely reduces the risk of unexpected shocks.

Equity market

The domestic equity market is small and undiversified. The three commercial banks constitute almost 60% of the OMXI15 index and their share prices move in close alignment. The market has produced excellent returns in recent years and is now close to its highest index value ever. How events unfold largely depends on the same factors as mentioned above: easy access to financing and ongoing growth in key international markets. Concerns were voiced a year ago about cross-ownership by the banks and their main shareholders. This has largely been unwound, but the banks have still funded acquisitions by their main shareholders both in Iceland and abroad. Moody's made this point when it downgraded Glitnir's bank financial strength rating (BFSR) at the beginning of the year. Related-party loans may tarnish the banks' credibility and catalyse similar market responses to those in the first half of 2006. It is important for the banks to address this risk firmly.

Most companies in the domestic market generated strong profits in 2006 and there is every indication that 2007 will be favourable for them as well. Equity prices have risen by 20% since the beginning of the year and market agents forecast further rises. The internal and external environment are still favourable, but macroeconomic imbalances could easily prompt an adjustment of the exchange rate of the króna, which customarily drives down equity prices on account of heavy foreign indebtedness.

Appendix 1

Household debt, assets and debt service

After the limits on lending by the Housing Financing Fund (HFF) were extended in summer 2004 and the commercial banks entered the mortgage loan market on a growing scale in competition with it in autumn that year, household debt increased. Households were offered higher loan-to-value ratios, longer maturities and higher mortgage ceilings at lower rates of interest than before. Household debt soared as a result. At the end of 2006 it exceeded 1,300 b.kr. and had grown by 60% in nominal terms and 40% in real terms since September 2004. The commercial banks and savings banks accounted for more than half of household debt – 707 b.kr. at the end of 2006, with the lion's share in indexed long-term loans. Mortgage loans were clearly used to retire older debt on less favourable terms, as well as to purchase new housing and, to some extent, finance consumption expenditure.

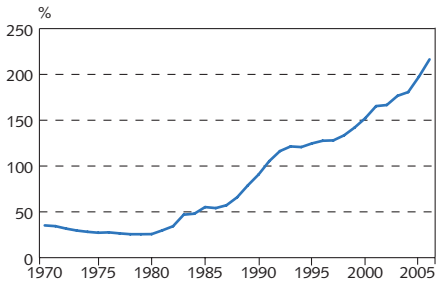
Increased credit supply drove up housing demand significantly. House prices surged and are now at an all-time high.[1] The longest available time series for price per square metre in condominiums now shows a 45% higher value in real terms than at the previous peak in June 1982. Relative to compensation of employees, which provides a clearer indication of payment ability, house prices are currently 10% higher in real terms than when they last peaked in March 1984. It should be borne in mind that these prices say nothing about the average size of purchased housing, nor how close to completion it was when bought.

Household debt has risen much faster than disposable income. At the end of 2006 it was at a historical peak at 216% of annual disposable income. This is higher than in any other industrial country apart from Denmark (260%) and the Netherlands (246%), according to a recent OECD report.[2]

Rapid growth of debt and assets in recent years prompts the question of whether there is an increased risk that a substantial share of households will be unable to meet their liabilities towards credit institutions. The answer is not immediately obvious, because lower mortgage rates and longer maturities offset higher debt. The following is an attempt to assess the probability of vulnerabilities by examining the development of household debt in recent years, on the basis of more complete data than have been available hitherto. It also examines how the growth in debt is distributed among different groups and whether the number of heavily indebted households, relative to both disposable income and assets, has increased.

Chart 1

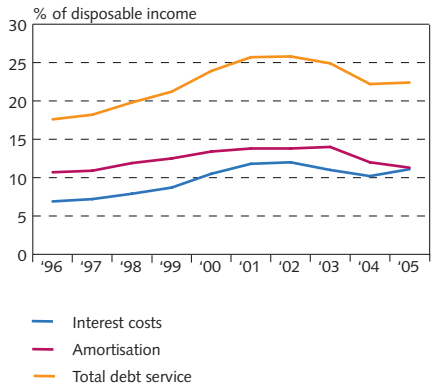
Household debt as % of disposable income
1970-2006



Source: Central Bank of Iceland.

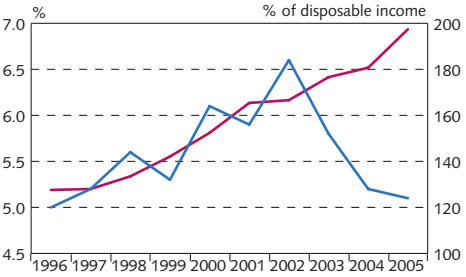
1. See e.g. Elíasson, Lúdvík and Thórarinn G. Pétursson (2006), The residential housing market in Iceland: Analysing the effects of the recent mortgage market restructuring, Central Bank of Iceland *Working Papers*, no. 29/2006.
2. OECD *Economic Outlook* no. 80, 2006: III. Has the rise in debt made households more vulnerable?

Chart 2
Household debt service 1996-2005[1]



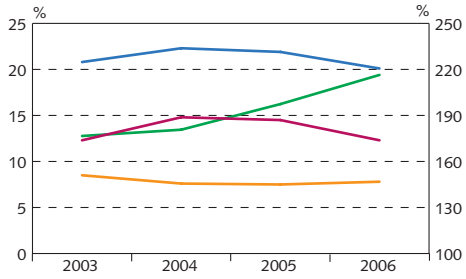
1. According to the Central Bank's earlier estimates.
Source: Central Bank of Iceland.

Chart 3
Real interest rates and debt ratio 1996-2005



Source: Central Bank of Iceland.

Chart 4
Debt service and debt as % of disposable income 2003-2006



Source: Central Bank of Iceland.

Methodologies for estimating debt service

The Central Bank has estimated household debt service for many years, although findings have not been published regularly. Studies have been based on data on amortisation and interest payments provided by the Student Loan Fund and HFF. Amortisation and interest payments to other credit institutions were estimated from a known loan position and imputed interest rates based on maturities from published statistics and informal data collection from those institutions. Generally, two figures were calculated, one as if all loans were indexed to prices, the other as if none of them were. The division between annuity and fixed-repayment loans complicated the calculations, but in 2006 an attempt was made to disaggregate indexed and nominal loans and take annuity formats into account. A third question was how to deal with bills and overdrafts, where rollover of the loan is virtually automatic. These loans have been regarded as having no amortisation, although they may equally be considered due or liable to fall due at any time. Fourth, data on disposable income has been unreliable, but Statistics Iceland published such figures in April 2007.

Debt service according to the earlier estimation method is shown in Chart 2 with underlying average interest rates in Chart 3. Debt grew from just over 150% of disposable income to just under 200% over the period 2000-2005. However, as a result of a reduction in average interest rates from 6% to 5%, an extension of maturities from 15 years to 21 years and a 15% increase in real disposable income per capita, estimated debt service remained unchanged at 24% of disposable income in 2000 and 2005.

A drawback to the methodology described above is that key components are based on rough estimates of the relationship between reference interest rates and average terms, maturities and annuity loan weightings, rather than on systematic acquisition of data on interest payments and amortisation. For as long as the bulk of household debt was with the HFF this was not much of a problem, because data for interest payments and amortisation on its lending were known and errors in estimates of bank loan debt service did not skew the outcome drastically. After the commercial banks and savings banks captured a large share of the mortgage loan market, however, much more detailed data on amortisation and interest payments was required for lending by deposit money banks and main pension funds. At the end of 2006, the Central Bank approached credit institutions about cooperating on the direct compilation of figures for interest and amortisation payments, comparable to the Bank's monthly data collection for other balance sheet data.

New findings on household debt service

According to the new data, household debt increased by 10% in real terms in 2004 after remaining stagnant in 2002 and 2003. This caused some increase in debt service. Amortisation and interest payments as a proportion of disposable income grew to just under 22½% in 2004 from 21% in 2003, as shown in Chart 4. Debt subsequently increased in real terms by 18½% in 2005 and 14% in 2006, based on end-of-year figures. However, total household disposable income

increased by more than 7% each year and loan maturities continued to lengthen, partly with prepayment of older loans. Debt service thus decreased by two percentage points over these two years and was just over 20% of household disposable income in 2006. It is more likely that debt service is overestimated than underestimated, due to the difficulty of sifting out every single prepayment from the amortisations.[3] In fact, the new figures show a similar result for the period to the previous methodologies, in spite of using better data.

It would be rash to jump to the conclusion that the position of households has strengthened in recent years. Although debt service has decreased marginally, it cannot be claimed that growing household debt has not raised the risk profile. Among the considerations are whether the rise in real wages is permanent and whether certain groups have taken on substantially more debt than the average, i.e. how the distribution of debt by income, assets, etc. has shifted. Another critical factor is whether the surge in house prices – more than doubling in real terms since the 1997 average – proves to be permanent.

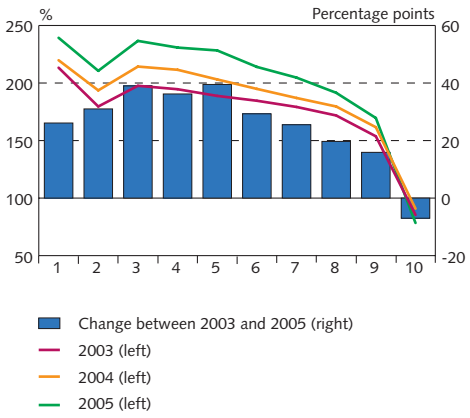
Admittedly, a number of features of the credit system reduce vulnerability. Household loan maturities are extremely long, interest rates predominantly fixed and debt service evenly distributed in real terms. Even if house prices decrease, households can still meet their liabilities provided that their real income does not fall below what was assumed at the time of purchase. On the other hand, falling house prices will weigh heavily on buyers who cannot meet their liabilities, which is where the risk lies.

Distribution of household debt by total income

The Central Bank publishes regular forecasts of real income and property prices, most recently in *Monetary Bulletin* in March 2007. However, little has been known about the distribution of debt and whether certain groups can be identified as likely to have trouble in meeting their liabilities in an economic downturn. Data published by Internal Revenue enable household debt developments to be examined for different income groups, in order to isolate particular risk groups of the kind described above. Indications of this distribution can be obtained by comparing data from tax returns for 2003, namely the year before the commercial banks entered the mortgage loan market, and 2005, the most recent year for which tax data are available. It should be borne in mind that debt appears to be underestimated in tax returns, where it was 15% lower than in Central Bank statistics for the end of 2005. Debt also increased in real terms by 14% in 2006, according to Central Bank data, but figures for that year are not yet available from Internal Revenue.

According to Internal Revenue data, debt as a proportion of disposable income increased in 2003-2005 for all income groups (deciles of total income of couples), apart from the highest income group. This growth is consistent with Central Bank credit statistics, which showed an increase in debt as a proportion of disposable income from 177% at the end of 2003 to 197% at the end of 2005.

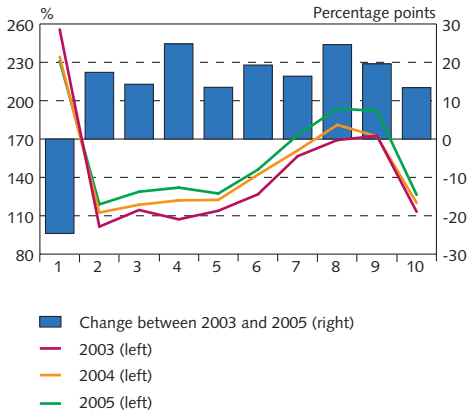
Chart 5
Debt as % of disposable income
2003-2005
Deciles of total income of couples



Source: Central Bank of Iceland calculations from Internal Revenue data.

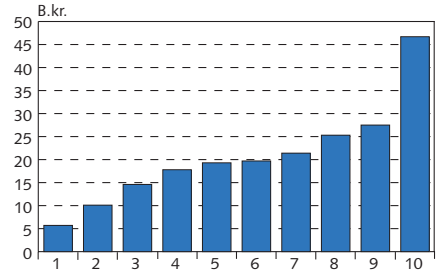
3. Data for 2006 are partly estimated.

Chart 6
Debt as % of disposable income
2003-2005
Deciles of total income of individuals



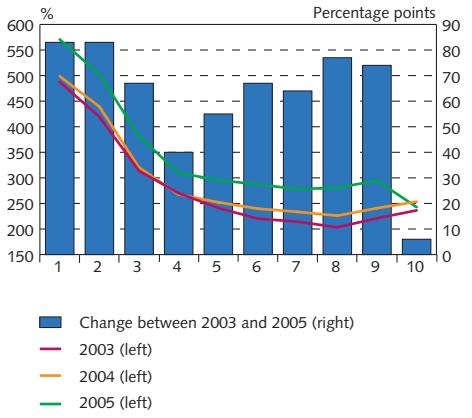
Source: Central Bank of Iceland calculations from Internal Revenue data.

Chart 7
Increase in household debt 2003-2005
Deciles of total income of couples and individuals



Source: Central Bank of Iceland calculations from Internal Revenue data.

Chart 8
Net wealth as % of disposable income
2003-2005
Deciles of total income of couples



Source: Central Bank of Iceland calculations from Internal Revenue data.

The debt ratio is highest in the lowest income decile. In 2005, debt was equivalent to 240% of disposable income of the lowest decile.[4] Sweeping conclusions should not be drawn from the debt ratios in the lowest and highest decile, however. The highest decile is coloured by taxpayers with large assets tied up in holding companies, but small debts in their own name. The lowest decile includes individuals with very low incomes, e.g. students, who therefore do not need much debt in order to produce a high ratio.

The debt ratio increased most in the third, fourth and fifth income deciles. Couples in these income groups had debts equivalent to more than 190% of annual disposable income at the end of 2003, but 230% at the end of 2005. The debt ratio rose by less in the sixth, seventh and eighth deciles. In 2003 these groups had average debts of 180% of disposable income, but in 2005 it had risen above 200%.

The development and distribution of debt by deciles of total income of individuals (as opposed to couples) reveals a similar trend, although the distribution is different. Debt ratio increased most in the fourth and eighth deciles. Individuals in the fourth decile had debts equivalent to just under 110% in 2003, which had risen to 130% in 2005. In the eighth decile, on the other hand, the ratio was 170% in 2003 and had risen to almost 195% in 2005.

Although debt increased by proportionally more among the lower income groups, the highest income group's debt grew by more in real terms. As Chart 7 shows, the growth rate of debt was successively higher in each income decile. However, the rising ratio of debt to disposable income for lower-income households is probably more of a cause for concern. Households in the lower income deciles that increased their debt the most are likely to be most vulnerable to economic shocks, since their debts are higher relative to disposable income. The lowest-income households also have relatively smaller assets. The highest income groups would also face a risk from a sudden drop in their income, if they have overmortgaged in expectation of high future income.

Distribution of and changes in equity (net wealth)

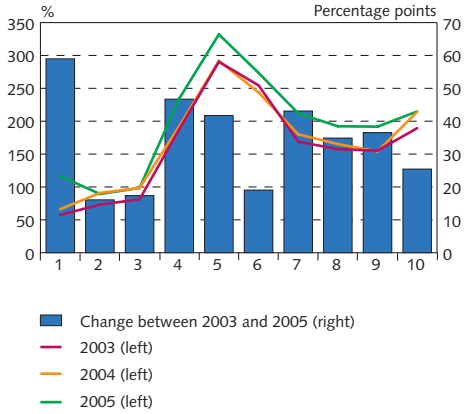
As well as debt, Internal Revenue data include assets declared on tax returns, although shareholdings are stated at nominal price. Measured in these terms, household assets net of debt have increased. The risk posed by the debt stock should have diminished because equity has increased as a proportion of disposable income in all income groups – for individuals and couples alike – despite high debt accumulation in recent years. The obvious explanation is that house prices rose by 50% more than general inflation over the same period. From end-2003 to end-2005, all groups – measured in deciles of total income of couples – increased their equity relative to disposable income. As a proportion of disposable income, equity rose by markedly more over this period in the upper income groups than in the middle of the distribution. Household equity therefore improved by less in the groups whose

4. Based on disposable income per tax return. These data are not fully comparable with Statistics Iceland's aggregates, which were 15% higher in 2005. Nonetheless, they are useful for a comparison of groups.

debt ratio increased the most, compared with other groups. As Chart 8 shows, the ratio of equity to disposable income is highest among couples in the lower income deciles. Pensioners with low disposable income but a strong equity position probably account for the majority of this income group.

For individuals, the picture is quite different. The highest proportion of equity to disposable income occurs among average-income groups. Young individuals with low disposable income and limited asset formation are presumably in the majority in the lowest income deciles. As their disposable income grows, individuals have more scope for improving their equity position. Equity of individuals as a proportion of disposable income increased most in the groups that also showed the greatest increase in debt. A possible explanation is that individuals who took on heavy extra debt deployed the borrowed funds almost entirely on purchases of assets that subsequently rose in price.

Chart 9
Net wealth as % of disposable income
2003-2005
Deciles of total income of individuals



Source: Central Bank of Iceland calculations from Internal Revenue data.

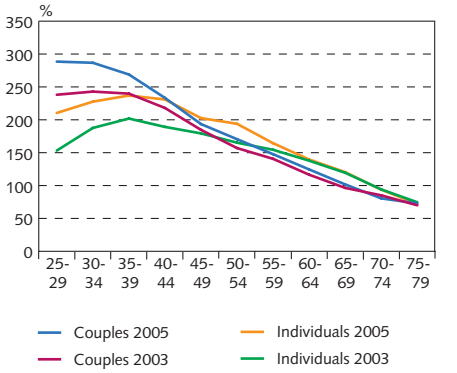
Household finances by age distribution

Changes in the distribution of debt by age group could also provide indicators of payment risk. The position of the youngest groups in the labour market, for example, may be less secure. Heavy debt accumulation by young people may increase the probability of illiquidity when disposable income contracts. As a rule, more unequal distribution also heightens risk. A sharp difference between the increase in assets and in debts of particular age groups may also signal a threat, especially if there is a risk of falling house prices.

Debt by age group and changes in it over the period 2003-2005 can be examined from Internal Revenue data, with certain limitations. The oldest and youngest age groups are not shown, because of their unique characteristics: it is not abnormal for students to have debts with no income to match them, or for senior citizens to own relatively unmortgaged assets that may seem large compared to their income. Chart 10 shows debt as a proportion of disposable income by age group. The broad profile is well known, e.g. from a Central Bank of Iceland study of debt and arrears at the end of 1994. Debt is highest relative to income early in life, then declines with age as income rises and later when loans are eventually paid off. From end-2003 to end-2005, the only significant growth in debt ratio was among the youngest age groups. The probable reason is greater scope for mortgage borrowing. The simplest explanation of the small increase in debt ratio among older groups is that relatively few members of that set have taken advantage of higher mortgage limits to buy more expensive housing, while higher disposable income has offset the increase in debt that actually took place.

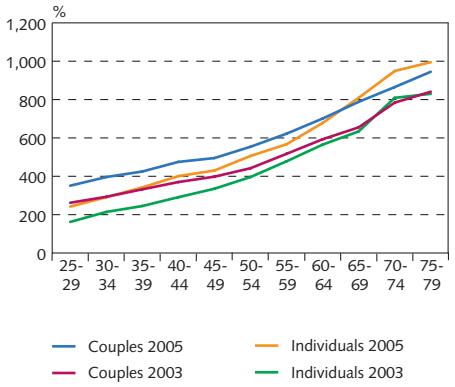
While the debt ratio falls with age, it remains fairly high across the sample. For example, it is still equivalent to 88% of disposable income in the 70-74-year group. At the end of 2005, individuals had average debt of 1.6 m.kr. and couples 3.1 m.kr. Although most people have retired by their seventies, they can continue to be active buyers of consumer durables for much longer. This average is somewhat higher than would be expected for renewing cars and appliances.

Chart 10
Debt as % of disposable income
by age group



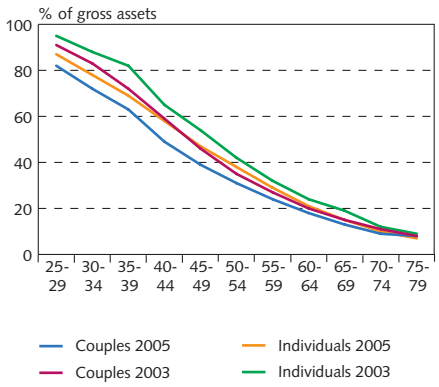
Source: Central Bank of Iceland calculations from Internal Revenue data.

Chart 11
Assets as % of disposable income by age group



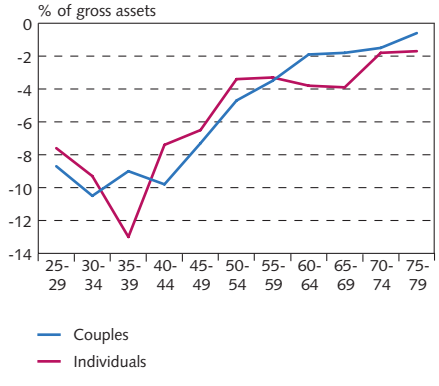
Source: Central Bank of Iceland calculations from Internal Revenue data.

Chart 12
Debt by age groups



Source: Central Bank of Iceland calculations from Internal Revenue data.

Chart 13
Change in debt ratio by age group



Source: Central Bank of Iceland calculations from Internal Revenue data.

Assets, debt and equity by age group

An increase in debt carries a lower risk, the greater the growth of assets against it. Just as for the income groups above, equity or net assets can be estimated from Internal Revenue data, with the caveat that shareholdings are severely underestimated and pension reserves omitted. The findings are shown in Chart 11. Assets as a proportion of disposable income, measured as the simple difference between ratios, have increased least among the youngest age groups, who have borrowed to purchase higher-priced assets than before. The ratio appears to have risen most among those whose housing has soared in value and is not highly mortgaged. The average increase is 76 percentage points. Even among the youngest groups the net wealth or equity ratio has risen substantially, from 13% in 2003 to 44% in 2005. The omission of shareholdings implies that asset growth is underestimated, since share prices have risen by even more than house prices – by 130-140% more than the CPI from end-2003 to end-2005.

Besides examining the ratio of assets to disposable income, useful information may also be gleaned from the ratio of assets to debt, e.g. about how much prices need to change in order for the equity of large groups to turn negative. If the main effect of the banks' entrance into the mortgage loan market in 2004 was a massive increase in leveraged assets of the youngest and lowest-income groups in the form of housing, this should be reflected, as a result of house price developments, in a lower ratio of debt to assets among these groups, notwithstanding the growth in their debt relative to disposable income. This is because the lowest age groups have gained from a rise in asset prices far in excess of the nominal rise in debt due to indexation. The effect was most pronounced in 2005, when Land Registration house valuations increased by 30% but indexation drove up debt by 4%. However, the big question remains how permanent the rise in real house prices will prove.

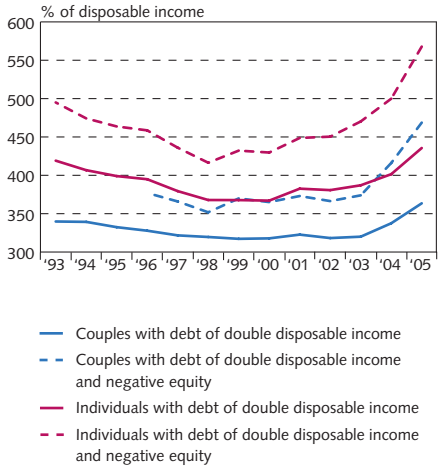
Debt of the most indebted group has increased far in excess of the average

Distribution of debt by income and age does not necessarily answer the question of whether dangerously high levels of indebtedness are more common than before. To answer this question, a sample was selected from Internal Revenue data comprising taxpayers with debts of more than double their disposable income, who have negative equity. The former category has grown steadily in recent years and the last two years do not diverge noticeably. Their growing number is consistent with the rise in average debt relative to disposable income. However, the number of taxpayers with debts of more than double their disposable income, who also have negative equity, has declined, especially among couples. There was a sharp drop in the number of taxpayers falling into this category in 2005, presumably as a result of higher house prices. Taken in isolation, these data indicate that although the number of large debtors has increased, a larger group now has assets that cover debt, which reduces the banks' vulnerability to their higher indebtedness.

Nonetheless, this is only part of the story. The debt of this group has grown much faster than average relative to disposable income.

Average debt as a proportion of disposable income rose by 20 percentage points in 2004 and 2005, from 177% to 197%. However, the ratio for individuals with debt of more than double disposable income rose by 43 percentage points, and for couples it rose by 49 percentage points. Among those who also had negative equity, the ratio rose by close to 95 percentage points. At the end of 2005 the debt ratio of couples with debts equivalent to more than double disposable income had risen to 350%, and for individuals it was more than 450%. Comparable ratios for those who also had negative equity were 450% and 550% respectively (see Chart 14). Such a level of debt is not unmanageable if real wages are steady or growing. Annual payment on an annuity equivalent to quadruple disposable income over 40 years, at a real interest rate of 5%, amounts to 23% of disposable income. If the debt ratio is 550%, the corresponding annual payment is 32%. These ratios decline if income increases. The CPI-indexed long annuities with fixed interest rates that characterise the Icelandic mortgage market enable debtors to sustain large debt over a long period, provided that their income flow is not disrupted. If this happens on a fairly large scale due to the economic situation, coinciding with a slump in house prices, households and financial institutions could face a serious risk of losses. Negative equity can pose severe problems for resolving these difficulties.

Chart 14
Developments among the most indebted group



Source: Internal Revenue data prepared for the Cental Bank of Iceland.

Conclusions

In spite of greater debt, household debt service does not appear to have increased as a proportion of disposable income on the whole since 2004; instead, it has gone down slightly. Nonetheless, households that increased their debt the most are quite vulnerable to shocks, such as higher unemployment and declining real wages, if the economy contracts. Such a development could cause payment difficulties for a large group. If this were to coincide with a fall in house prices, at least in real terms, financial companies might need to step up their mortgage write-offs. Distribution of debt by income, asset and age groups indicates that certain groups could be vulnerable in the event of a prolonged recession. Although fewer taxpayers are heavily indebted relative to both income and assets, the debt of the most indebted segment has grown significantly, and far in excess of the average. As the Central Bank has repeatedly pointed out, an inevitable adjustment of the Icelandic economy lies ahead. All households will be affected and the most heavily indebted could be at considerable risk of an illiquidity crisis.

At the end of 2006, households' debt had risen by 240 b.kr. year-on-year, but their assets by 697 b.kr., including growth of pension reserves amounting to 307 b.kr. A turning point was reached in 2006 when the rate of asset growth slowed down but inflation was relatively high. The position of many highly indebted households has probably worsened because their price-indexed debt increased at the same time as asset prices began to fall in real terms in 2006. Debt service did not increase as a proportion of disposable income in 2006, but it is uncertain whether this trend will continue if interest rates and inflation do not begin to come down in the fairly near term.

Financial companies[1]

Strong liquidity and capital adequacy must be maintained

The year 2006 was both favourable and instructive for Icelandic financial companies. The banks' return on equity was very high, their assets swelled and they continued to consolidate their activities both in Iceland and overseas. The main drivers of strong profitability were increased net interest income following rapid credit growth, high income from fees and commissions and substantial trading gains on securities, especially equities. Domestic and foreign lending soared in 2006, while leading indicators imply very satisfactory loan portfolio quality. Delinquency and impairment are at a historical low. At the same time, large exposures have decreased as a proportion of equity capital. Mortgage lending has increased rapidly in the recent term. If adequate returns can be achieved on mortgages, with mortgage collateral levels within moderate limits and fixed interest rate risk kept to a minimum, the growth in mortgage lending will strengthen the banks' position.

Nonetheless, experience has shown that a sudden surge in lending growth, like that in recent years, may eventually lead to greater loan losses. It should be borne in mind that their low levels of provision for impairment as a ratio of lending leave the deposit money banks with less scope to meet such a contingency in the next economic downturn. A large proportion of their lending and forward contracts is secured with collateral in equities. A sizeable amount of the equities listed on Iceland Stock Exchange is probably leveraged, which could prove precarious when the rise in equity prices unwinds. Market risk from the banks' equity exposures, as a proportion of own funds, decreased in 2006, but their foreign exchange positions swelled. In particular, the growth in the banks' foreign currency holdings reflects hedges against the effect of exchange rate movements on their equity position and capital adequacy.

The rapid expansion of the commercial banks in recent years has driven up their foreign currency-denominated borrowing, including market funding. A substantial share of their foreign borrowing matured in 2006 and an even larger proportion will do so in 2007. In the first half of 2006, doubts were raised about their refinancing capacity. The banks responded by tapping new credit markets, taking subordinated loans and targeting deposit-taking. At the end of 2006 the banks had completed their refinancing arrangements for 2007. Heavy foreign currency-denominated funding underlines the importance of credit ratings for the banks. At the end of 2006 their equity position was strong and their equity ratios at the highest level since capital adequacy requirements were introduced. Liquidity was also excellent. Maintaining a strong equity position and ample liquidity are preconditions for the stability of the financial sector.

An instructive year in 2006

Market funding in the spotlight

Rapid expansion in recent years has increased the importance of foreign funding for Iceland's commercial banks and made them more dependent on smooth access to international capital markets. Uncertainties about their market funding loomed at the end of 2005 when their CDS spreads and finance costs in international markets began to rise. A spate of negative reports about the Icelandic economy and banks was published early in 2006 and Fitch Ratings lowered

1. This section discusses the main financial companies from a financial stability perspective. The aggregate consolidated position of the largest commercial bank groups is covered first, then the aggregate position of the largest savings banks.

Table 1 Total assets of the commercial banks' foreign subsidiaries

End of 2006, b.kr.

Kaupthing Bank		*Glitnir Bank*		*Landsbanki*	
FI Holding AS (FIH)	1,222	BNbank	557	Landsbanki Luxembourg	303
Kaupthing UK – Group	536	Glitnir-Lux	153	Heritable Bank	122
Kaupthing Bank Luxembourg S.A.	478	Glitnir Bank Norway	67	Kepler Equities	44
Kaupthing Sverige AB	180	Glitnir AB	20	Landsbanki Guernsey Ltd.	17
Kaupthing Finance Ltd.	44	Union	5	Teather & Greenwood	17
Kaupthing Bank Oyj	22	Glitnir Securities	3	LI Investment Ltd.	8
Kaupthing Norge AS	14	Glitnir-Norway	0.4	Merrion	5
Norvestia Oyj	16				
Total assets of foreign subsidiaries	2,512	Total assets of foreign subsidiaries	805	Total assets of foreign subsidiaries	516
Total assets of group	4,055	Total assets of group	2,246	Total assets of group	2,173
Foreign subsidiaries' share	62%	Foreign subsidiaries' share	36%	Foreign subsidiaries' share	24%

Three largest commercial banks. Exchange rate at end of 2006. Excluding foreign branches.

Source: Financial Supervisory Authority (FME).

Iceland's sovereign outlook from stable to negative in February. The króna depreciated as a result, equity prices dropped and doubts arose about the banks' ability to secure funding for maturing loans. The banks responded with improved communication about their activities as well as slowing down their expansion, selling from their equity portfolios and boosting capital adequacy. This turbulence prompted them to ply capital markets elsewhere than in Europe, especially in the US, with a raft of issuance, other borrowing and increased deposit-taking. By the end of 2006 the banks had funded their debt service for 2007 and built up strong liquidity positions. The Central Bank's responses to the shift in the commercial banks' foreign refinancing is discussed in Box 1 on p. 43.

Consolidation of activities

The banks' international expansion and acquisitions of financial companies began only a very few years ago. Acquisitions of foreign financial companies characterised the Icelandic banks' activities in 2004 and 2005. In 2004, Kaupthing Bank acquired the Danish FIH bank to become the largest banking group in Iceland. Highlights in 2005 were Glitnir's acquisition of BNbank of Norway and Kaupthing Bank's acquisition of the UK bank Singer & Friedlander. Landsbanki also acquired three European securities companies in 2005. The main characteristic of 2006 was consolidation of activities both in Iceland and abroad, with less pronounced changes in group structure than in preceding years. The main changes were Glitnir's acquisition of the Norwegian consultancy Union Group in March and the Swedish securities house Fischer Partners in May, and Landsbanki's acquisition of Cheshire in Guernsey. At the end of 2006, almost half of total assets of the largest commercial bank groups were accounted for by foreign subsidiaries, as Table 1 shows.

Changed and more dispersed risks

Expansion outside Iceland and lending by parent companies to non-residents have broadened the commercial banks' income base, so

Box 1

Central Bank responses to shifts in the commercial banks' capital market funding

There was never any need to call upon the Central Bank of Iceland's facilities for commercial banks amidst the uncertainty connected with their capital market funding in the first half of 2006. The financial system was broadly sound and capable of responding on its own to the challenge it faced. Nonetheless, the Central Bank played a diverse role, which essentially took three forms: increased data acquisition, communication of information and contingencies.

Data acquisition focused primarily on close monitoring of the commercial banks' financing, liquidity and risk management. At the same time a close watch was kept on developments in international markets and comments by analysts abroad. An internal working group met regularly to discuss the banks' position from a central banking perspective from November 2005 to November 2006 and the Central Bank's contingency procedures were also revised.

The Central Bank was inundated with requests for information about the Icelandic economy and financial sector from foreign financial companies, investors, analysts, media and international agencies. A continuous dialogue was maintained with the rating agencies. The most hectic time was from February to May last year. *Financial Stability*, which was published in early May 2006, responded to the situation with extended coverage. It strove to respond to market agents' concerns with analysis of most of the potential weaknesses that had been pointed out in the Icelandic financial sector. *Financial Stability* 2006 was later deemed to be professional, candid and in line with international best practice.

The most important steps in crisis management were an agreement with Government ministries and the financial supervisory authority, and contingency exercises. In February 2006, a Memorandum of Understanding was signed between the Office of the Prime Minister, Ministry of Finance, Ministry of Commerce, Financial Supervisory Authority (FME) and Central Bank of Iceland, on consultation concerning financial stability and contingency plans.[1] The MoU was one proposal from a task force representing all these institutions which had been engaged for two years on financial system contingencies. Its work was partly modelled on crisis management procedures in other countries. The Central Bank and FME held a joint contingency exercise in January 2006, along similar lines to the exercise in January 2004, addressing the financial markets as a whole. In January 2007 a further exercise was held to test responses to shocks to payment and settlement systems. A joint Nordic financial system contingency exercise is currently being planned in which central banks, financial supervisory authorities and ministries of finance of the five Nordic countries will participate. Finally, mention should be made of measures to strengthen the Central Bank's foreign reserves, which are described in more detail in Box 2 on p. 46.

1. http://www.sedlabanki.is/lisalib/getfile.aspx?itemid=3668.

that their risks have changed and are more diverse. Group income from outside Iceland has surged, and so have their foreign assets. At the same time, the three banks' different business structures in other countries also disperses risk. In 2006, 48% of group income originated outside Iceland, compared with 46% in 2005. Credit to non-residents accounted for 61% of total lending to customers at the end of 2006, as against 56% at the end of the previous year.[2] The proportion of

2. Lending to customers excludes lending to financial companies. A higher figure is produced for the banks' total lending to non-residents if their lending to financial companies is included, see the discussion of total lending to non-residents in the section on lending on p. 48.

foreign income was highest at Kaupthing (53%), and 77% of its lending to customers was to non-residents, as shown in Table 2. A broader income base and more dispersed risks leave the Icelandic banks less vulnerable to domestic shocks, but correspondingly more susceptible to a more diverse range of financial shocks.[3]

Table 2 Commercial banks' income and lending outside Iceland at the end of 2006, %

	Income from abroad	*Lending abroad*
Kaupthing Bank	53%	77%
Glitnir	33%	55%
Landsbanki	52%	38%
Total	48%	61%

Largest commercial bank groups.

Income originating outside Iceland as a proportion of total income. Lending to customers outside Iceland as a proportion of total lending to customers.

Sources: Commercial banks' annual reports, Central Bank of Iceland calculations.

Commercial banks' credit ratings

International agencies assess the credit ratings of Iceland's three large commercial banks, i.e. Kaupthing Bank, Glitnir and Landsbanki. Ratings become increasingly important for the banks, the more that they raise funding in the markets, making it critical for financial stability that they maintain strong ratings. The banks' ratings are shown in Tables 3 to 5.[4]

Table 3 Moody's ratings of Icelandic commercial banks

	Announced	*Long-term*	*Short-term*	*Financial strength*
Kaupthing Bank	April 2007	Aa3	P-1	C
Glitnir Bank	April 2007	Aa3	P-1	C
Landsbanki	April 2007	Aa3	P-1	C

Source: Commercial banks' websites.

Table 4 Fitch's ratings of Icelandic commercial banks

	Announced	*Long-term*	*Short-term*	*Individual*	*Support*
Kaupthing Bank	March 2007	A	F1	B/C	2
Glitnir	March 2007	A	F1	B/C	2
Landsbanki	March 2007	A	F1	B/C	2

Source: Commercial banks' websites.

Table 5 Standard & Poor's ratings of Glitnir

	Announced	*Long-term*	*Short-term*
Glitnir Bank	February 2007	A-	A-2

Source: Glitnir website.

3. The rapid expansion of the Icelandic banks and a comparison with other Nordic banks were discussed in a report by the Nordic central banks, *Nordic Banking Structures*, published in August 2006. See the Central Bank of Iceland website, www.sedlabanki.is
4. Credit ratings of the Icelandic banks were discussed in detail in Appendix 2 to the Financial companies section of *Financial Stability* 2006, p. 69-77.

Main commercial banks[5] Operating results

Major changes in external environment

The banks' financial statements for 2006 reflected changes in domestic and international financial markets, including the depreciation of the króna. The exchange rate index rose by 23% and the króna weakened correspondingly. Listed domestic equity prices rose by 16% over the year and equity prices in neighbouring countries were buoyant. Inflation in Iceland rose quite sharply and measured 7% over the year.

Record profitability

Profitability was very strong at the largest commercial banks in 2006. At 38%, their combined return on equity has never been higher. The main explanations are increased interest income following a surge in lending, large income from fees and commissions, and substantial gains on portfolios of securities, especially equities. Year-on-year comparisons are complicated by factors including the depreciation of the króna, however.

Interest income soared but interest margin unchanged

Net interest income[6] is the commercial banks' largest income item. Other main sources of income are net fees and commissions and trading gains. In 2006, net interest income of the largest commercial banks amounted to 131 b.kr. compared with 79 b.kr. in 2005, a 66% increase year-on-year. Although net income grew, the interest margin[7] remained unchanged from 2005 at 1.9%. In the first half of the year the interest margin increased with higher inflation, reflecting the fact that the banks hold considerable indexed assets net of indexed liabilities. In the second half of the year, a rise in interest rates on non-indexed instruments narrowed the margin. Growth in foreign currency-denominated lending, mortgage loans and lending by foreign subsidiaries has narrowed the spread in recent years.

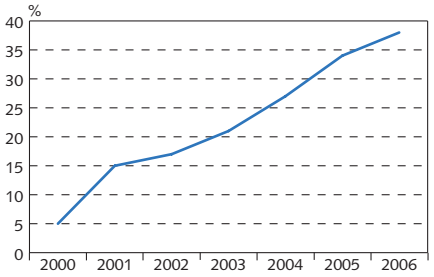
Sharp growth in fees and commissions and trading gains

Net fees and commissions[8] grew sharply year-on-year. They increased by 92%, to 92 b.kr. in 2006 from 48 b.kr. in 2005. Proportionally, the greatest growth was in fees and commissions originating outside Iceland. Trading book gains,[9] especially gains on equities, were also substantial in 2006, rising 47% to 87 b.kr. from 59 b.kr. the year before. Domestic listed equities rose firmly and the banks divested holdings in large companies, both associates and trading book investments. Highlights were Kaupthing's 26 b.kr. gain on the sale of its

Chart 1

Return on equity 2000-2006[1]

Profit as a ratio of average capital position less profit

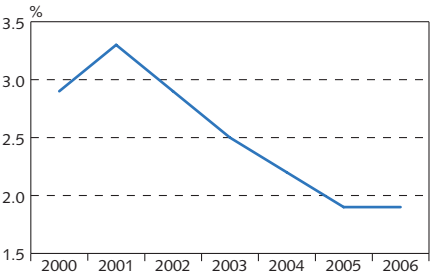


1. Largest commercial banks' consolidated accounts. ROE for 2000-2004 based on earlier accounting methods.
Sources: Commercial banks' annual reports, Central Bank calculations.

Chart 2

Interest margin 2000 - 2006[1]

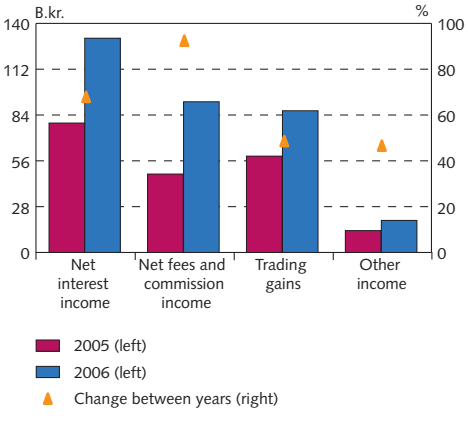
Net interest income as a ratio of the average between total assets at the start and end of the year



1. Largest commercial banks' consolidated accounts. Interest margin for 2000-2004 based on earlier accounting methods.
Sources: Commercial banks' annual reports, Central Bank calculations.

Chart 3

Net operating income 2005 and 2006[1]



1. Largest commercial banks' consolidated accounts.
Sources: Commercial banks' annual reports, Central Bank calculations.

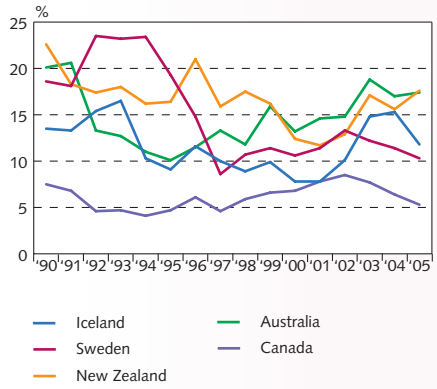
5. The main commercial banks comprise Kaupthing Bank, Glitnir and Landsbanki. Consolidated figures are quoted here unless otherwise stated. Discussion of the aggregate position may diverge from that of individual financial companies.
6. Interest income less interest expenses.
7. The ratio of net interest income (interest income less interest expenses) to the average between total assets at the start and end of the year.
8. Income from fees and commissions net of fees and commission expenses.
9. Including dividends.

Box 2

Measures to strengthen the Central Bank's foreign reserves

Chart 1

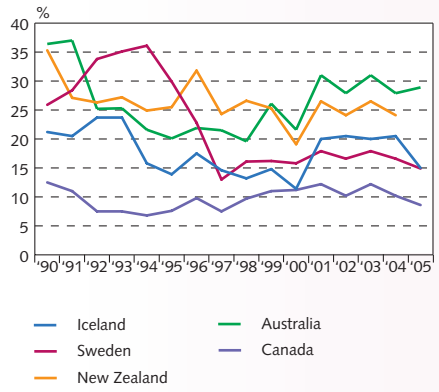
Foreign reserves (excl. gold) in weeks of goods imports (cif)



Source: International Monetary Fund.

Chart 2

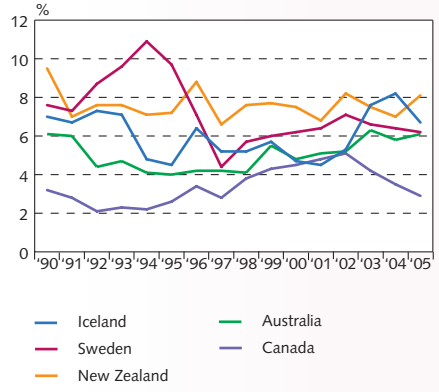
Foreign reserves as % of goods and services imports



Sosurce: International Monetary Fund.

Chart 3

Foreign reserves as % of GDP



Source: International Monetary Fund.

Foreign reserves expanded

The Central Bank of Iceland's foreign reserves were strengthened substantially towards the end of 2006. After lying in the range 65-80 b.kr. for most of the year they were boosted by 90 b.kr. on December 1, 2006. In consultation between the Central Bank and the government, the reserves were boosted with a Republic of Iceland EMTN issue in the amount of €1 billion, the proceeds from which were deposited in the Central Bank.

Reasons

Several factors lay behind the decision to expand the reserves. First, Iceland's financial sector has mushroomed in recent years and the commercial banking sector's assets are now equivalent to eight-fold GDP. At the end of 2000 they were marginally less than GDP. The Central Bank's reserves increased only slightly over the same period. Second, non-residents are now active participants in króna transactions as investors and bond issuers, as well as through trading in the FX, króna and bond markets. Third, the strong fiscal position and favourable financial market climate provided an incentive for taking this action in November 2006. EMTN issuance created a welcome opportunity to promote Iceland to foreign investors. With their growing focus on Iceland, investors have been interested in familiarising themselves with local conditions. Finally, international rating agencies have repeatedly pointed out that the Central Bank's reserves were on the low side.

There is no academic consensus on whether a central bank with a floating currency and on an inflation target needs to maintain foreign reserves in the first place. The Central Bank does not target the exchange rate and is under no obligation to intervene in the market. Its main objectives involve price stability and financial stability, i.e. promoting a sound and efficient financial system. After the turbulence experienced in the financial sector and the economy in the first half of 2006, the Central Bank took the view that larger foreign reserves would enhance faith in the Bank's ability to perform its mandatory role and the government's ability to meet its commitments.[1]

Such measures pose a risk of moral hazard, if market agents regard the Central Bank's strengthened liquidity as a guarantee for major financial companies. This in turn influences their risk behaviour and the risk assessment of the depositors and securities investors who fund their activities. It is clear that the Central Bank's role as a provider of liquidity for the financial sector is confined to local currency, i.e. the Icelandic króna, and that it may only lend to financial institutions against adequate collateral. Rating agencies and others assume that the government will assist systemically important institutions that encounter difficulties, on the grounds that this would cost the economy less than the financial crisis that might otherwise result. However, neither the Treasury nor the Central Bank issues financial companies with such formal guarantees and have never made declarations to this effect to agencies responsible for Iceland's sovereign and banking sector ratings. Difficulties resulting from greater risk would have lasting reputational consequences for the financial company concerned, and its management. Thus the increased reserves should not give grounds for taking greater risks.

Next steps

No decisions have been made regarding further strengthening of the Central Bank's foreign reserves. In recent years the Treasury has

1. See e.g. the address by the Chairman of the Board of Governors at the Central Bank's annual meeting in 2007.

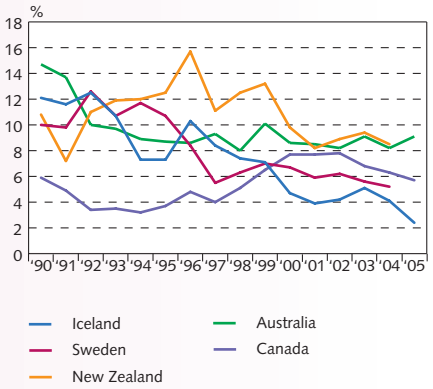
been retiring its foreign debt. Low debt and a healthy economic outlook are instrumental in securing Treasury access to credit if needed. There is no rule on the preferable size of foreign reserves. Developed countries with easy access to international capital markets need smaller reserves than less developed ones with sporadic credit access. In the event of unexpected shocks, reserves are an indication of the authorities' ability to respond. Ample reserves can enhance credibility and reduce uncertainty.

Comparison

Charts 1-4 compare the size of the Central Bank's foreign reserves with those of selected other countries. The countries in the sample all have an independent currency and target the inflation rate: Australia, Canada, New Zealand and Sweden. Iceland's reserves are noticeably on the high side by most measures. They are lowest relative to the external debt of the economy, which in turn reflects in particular the banking sector's meteoric expansion in recent years. Data are from the end of 2005 and show the position before reserves were boosted in December 2006.

Chart 4

Foreign reserves as % of external debt of the economy



Source: International Monetary Fund.

shares in Exista financial services company and Landsbanki's 10 b.kr. gains on the sale of its shares in the Swedish Carnegie investment bank. Equity prices on exchanges in neighbouring countries also rose considerably. Other income[10] also increased substantially year-on-year and totalled 20 b.kr. in 2006.

Impairment ratio continued to fall

In recent years the cost/income ratio[11] of the largest commercial banks has decreased yearly, mainly driven by a surge in operating income. In 2006 the cost/income ratio inched up to 38%.

Impairment on loans and advances[12] for the main commercial banks was 15.8 b.kr. in 2006, compared with a provision of 10.5 b.kr. the year before. The ratio of impairment on loans and advances to net interest income was 12% at end-2006. This was the third consecutive year in which the ratio fell, after years of rising relative to operating income. Low delinquency in recent years has reduced the commercial banks' write-offs.

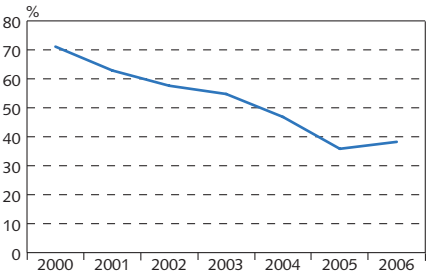
Acceptable core income

In 2006, trading book gains accounted for more than one-fifth of the largest commercial banks' net operating income. Although position-taking in securities is a part of investment bank activities, gains cannot always be taken for granted. If the banks had shown zero trading book gains in 2006, their profit before tax would have been 24% instead of 44%, and their cost/income ratio would have risen from

Chart 4

Cost/income ratio 2000-2006[1]

Operating expenses as a proportion of net operating income

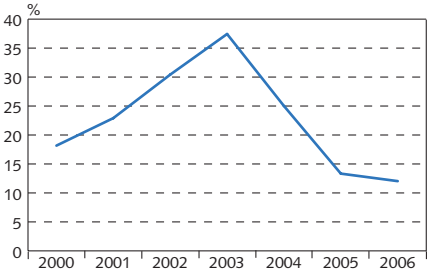


1. Largest commercial banks' consolidated accounts. Cost/income ratio for 2000-2003 based on earlier accounting methods.
Sources: Commercial banks' annual reports, Central Bank calculations.

Chart 5

Impairment of loans 2000 - 2006[1]

Impairment as a ratio of net interest income



1. Largest commercial banks' consolidated accounts. Impairment and net interest income for 2000-2003 based on earlier accounting method
Sources: Commercial banks' annual reports, Central Bank calculations.

10. Net operating income comprises net interest income, net fees and commissions, trading gains and dividends, and other income. Other income comprises net income on insurance activities, earnings from holdings in associates, gains on sale of disposal groups held for sale and sundry operating income.
11. Operating expenses as a proportion of net operating income.
12. Previously "provisions for loan losses" in the accounting terminology used by Iceland's Financial Supervisory Authority (FME).

38% to 52%.[13] Thus even with no trading book gains, their profitability in 2006 would have been quite acceptable.

Lending

Large-scale operations in neighbouring countries

The bulk of the commercial banks' assets is in the form of lending. At the end of 2006 their outstanding loan stock totalled 6,438 b.kr., an increase of 62% year-on-year. Due to their strong liquidity in the second half of the year, the banks had a sizeable stock of outstanding loans to financial companies. Lending to customers (i.e. excluding financial companies) thus grew by rather less than total lending, at 46%. It should be underlined that these are consolidated figures, and also that around one-third of the lending growth is explained by the depreciation of the króna.

According to data from the FME, the outstanding stock of lending by the largest commercial bank groups to non-residents at the end of 2006 amounted to 4,968 b.kr., which was 77% of their total lending. The corresponding ratio at the end of 2005 was 63%. Data on foreign lending by the commercial banks' groups show that borrowers in the Nordic countries account for the largest share. The largest lenders there are the Danish FIH Bank, which is part of the Kaupthing Bank group, and BNbank of Norway, which is part of the Glitnir group. A fifth of foreign lending is in the UK, headed by Kaupthing Singer & Friedlander in the Kaupthing Bank group. Considerable amounts have also been lent to Benelux – mainly Luxembourg. In all, 95% of the commercial banks' foreign lending is to northern Europe and North America. Thus the bulk of lending is to stable regions where the general economic situation is good. The quality of loans to customers is discussed in more detail in Appendix 1 on p. 62.

Lending growth still robust

Lending by the commercial banks' parent companies at the end of 2006 amounted to 2,924 b.kr., having grown by 48% year-on-year. Domestic borrowers accounted for 2,120 b.kr. at end-2006 (an increase of 42%) and foreign borrowers 804 b.kr. (up 64%). Loans to domestic businesses grew by 46% last year and to households by 28%. Growth in lending to households, including mortgage loans, has slowed down sharply from the 94% recorded in 2005.

Mortgage lending, loan-to-value ratios and interest rate risk

Increased mortgage lending by the banks will strengthen their position if the returns prove satisfactory, because experience has shown a low rate of delinquency and write-offs on such credit. Delinquency could increase with higher loan-to-value ratios, however. FME data reveal that 16% of mortgage loans by the commercial banks' parent companies at the end of 2006 involved a mortgage-to-value ratio of over 90%. This could be questionable when house prices fall. As a

13. Other income and expenses remaining unchanged. This is a simplified assumption; for example, remuneration in the investment banking sector is partly performance-related, and net fees and commissions are unlikely to remain unchanged during a downturn in the securities market.

Table 6 Total foreign lending by the three largest commercial bank groups

Country/region	*End-2006 b.kr.*	*%*
Nordic	2,326	47
UK and Ireland	1,098	22
Benelux	969	20
North America	112	2
Germany	121	2
Other European countries	108	2
Other	234	5
Total	4,968	100

Source: Financial Supervisory Authority (FME).

Table 7 Commercial bank lending

	End of 2005 b.kr.	*End of 2006 b.kr.*	*Increase b.kr.*	*Increase %*
Total lending	1,981	2,924	943	48
Domestic lending	1,490	2,120	630	42
Corporates	1,042	1,522	480	46
Households	420	538	118	28
Foreign lending	491	804	313	64

Parent companies of the three largest commercial banks.

Source: Financial Supervisory Authority (FME).

rule, the commercial banks' mortgage loans are CPI-indexed with a fixed interest rate and a maturity of up to 40 years. So far, the banks have only matched part of their mortgage lending with funding of a similar profile. Thus their fixed interest risk has increased, after being virtually non-existent before 2004. According to data from the FME, the largest commercial banks could have lost 33 b.kr. if market interest rates had risen by 1%, based on their lending book positions at the end of 2006. Measured as a proportion of own funds, the banks' fixed interest risk was 3.6% at the end of 2006, compared with 5% at the end of 2005. In proportional terms, then, their fixed interest risk has diminished year-on-year.

Ongoing growth in foreign currency-denominated lending ...

The outstanding stock of foreign currency-denominated loans by parent commercial banks at the end of 2006 stood at 1,789 b.kr., an increase of 680 b.kr. (61%) year-on-year. Some 57% of foreign

Table 8 Loan-to-value ratio in commercial banks' mortgage lending

	End of 2006 %
LTV ratio 0-50%	20
LTV ratio 50-70%	22
LTV ratio 70-90%	34
LTV ratio 90-100%	8
LTV ratio over 100%	8
LTV ratio unknown	8

Parent companies of the commercial banks.

Source: Financial Supervisory Authority (FME).

currency-denominated lending was to Icelandic residents, broadly unchanged year-on-year. The overwhelming majority of foreign currency-denominated lending to residents is to businesses, which account for 92%, while 6% is to the household sector but has risen from the year before. Foreign currency-denominated lending to households grew by 35 b.kr. (140%) in 2006. Since households generally do not have income in foreign currency, it could be questionable for them to assume debt in other currencies than the króna. Foreign currency-denominated lending by parent commercial banks to non-residents continued to grow in 2006 to 771 b.kr. at the end of the year, an increase of 62% year-on-year.

Table 9 Commercial bank foreign currency-denominated lending

	End of 2005 b.kr.	*End of 2006 b.kr.*	*Increase b.kr.*	*Increase %*
Total foreign currency-denominated lending	1,109	1,789	680	61
Domestic lending	634	1,018	384	61
Corporates	597	936	340	57
Households	25	60	35	140
Foreign lending	474	771	296	62

Parent companies of the three largest commercial banks.

Source: Central Bank of Iceland.

... but the largest share is borrowed by currency earners

The bulk of foreign currency-denominated lending is to borrowers with sizeable incomes in foreign currency.[14] Thus 39% of foreign currency-denominated lending at the end of 2006 was to non-residents, 25% to residents with more than 2/3 of their total revenues in foreign currency and 15% with between 1/3 and 2/3 of their total revenues in foreign currency. This left 21% of lending to residents who earned less than 1/3 of their total revenues in foreign currency.[15] One-third of that group had no income in foreign currency. The share of foreign currency-denominated lending to the borrower group that is most susceptible to a possible depreciation of the króna therefore decreased year-on-year.[16]

Table 10 Foreign currency-denominated lending

Foreign currency income or residence	*End of 2005 %*	*End of 2006 %*
Foreign currency income <33% of total income, or none	29	21
Foreign currency income 33% to 67% of total income	6	15
Foreign currency income >67% of total income	24	25
Foreign currency-denominated lending to non-residents	41	39
Total	100	100

Foreign currency-denominated lending and derivatives. Parent companies of the three largest commercial banks.

Source: Central Bank of Iceland.

14 Foreign currency-denominated lending and derivatives. Parent companies.

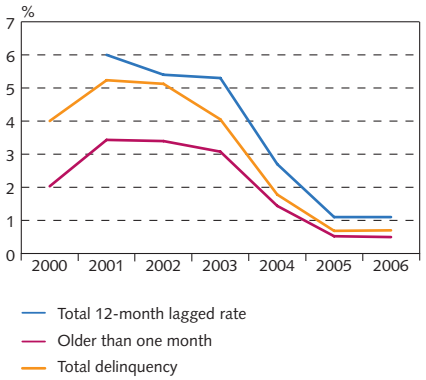
15. This category includes businesses with a strong enough market position to be able to pass on to prices the extra cost resulting from a depreciation of the króna.

16. Ignoring the possibility that borrowers may hedge against currency fluctuations with derivatives.

Delinquency rate stays at a historical low

According to data from the FME, the delinquency rate[17] on lending by the commercial banks at the end of 2006 was 0.7%, unchanged over the year. This is the lowest delinquency rate recorded since regular compilation of data on arrears began at the end of 2000. However, the nominal amount of customers' total arrears with commercial banks increased year-on-year at the end of 2006 to 21 b.kr., from 14 b.kr.[18] Total arrears thus increased by 7 b.kr., or 50%, in the space of a year. Classified by duration, the longest and thereby most serious arrears accounted for 19% of total delinquency at the end of 2006 and were down from the year before. Since new lending is unlikely to end up in arrears immediately, the lagged delinquency rate[19] is considered to give a more representative picture of the trend. Measured in these terms, arrears have also been trending downwards to 1.1% at the end of 2006. Lower ratios of delinquency go hand in hand with the favourable economic climate for businesses and households. Business profitability was strong last year, the employment situation was exceptionally robust and real disposable income increased.

Chart 6
Delinquency rate 2000-2006[1]

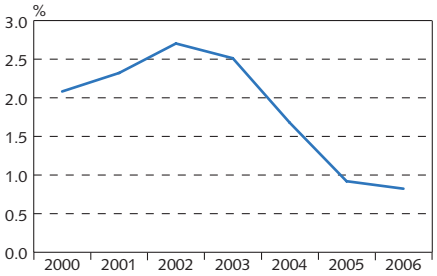


1. Commercial banks' parent companies
Source: Financial Supervisory Authority (FME).

Record low ratio of credit loss allowance accounts

The combined credit loss allowance account of the largest commercial banks amounted to 46 b.kr. at the end of 2006, an increase of 11 b.kr. (31%) from 35 b.kr. at the beginning of the year. Although they increased in nominal terms, credit loss allowance accounts have shrunk relative to lending growth. As a proportion of total outstanding loan stock, the largest commercial banks' credit loss allowance accounts stood at 0.8% at the end of 2006, the lowest ratio ever. They were in the range 2.1-2.7% over the period 2000-2003. Low levels of delinquency are the main explanation for the low position of credit loss allowance accounts.

Chart 7
Credit loss allowance accounts 2000-2006[1]
Ratio of total outstanding lending to customers



1. Largest commercial banks' consolidated accounts.
Sources: Commercial banks' annual reports, Central Bank calculations.

Leveraged stock purchases

Lending by the largest commercial bank groups against share collateral amounted to 674 b.kr. at the end of 2006, or 12% of their total lending to customers, according to FME data. Some 93% of lending against share collateral had more than 100% margining and 63% more than 150% margining.[20] This means that the banks have considerable leeway for meeting a drop in equity prices. The bulk of leveraging (59%) involves equities listed on OMX Nordic Echange in Iceland. At the end of 2006, the equivalent of 29% of market capitalisation of listed equities on OMX in Iceland was used as collateral. The above implies that equity investments on OMX in Iceland are being leveraged on a sizeable scale, which could be questionable when share prices fall.

17. Total arrears as a proportion of outstanding loans, including provisions for impairment. Parent companies.
18. Arrears generally decrease in the fourth quarter, due to final write-offs. Arrears within the year may therefore easily exceed the end-of-year figure.
19. Total arrears as a proportion of outstanding loans one year before, including provisions for impairment. Parent companies.
20. Margining indicates the market value of equity collateral for loans in proportion to the loans secured by it. A margining level above 100% indicates that the market value of the shares exceeds that of the loan they secure.

Box 3

Transactions by banks with major shareholders and senior executives

Ownership of Icelandic banks has become more concentrated in recent years and large shareholdings have become prominent. In some cases, large shareholders are also clients of the banks concerned or their investment partners. Iceland's financial legislation imposes no restrictions on facilities granted to such parties or financial company executives, over and above those applying to customers in general, for example rules on large exposures. This entails certain risks and it is the role of the Financial Supervisory Authority (FME) to ensure that certain principles concerning equality, conflicts of interests and eligibility are adhered to. The FME has strongly emphasised this aspect of its supervisory role, as discussed in its Annual Report for 2006.

Risks

The potential risks involved in concentrated ownership and business relations are primarily the following:

- Owners enjoy easier access than non-related parties to loan capital or favourable credit terms.
- Owners enjoy greater understanding than non-related parties concerning guarantees or measures in the event of default.
- Investment projects involving owners are not subject to the same scrutiny as projects involving non-related parties.
- Owners receive information on the operations, trading conditions or future policies of customers (or companies) which may be their (or their subsidiaries/associates') competitors in a specific area. Owners also have access to comparable information about the financial company itself.
- Reputation risk, if a foreign rating agency or investors are of the opinion that supervision of these risks is inadequate.

Remedies

The remedies proposed by the legislature in order to avoid the detrimental effects of concentrated ownership and prevent these risks from becoming actual threats are primarily as follows:

- Applications for the acquisition of qualifying holdings in financial undertakings, i.e. 10% or more, must be made to the FME. This is followed by an assessment as to whether the holding may in any way weaken the sound and solid operations of the undertaking. Approvals may be conditional or unconditional.
- The FME monitors eligibility rules, i.e. on the general eligibility of board members and senior executives and also their specific eligibility to handle individual cases. To this end, an eligibility test is performed when such parties assume posts with financial companies, in addition to ongoing supervision of eligibility.
- Large exposures are monitored. Regulations stipulate that no individual or affiliated parties enjoy credit facilities amounting to more than 25% of a credit undertaking's equity.
- Under recent legislation aimed at transposing Basel II, the FME's remit to estimate specific operational risks and their impact on corporate capital requirements has been widened. It is under consideration to view the increased risk that may be entailed by financial company ownership in this context.
- Finally, specific prudential rules apply to ownership links between financially related companies. In such cases, the shareholding is deducted from the equity when calculating minimum equity. Provisions on the above are specified in FME guidelines No. 4/2006.

In addition to the above, the FME ensures that advances to affiliated parties are based on the arm's length principle, i.e. on the same terms as available to comparable non-related parties. The FME monitors this on the basis of the financial companies' own reporting. Furthermore, the FME recommends that external auditors examine such advances, compare them with similar transactions by other customers and present a reasoned opinion on whether the arm's length principle has been observed.

Source: Financial Supervisory Authority (FME).

Decline in ratio of large exposures

According to FME data, total large exposures[21] of the largest commercial banks amounted to 547 b.kr. at end-2006, the equivalent of 59% of their combined own funds. Between them, the banks had 17 large exposures at the end of 2006. By comparison, total large exposures at the end of 2005 numbered 16 and their value was 377 b.kr., or 76% of own funds. It should be remembered that the swelling of commercial banks' capital in 2006 has naturally reduced their number of large exposures. Since the total amount of large exposures has grown by 170 b.kr. year-on-year, and their number has increased by one, it can be inferred that the largest exposures have been augmented year-on-year. However, the reduction in the ratio of large exposures to capital between the years is an important consideration from the perspective of financial stability.

Marketable securities and foreign currency

Increase in marketable securities portfolios

The largest commercial banks' total marketable securities portfolios, derivatives and shareholdings amounted to 1,489 b.kr. at the end of 2006, an increase of 350 b.kr., or 31% year-on-year. The bulk of the marketable securities portfolio is in the form of bonds.

Growth in foreign exchange positions

Market and currency risk of the largest commercial banks, measured according to FME rules on capital adequacy of financial undertakings, amounted to 753 b.kr. at the end of 2006 and grew by 253 b.kr. year-on-year. As before, equity exposures were the main item in the risk base.[22] The equity risk base stood at 275 b.kr. at the end of 2006, but rose by only 4% over the year. The bond risk base increased somewhat over 2006 to 239 b.kr. at the end of the year, which must be viewed to some extent in the context of the banks' strong liquidity position then. The largest banks boosted their foreign exchange

21. An exposure (lending, securities holding, share, guarantee granted, etc.) incurred by a financial undertaking to a client or a group of connected clients, the value of which amounts to 10% or more of the own funds of the undertaking.

22. Risk base represents the risk connected with a company's exposure in a given financial instrument, due to conceivable changes in its value.

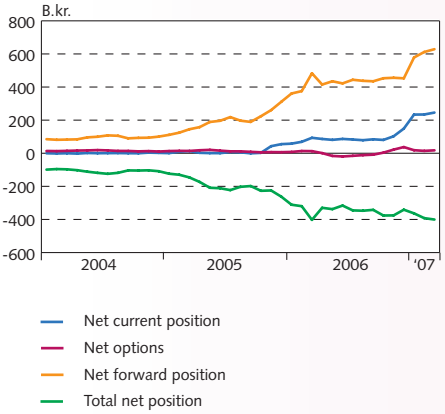
Box 4

The development of credit institutions' foreign exchange balances

Chart 1

Foreign exchange balance of credit institutions[1]

January 2004 - March 2007

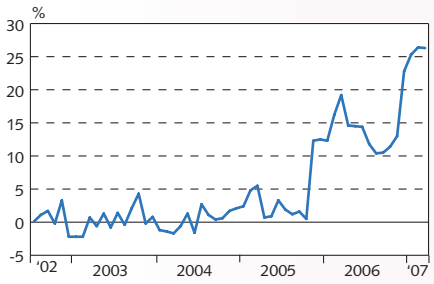


1. Three largest commercial banks.
Source: Central Bank of Iceland.

Chart 2

Foreign exchange balance of credit institutions[1]

July 2002 - March 2007, as % of equity capital



1. Three largest commercial banks.
Source: Central Bank of Iceland.

Rules on credit institutions' foreign exchange balances[1]

Credit institutions' foreign exchange balance may be defined as the difference between their foreign currency-denominated assets and liabilities, on and off the balance sheet. It is therefore a measure of an institution's currency risk. The Central Bank of Iceland has set rules on credit institutions' foreign exchange balance since 1984. At first they were not permitted to have a negative foreign exchange balance. The rules regulating foreign exchange balance were amended in 1993 when trading opened in the FX market and provisions were introduced stipulating permissible net foreign exchange imbalances.

The rules aim to restrict currency risk by preventing the net foreign position from exceeding specific limits. Initially, the maximum permissible net foreign exposure for a bank was 20% of its equity. When the rules were revised in 1997 the balance was changed to 30% of equity according to the last financial statements, and this maximum is still in effect. The current rules date from May 2006.[2]

Watershed in autumn 2005

Until 2005, the banks' net foreign-denominated assets and liabilities were generally in broad balance – never more than 5 b.kr. long or short.[3] This changed in autumn 2005 when the banks abandoned their policy of maintaining balance and began to build up positive exposures. From October to November 2005, the combined net foreign assets of the three largest commercial banks soared from 0.5% to 12.3% of equity. In terms of end-of-month figures, the increase amounted to 52 b.kr. This pattern continued and by March 2006 their net foreign position was equivalent to 19.2% of equity.[4]

Separate positive foreign exchange balance allowed

The financial markets have undergone massive changes in recent years. Since becoming fully privatised in 2003, the commercial banks have expanded their operations exponentially. The lion's share of growth has been outside Iceland, where banks have both established branches and acquired foreign subsidiaries. Swelling foreign assets have left the banks' capital adequacy ratios more exposed to changes in the exchange rate.

Under Central Bank rules on foreign exchange balance, the Financial Supervisory Authority (FME) may permit institutions to exclude certain items from calculations of the foreign exchange balance, namely exposures made specifically to hedge against the adverse impact of changes in the exchange rate of a currency on its capital adequacy ratio, and shareholdings in subsidiaries which have been deducted from equity capital calculations. This authorisation was refined in spring 2006 to allow financial institutions to maintain a separate positive foreign position outside their total foreign balance as a hedge against the effect of exchange rate movements on their capital adequacy ratios. These changes entered into force as of May 1, 2006.

1. The rules apply to credit institutions subject to minimum reserve requirements and to other parties authorised to act as intermediaries in foreign exchange transactions. Minimum reserve requirements apply to commercial banks and savings banks, credit undertakings which are authorised by law to accept deposits from the public for custody and investment, and financial undertakings operating on the basis of Article 4, Point 3 of Act No. 161/2002, and which are not bound by the provisions of specific laws or of the Treasury budget at any time with respect to the procurement of funds for their activities.
2. The prudential regulation on foreign exchange balance is discussed in more detail in the Appendix on p. 81.
3. Based on monthly average.
4. Banks benefited from their positive foreign exchange position in spring 2006 when the króna depreciated by almost 20% over the two months from February 21 to April 21.

The Central Bank has authorised two credit institutions to maintain a separate positive foreign balance, and net foreign assets have increased as a result. Combined net foreign assets of the three largest banks leapt by more than 81 b.kr. from 13% to 22.8% of equity from November to December 2006. It should be pointed out that Kaupthing made a 55 b.kr. equity offering over this period, targeted at foreign investors. At the end of 2006, the three largest banks' combined net foreign assets stood at 188.5 b.kr. and they have continued to grow in 2007.

positions sharply in 2006. The currency risk base amounted to 194 b.kr. at the end of 2006, up by 143 b.kr. (276%) from the preceding year. Until recent years, the banks faced little exposure to currency risk. A large part of the increase in reserves now is due to hedging by banks against the impact of exchange rate movements on their equity and capital adequacy ratios. The development of the banks' foreign exchange balance is discussed in Box 4 on p. 54.

Lower ratio of equity exposure at own risk

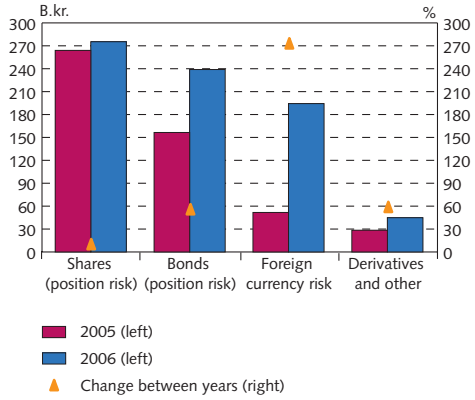
As a result of derivative contracts with their clients, the largest commercial banks' market risk on equity exposures is not the same as their book value. Book value of equities amounted to 422 b.kr. at the end of 2006 but after adjustment for derivatives, their equity exposure at own risk was 246 b.kr.[23] The banks' stock of equities at own risk grew by 44 b.kr., but declined as a proportion of own funds. Equities at own risk as a proportion of own funds amounted to 27% at the end of 2006, compared with 41% a year before.

Equity derivative contracts

The most common term for equity derivative contracts is 3-6 months, which is often extendable. Derivative contracts reduce the banks' market risk from holding the equities, which in most respects is comparable to an loan secured with collateral in shares. Thus the banks' risk may be underestimated in the event of default on a derivative contract following a fall in the price of the underlying equities. According to FME data, the commercial bank groups' forward contracts with equities as collateral amounted to 139 b.kr. at the end of 2006. Some 69% of forward contracts had more than 100% margining and 20% more than 150% margining.[24] This means that the banks have considerable leeway for meeting a drop in equity prices. The bulk of leveraging (60%) in forward contracts is in equities listed on OMX Nordic Exchange in Iceland. Growth of equity derivative contracts may have been one of the drivers of higher share prices in recent years. By the same token, a contraction in derivative trades may cause downward pressure on prices.

Chart 8

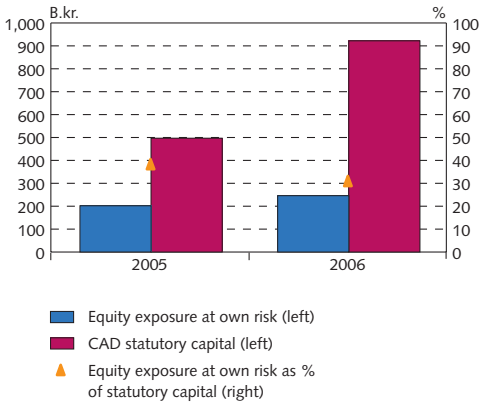
Market and foreign currency risk 2005 and 2006[1]



1. Risk according to risk weight base in capital adequacy rules. Largest commercial banks' consolidated accounts.
Source: Financial Supervisory Authority (FME).

Chart 9

Equity exposure 2005 and 2006[1]

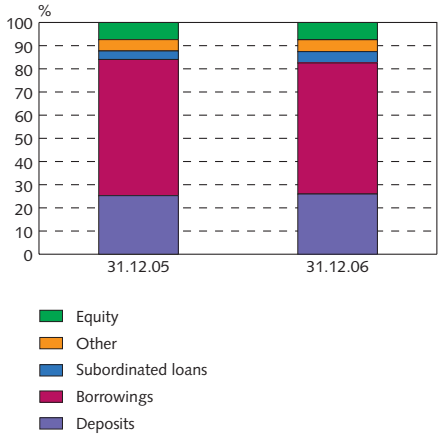


1. Three largest commercial banks' consolidated accounts.
Sources: Commercial banks' annual reports, Central Bank calculations.

23. Equities included among trading assets and financial assets designated at fair value under IFRS. Excluding the banks' holdings in associates owning shares in listed and unlisted companies.

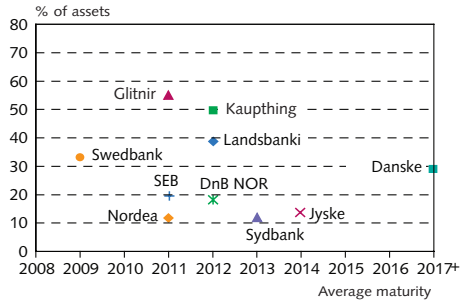
24. Margining indicates the market value of equity collateral for forward contracts in proportion to the forward contracts with equities. A margining level above 100% indicates that the market value of the shares exceeds that of the forward contract they secure.

Chart 10
Composition of funding 2006[1]



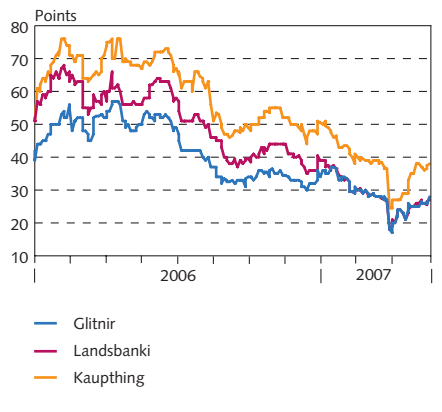
1. Largest commercial banks' consolidated accounts.
Sources: Commercial banks' annual reports, Central Bank calculations.

Chart 11
Nordic banks' funding
Market borrowings with regard to total assets and average maturity[1]



1. Average maturity for Danske Bank is 2020.
Sources: Commercial banks' annual reports, Bloomberg.

Chart 12
Credit default swaps
May 2006 - March 2007



Source: GFI Group.

Financing

Composition of financing

The financing requirement of the largest commercial bank groups continued to grow in 2006 in pace with their swelling balance sheets. The banks' main channel for financing is borrowing, including securities issuance. At the end of 2006, 57% of the banks' assets were financed with borrowing, compared with 59% at the end of 2005. In particular, the lower ratio is explained by an increase in subordinated debt.[25]

Hefty securities issuance in other currencies

At the end of 2006, borrowing by the largest commercial bank groups amounted to 4,793 b.kr., of which securities issues accounted for 4,034 b.kr. Securities issuance increased by 1,231 b.kr., or 44%, year-on-year. Securities issuance by the parent banks grew by 1,079 b.kr. (55%) over the same period. At the end of 2006, 94% of securities issued by parent companies were denominated in foreign currency. An even higher ratio may be expected with the inclusion of activities of foreign subsidiaries in the consolidated accounts.

Large majority of debt instruments listed

Most of the largest commercial banks' borrowing is made in the markets. At the end of 2006, debt instruments of the three commercial banks amounting to 4,061 b.kr. were listed on markets, or 78% of their total borrowing and subordinated debt. Only 3.6% of listed instruments were denominated in Icelandic currency. Compared with a sample of Nordic banks, the Icelandic banks have a higher ratio of listed issues to total assets, but a similar average residual maturity. The Icelandic banks' borrowing as a ratio of total assets decreased year-on-year, but they still rely much more heavily on financing in the market than the other Nordic banks.

At the end of 2006, the largest commercial banks had 1,026 b.kr. of listed debt maturing in 2007 and 587 b.kr. in 2008. Thus the banks will need to refinance or repay 1,613 b.kr. by the end of 2008, the equivalent of 40% of their listed debt instruments. Part of the refinancing will devolve upon their foreign subsidiaries.[26] By the end of 2006, the banks had completed their refinancing arrangements for 2007.

Much sharper focus on deposits

Total deposits with the largest commercial banks amounted to 2,202 b.kr. at the end of 2006, an increase of 61% year-on-year. As a proportion of total liabilities, however, deposits increased only marginally to 28%. In the recent term, the banks have given a much sharper focus to deposit-taking and have made good progress, especially outside Iceland. However, as a result of their rapid expansion, the ratio of deposits to total liabilities and lending for the banks as a

25. In the banks' accounts, borrowing comprises securities issuance and other borrowing (excluding subordinated debt). Securities issuance is divided into bonds and bills.

26. A negligible part of the refinancing requirement is extendable.

whole has remained virtually stagnant, even though the volume has surged. Some agencies that rate the commercial banks have pointed to the low share of deposits in their total financing. Ongoing growth of deposits and a larger share for them in total funding will underpin the banks' ratings.

Liquidity position was well in line with rules

The liquidity position of financial companies, measured according to the Central Bank's liquidity rules, was easy last year.[27] Liquid asset growth outstripped the increase in liquid liabilities over the year, driving up the end-of-year liquidity ratio. At end-2006, weighted net liquid assets of financial companies in the time belt 0-3 months tripled to 1,685 b.kr. with a year-on-year increase of 1,121 b.kr. Central Bank rules set a minimum liquidity ratio of 1, i.e. weighted net liquid assets one month and three months ahead shall be equal to or exceed net liquid liabilities. This ratio has been above 2 since the middle of 2006 but was 1.5 at the end of 2005. On the liquid asset side, claims on foreign credit institutions grew by 201% and marketable securities by 87%, while securities issuance increased by 109% on the liquid liabilities side. Net liquid assets at the end of 2006 were almost entirely denominated in foreign currencies, amounting to 1,567 b.kr., or 98% of the total. Virtually all the liquidity is therefore in the form of foreign currency.

Besides compliance with the Central Bank limits, the commercial banks have also set in-house rules aimed at enabling them to cover liabilities maturing within one year without resorting to market capital.

Large issuance of subordinated debt

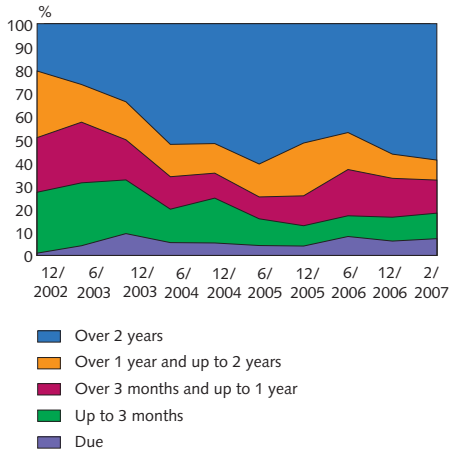
The largest commercial banks' equity swelled in 2006, increasing by 230 b.kr. (57%) to 630 b.kr. at the end of the year. Market value of total new issues of capital by the commercial banks amounted to 77 b.kr. in 2006. The bulk of new capital, 56 b.kr., was procured by Kaupthing, while Glitnir also made an issue with a market value of 21 b.kr. There has been a large increase in the commercial banks' subordinated debt in the recent term. Rapidly expanding balance sheets have called for more capital, and subordinated debt that meets certain conditions is considered the equivalent of capital under law. At the end of 2006, subordinated debt of the largest commercial banks stood at 415 b.kr., an increase of 216 b.kr., or more than double, from the previous year. Around two-thirds of the additional subordinated debt issued last year was classified as Tier II capital for calculation of mandatory capital adequacy.

Highest capital adequacy ratio since rules were set

As defined under FME rules, the capital adequacy ratio (solvency ratio) of the largest commercial banks was 15% at the end of 2006, the highest ratio since the rules were introduced in 1992. The Tier

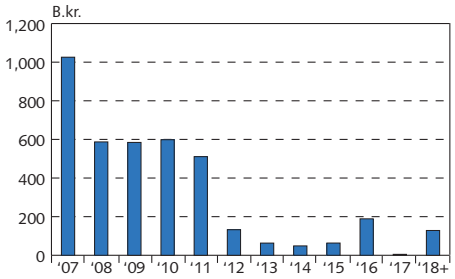
27. Central Bank of Iceland Rules on Liquidity Ratio apply to credit institutions subject to minimum reserve requirements. See the Central Bank of Iceland website, www.sedlabanki.is

Chart 13
Proportion of claims by foreign entities, by maturity[1]
Commercial banks' parent companies



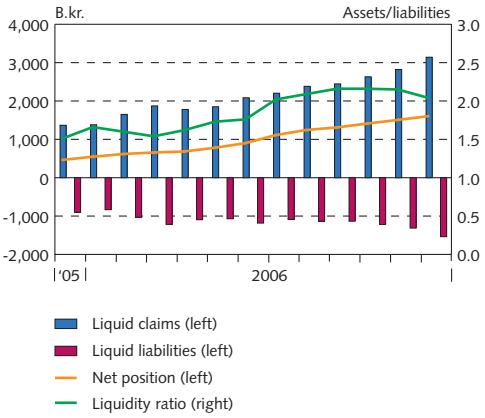
1. Residual maturity not original maturity.
Source: Central Bank of Iceland.

Chart 14
Maturity profile of market funding[1]
End of year, 2006



1. Largest commercial banks' consolidated accounts.
Source: Bloomberg.

Chart 15
Credit institutions' liquidity position 2006[1]
0-3 month



1. According to Central Bank rules on liquidity.
Source: Central Bank of Iceland.

Box 5

New capital standards

New international capital standards for financial companies took effect at the beginning of 2007. They are based on the Basel Committee on Banking Supervision's Revised International Capital Framework (Basel II), which was first published in June 2004 and revised in November 2005. Basel II replaces an earlier Capital Accord originally dating to 1988. The aim of Basel II is convergence of the regulatory framework governing the capital adequacy of internationally active banks.

The new framework has been adopted in the European Economic Area with amendments to Directives No. 2000/12/EC (now 2006/48/EU) and 93/6/EU (now 2006/49/EU). The former was transposed into Icelandic law with Act No. 161/2002 and rules were set under its provisions. In December 2006, Act No. 170/2006 transposed the amendments to these Directives, and current laws and rules were amended correspondingly. Under the new legislation, financial companies may defer calculation of capital adequacy ratios and risk base according to the new rules until January 1, 2008, and retain the corresponding provisions in force at the end of 2006. Two-thirds of financial companies in Iceland – primarily smaller ones accounting for 5% of total assets of financial companies – intend to take advantage of the deferral clause.

In future, financial companies will have a choice of approaches for calculating risk-weighted capital requirements. They can choose between a standard approach and one of two internal-based (IRB) approaches. Use of the IRB approach is subject to permission from the Financial Supervisory Authority (FME), which will also monitor compliance with the requirements. The standard approach resembles the traditional method for calculating capital adequacy and the overwhelming majority of financial companies, in terms of numbers, will probably opt for it. IRB makes more stringent and costly requirements and only the largest financial companies are expected to request authorisation. Two banks – Kaupthing and Glitnir – have already applied for permission.

On March 2, 2007, the FME set new rules on capital adequacy and risk base of financial undertakings, No. 215/2007, and new rules on large exposures of financial undertakings, No. 216/2007, based on the EU Directives. A provisional clause in Act No. 170/2006 authorises the FME to refer to Annexes to the Directives as published in the Official Journal of the European Union. The new capital adequacy rules extend to credit risk as well as market and operating risk.

In April 2007, the FME issued guidelines to promote a common framework for supervisory disclosure, which relate to Pillar II of Basel II. At the same time, the FME issued guidelines for rules on stress testing, management of concentration risk and management of interest rate risk arising from non-trading activities. All these rules have been set by Committee of European Banking Supervisors (CEBS) and are expected to be incorporated into the FME's own guidelines. Pillar II also makes a financial undertaking's management responsible for setting capital targets that are commensurate with its risk profile and control environment. The target should be equal to or higher than the general requirement to hold total capital equivalent to at least 8% of risk-weighted assets. Other requirements under Pillar II relate to routines and processes as well as internal audit of risk management systems and control processes.

Pillar III makes requirements for disclosure of risk profiles to market participants, in order to impose market discipline and facilitate investors in comparing financial undertakings.

Source: Financial Supervisory Authority (FME).

I capital adequacy ratio was 11.2% at the end of 2006. It can only be said that the capital position of the commercial banks is sound. A strong equity position and ample liquidity are important preconditions for financial stability.

Largest savings banks[28]

Savings banks are small in comparison with the commercial banks. Their assets correspond to less than one-tenth of the largest commercial banks' assets. Nonetheless, savings banks play an important competitive role in the domestic market.

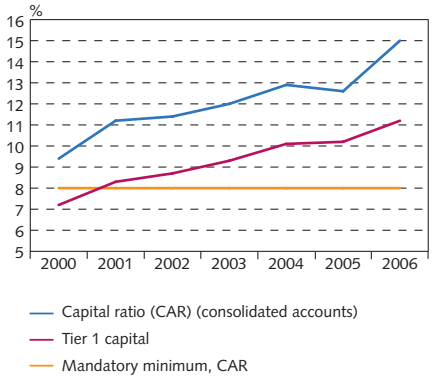
Massive trading gains on equities

The largest savings banks returned an exceptionally strong performance in 2006. Their combined return on equity reached 52%, compared with 39% in 2005. Much of this strong profitability can be attributed to trading gains on equities, which accounted for around 60% of net operating income for the largest savings banks.[29] In recent years, interest income has been decreasing as a proportion of the largest savings banks' net operating income. This trend continued in 2006 and – partly due to increased mortgage lending – their interest margin narrowed as well, falling to 1.9%, the same as for the commercial banks. The declining weight of interest income is surely a cause of some concern to the savings banks, because experience shows that other income, especially trading gains on financial activities, is volatile. Although position-taking in securities may form part of the savings banks' investment banking activities, it would be imprudent to assume that trading gains will always be positive. For example, if the savings banks had shown zero trading gains in 2006, their profit before tax could have been 8% instead of 62%.[30] In other words, without their trading gains, the savings banks' performance would have been unsatisfactory in 2006.

Low impairment provisioning

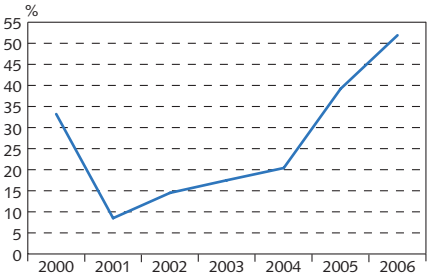
Impairment provisioning of the largest savings banks declined year-on-year in spite of soaring lending growth. Provisions amounted to 1.1 b.kr. in 2006, but were 1.4 b.kr. the previous year. At 19%, provisioning as a ratio of net interest income was at the lowest level for many years. A reduction in delinquency reduced the need for impairment provisioning in 2006, but the savings banks' provisioning as a ratio of net interest income is somewhat higher than that of the commercial banks.

Chart 16
Capital ratio 2000-2006[1]



1. Largest commercial banks' consolidated accounts.
Sources: Commercial banks' annual reports, Central Bank calculations.

Chart 17
Return on equity 2000-2006[1]



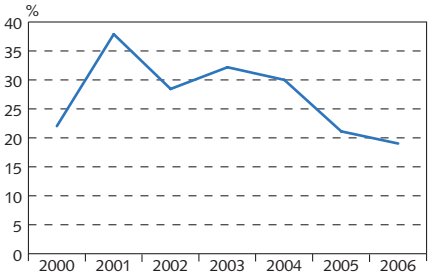
1. Largest savings banks' consolidated accounts.
Sources: Largest savings banks' annual reports, Central Bank calculations.

28. The largest savings banks are Sparisjóður Reykjavíkur og nágrennis (SPRON), BYR-sparisjóður (created by the merger of Sparisjóður Hafnarfjarðar and Sparisjóður vélstjóra), Sparisjóðurinn í Keflavík, Sparisjóður Mýrasýslu and Sparisjóður Kópavogs. Figures are consolidated unless otherwise stated. Discussion of the aggregate position may diverge from that of individual savings banks. SPRON, BYR-sparisjóður and Sparisjóður Kópavogs present their accounts based on IFRS principles.

39. Some savings banks are shareholders in Exista financial services company, which generated large trading gains in 2006. Exista operates in the insurance, leasing and investment sectors with brands including VÍS and Lýsing. Exista is also a core investor in several of Iceland's largest companies, including Kaupthing Bank, Bakkavör Group and Iceland Telecom.

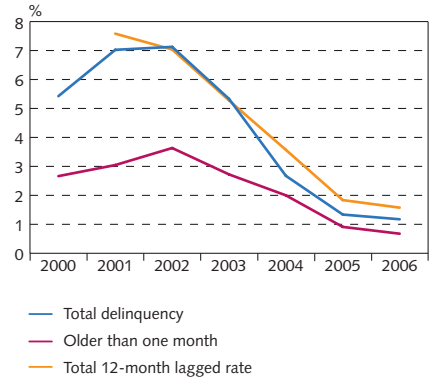
30. A simplified assumption, based on other income and expenses remaining unchanged.

Chart 18
Impairment of loans 2000 - 2006[1]
Provisions as a ratio of net interest income



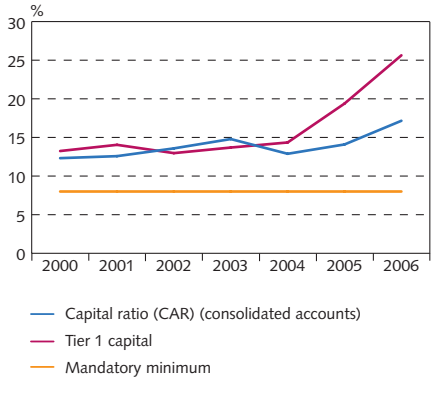
1. Largest savings banks' consolidated accounts.
Sources: Largest savings banks' annual reports, Central Bank calculations.

Chart 19
Delinquency rate 2000-2006[1]



1. Largest savings banks' parent companies.
Source: Financial Supervisory Authority (FME).

Chart 20
Capital ratio 2000-2006[1]



1. Largest savings banks' consolidated accounts.
Sources: Largest savings banks' annual reports, Central Bank calculations.

Growth in lending and market securities portfolios

Lending by savings banks[31] at the end of 2006 amounted to 299 b.kr., an increase of 35% year-on-year. Domestic borrowers accounted for 286 b.kr. of the total outstanding loan stock at end-2006 (an increase of 36%) and foreign borrowers 13 b.kr. The lion's share of domestic lending is CPI-indexed, including mortgage loans to households. If it generates adequate returns, and if moderate loan-to-value ratios are maintained and fixed interest rate risk is kept to a minimum, increased mortgage lending should strengthen the savings banks' position, because experience shows that delinquency and impairment of such loans is generally low. Substantial growth was shown in 2006 on the savings banks' portfolios of marketable securities, which grew by 44 b.kr. year-on-year to 87 b.kr. at the end of the year.[32] Domestic equities account for the bulk of their marketable securities portfolios.

Low delinquency and credit loss allowance accounts

According to data from the FME, the delinquency rate[33] on lending by the largest savings banks at the end of 2006 was 1.2%, virtually unchanged from a year earlier. This is the lowest delinquency rate recorded since regular compilation of data on arrears began at the end of 2000. Nonetheless, the customer delinquency rate is higher for savings banks than for the commercial banks. Lower ratios of delinquency go hand in hand with the favourable economic climate for businesses and households. Alongside low delinquency, credit loss allowance accounts shrank sharply relative to lending growth. As a proportion of total outstanding loan stock, the largest savings banks' credit loss allowance accounts stood at 1.2% at the end of 2006, the lowest ratio ever. Low levels of delinquency warrant smaller credit loss allowance accounts. However, sharp lending growth in recent times may be seen as conducive to increased loan losses later.

Diminishing share of deposits

Unlike the commercial banks, the savings banks largely procure their finance in the domestic market. The largest single component of their funding is deposits, although the share has been declining in recent years. At the end of 2006, deposits with savings banks amounted to 190 b.kr., which was 39% of their funding.[34]

Capital adequacy and holdings in other financial companies

As defined under FME rules, the capital adequacy ratio (solvency ratio) of the largest savings banks was 17.2% at the end of 2006. The Tier I capital adequacy ratio was 25.6%. The main explanation for the discrepancy between the two capital ratios in recent years has been that several of the largest savings banks own substantial holdings in

31. Parent companies of the savings banks and Icebank.
32. Parent companies of the savings banks and Icebank.
33. Total arrears as a proportion of outstanding loans, including provisions for impairment. Parent companies.
34. Parent companies of the savings banks and Icebank.

other financial companies which are deducted from their own capital when the solvency ratio is calculated. Because of the high equity ratio of the largest savings bank, SPRON, the savings banks' capital adequacy ratios are higher than those of the commercial banks.

Appendix 1

Estimating the commercial banks' loan portfolio quality

Credit risk is a major risk in banking operations. Consequently, it is important to monitor the development of the largest banks' loan portfolios and assess their resilience towards impairment. This paper describes an assessment of the loan portfolios of Iceland's largest commercial banks. The aim was to develop a simple but functional model of the banks' credit risk. Their expected credit loss was estimated using information on the geographical and sectoral distribution of their loan portfolios. Although expected default frequency is much higher in Iceland than elsewhere in Europe, the outcomes of these estimates indicate that the banks have adequate buffers for meeting expected impairment. Further development of the model will focus on assessments of the banks' capital requirement and design of stress tests to estimate their resilience to economic shocks.

Financial Stability 2006 included an estimation of the banks' potential credit losses on lending to households and its effect on their balance sheets. Their resilience to serious economic shocks was assessed and a stress test performed using the results of a simple regression analysis. On the basis of the findings it was considered safe to conclude that the equity position of Iceland's commercial banks was strong enough to be resilient towards a significant economic shock in the form of a large fall in real asset prices, increased unemployment and a decline in disposable income.

The following study estimated the banks' total impairment and used other methodologies to estimate potential loan losses. Unlike the 2006 study, losses on lending to households were not estimated. It was largely modelled on a Sveriges Riksbank study of the credit risk of the four largest banks in Sweden.[1] Initially it was planned to follow Riksbank in using only official published data, i.e. from the banks' annual reports. In the end a different approach was opted for and it was decided to request certain additional unpublished information from the banks.[2] In their annual reports, the banks publish a geographical breakdown of lending based on either the location of their offices and subsidiaries, or of their customers. The latter disaggregation was used for this study. Banks were also asked to disaggregate sectoral information by country and provide a breakdown into nominal and indexed lending.

Uncertainty always surrounds estimates based on such data. The banks have more comprehensive data on their individual loans and can evaluate the risk of each one, and thereby the portfolio as a whole, far more accurately than can be done in such a study. The aim was to

1. See Sveriges Riksbank (2006), pp. 75-88.
2. Iceland's largest commercial banks are Kaupthing Bank, Glitnir and Landsbanki.

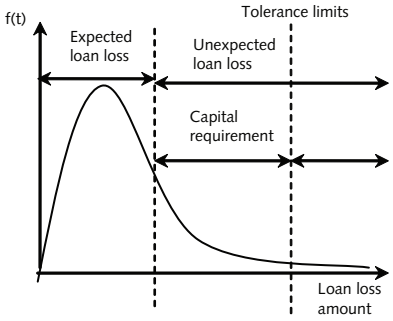
produce a broad simulation of the risk profile of the banks' loan portfolios, based on data about borrowers, then to estimate their potential impairment and perform a stress test on the basis of it.

The following study begins with an explanation of expected loan loss and how it can be calculated. Data collection is described along with the compilation methodology for individual data sets. Next comes a discussion of the geographical and sectoral breakdown of the banks' loan portfolios. The findings of these estimations are presented and compared with the banks' own assessments in their annual reports. Finally, the development of expected loan losses is examined using a number of different assumptions.

Expected and unexpected loan losses

Loan loss is a loss incurred by a creditor on default by the borrower.[3] The distribution of a banks' loan losses indicates the risk profile of the loan portfolio. Chart 1 shows loan loss distribution. Banks always assume that a certain proportion of credit will be lost, and estimate their expected loan loss. They compensate themselves for the expected loss with a risk premium on the price of loans. However, the actual loss can be much greater. Banks set a tolerance level on the basis of how much of possible total loan losses they can cover with their capital. The greater the difference between expected losses and the tolerance level, the greater the banks' capital requirement (see Chart 1).

Chart 1
Distribution of loan losses



f(t): Probability density function

Estimate of expected loan losses

With data on the banks' loan portfolio, expected default frequency and expected recovery rate, expected loan losses can be estimated as follows:

(1) $ELL = NVD \times EDF \times (1 - ERR)$

Where *ELL* is expected loan loss one year ahead, *NVD* is nominal value of debt,[4] *EDF* is expected default frequency and *ERR* expected recovery rate.

EDF reflects the probability of default within a given period. Moody's and Lánstraust (the Icelandic member of Creditinfo Group) have designed a model to estimate EDF of companies within one year.[5] A geographical and sectoral breakdown of EDF in the banks' portfolios was obtained from the Moody's database for non-resident companies and from Lánstraust for domestic companies.[6] The banks' sectoral classifications were harmonised to ensure consistency in EDF estimates.

ERR reflects the market value of a bond as a proportion of its nominal value immediately upon default. Since data was not available for ERR on lending by Icelandic banks, the findings of international

3. A borrower defaults by failure to pay, bankruptcy or an unsuccessful distraint action.
4. Under Basel II, debt should be stated at nominal value within a period of one year. Data was collected from the largest commercial banks in Iceland on the registered nominal value of lending by parents and subsidiaries. Lending was then broken down by country and sector in order to allow for portfolio risk distribution.
5. Probability of default can also be estimated within other periods, e.g. three months or five years.
6. See Box 1 on p. 68 for Moody's and Lánstraust's methodology for estimating EDF.

studies were used as a reference.[7] Loans were classified into whether they were secured with collateral or unsecured, and senior or subordinated debt. The lower ERR on bonds than other credit instruments was also taken into account.

No data were available on probable household and public sector default. Historical data were therefore used for Iceland, whereas for other countries, EDF was estimated from international studies.[8]

It is unlikely that all lending to the same sector carries an equal risk. To allow for this, companies were classified into three risk groups; low, average and above average. Since insufficient data were available to estimate the shares exactly, the Icelandic banks' portfolios were assumed to resemble those of the Swedish banks in the Riksbank study (see Table 1). However, a higher proportion of above-average risk was assumed for lending to European countries, to compensate for the difference between data in the Moody's and Lánstraust databases.[9]

Table 1 Risk distribution of Icelandic bank's loan portofolios

Risk category	*Lending to Iceland*	*Lending to Europe*
Low	10%	10%
Average	80%	70%
Above average	10%	20%

Data on expected loss and its distribution enable an estimate of unexpected loan losses and thereby the banks' capital requirement relative to given tolerance limits. Thus in order to assess the banks' minimum capital ratio, the distribution of lending by Icelandic banks needs to be known.

Geographical and sectoral classification of lending

Loan portfolio risk can either be confined to individual borrowers or systemic, i.e. applying to the entire portfolio. Total risk in a loan portfolio can be reduced with diversification of borrowers. Portfolio risk is reduced if a suitable geographical and sectoral distribution is achieved. Systemic risk, on the other hand, cannot be reduced in this way, since it is intrinsic to the portfolio.

Table 2 shows a geographical breakdown of the banks' loan portfolios. A large proportion of credit was to Iceland, where default frequency was much higher than elsewhere in Europe.[10] Iceland's relatively high corporate leverage could explain this difference. A significant share of lending in Iceland was secured with collateral, which implies that the recovery rate should be higher than in other countries. Nonetheless, since Iceland's expected loss was higher, the higher default frequency ought to outweigh the higher recovery rate in calculations of expected loan losses in Iceland.

7. Data on ERR in Europe was obtained from the report *Default and Recovery Rates of European Corporate Bond Issuers: 1920-2006*.
8. Including the Riksbank study, op. cit.
9. The Lánstraust database contains all companies in the Icelandic Register of Firms, while Moody's covers only listed companies.
10. It should be borne in mind that different methodologies were used to estimate default frequency in Iceland and the rest of Europe, which may explain some of the discrepancy. However, Lánstraust (Creditinfo Group) has estimated default frequency outside Iceland using its model and confirmed the difference.

The UK and Germany had the highest default frequency after Iceland in the country sample, although it was much lower. The largest share of foreign lending by Icelandic banks went to the UK, but a relatively small proportion to Germany at only just over 1% in all. Almost 16% of bank credit was to Denmark, which had the lowest default frequency of the countries in Table 2. Norway was the next lowest.

Table 2 Geographical classification of loan portfolios

Country	*% of total*
Iceland	39
UK	18
Denmark	16
Norway	12
Sweden	4
Luxembourg	2
Germany	1
Finland	1
Other	8
Total	100

Table 3 shows a sectoral classification of bank lending, in Iceland and in Europe. Default frequency was highest in retail and transport, but these sectors accounted for less than 10% of bank lending. The largest sectoral borrower was services, where default frequency was fairly high. Bank lending to households was also high, but the default frequency quite low. In Europe, 24% of lending was to manufacturing, which had a fairly high default frequency, and 22% to property management companies where the frequency was very low.

Table 3 Sectoral classification of loan portfolios

Sector	*% of total, Iceland*	*% of total, Europe*
Services	37.5	29.44
Households	26.6	15.01
Retail	10.4	8.45
Manufacturing	9.4	23.81
Fisheries	8.3	0.00
Property management	5.0	21.60
Transport	1.2	1.36
Public sector	0.7	0.12
Agriculture	0.4	0.02
Utilities	0.1	0.11
Other	0.3	0.08
Total	100	100

After lending has been broken down by country and sector and classified by credit quality, expected loan losses can be found (see equation 1).

Findings of calculations

The banks publish the position of their credit loss allowance accounts in their annual reports. As a proportion of the banks' total lending, this amounted to 0.8% at the end of 2006. According to the above calculations, expected losses were equivalent to 0.53% of total lending, so

their provisioning was adequate in this respect. As pointed out above, Iceland's high EDF has a major effect on the results of calculated expected losses.

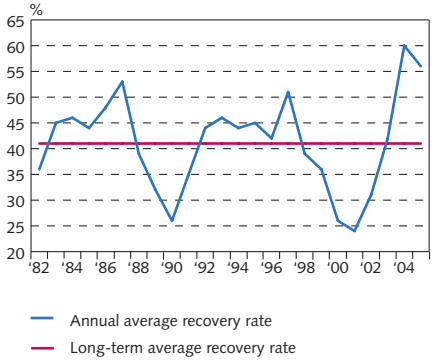
Given the lack of data on recovery rate, a rough approximation was made instead. Studies have also revealed considerable volatility in recovery rate, which can cause large fluctuations in loss given default (LGD).

The assumptions in the model were therefore changed to allow for the possibility of a lower recovery rate. According to Moody's the recovery rate has hovered around a long-term average of 41% over the period 1982-2005, as shown in Chart 2. Over this period, the largest year-on-year decrease was 29%. A new assumption was then made, reducing the recovery rate by 29%.[11] This raised expected loss as a proportion of the banks' total loan portfolio from 0.53% to 0.68%. The banks can still cover a change on this scale, since their provisioning was higher, at 0.82%.

As Chart 2 shows, the recovery rate reached a low of 24% in 2001. The modelling results were also tested if the recovery rate falls to 24% over one year. This raises the expected loss from 0.53% to 0.83% of the total portfolio. It should be borne in mind that the recovery rate never fell by more than 30% in a single year over the historical period. On this basis it could be inferred that the banks would have time to adjust to such a reduction by increasing their write-offs.

The findings for expected loss were also tested against a downturn in the Icelandic economy. A deterioration in loan portfolio quality and a fall in the recovery rate were assumed. The number of companies classified as below average risk in Iceland was assumed to increase, with a corresponding reduction in the average category. The low-risk classification was assumed to remain unchanged, since companies with high credit ratings are expected to show more resilience to a downturn than lower-rated ones.[12] The recovery rate was also assumed to fall by 29%. According to the model, expected loss as a ratio of the total loan portfolio would increase from 0.53% to 0.75% if credit quality deteriorated and the recovery rate fell.

Chart 2
Annual average recovery rate of due bonds 1982-2005



Source: Moody's.

Table 4 Overview of results

Credit loss allowance accounts as % of lending	0.82%
Expected loss:	
Central Bank estimate	0.53%
Recovery rate reduced by 29%	0.68%
Recovery rate reduced to 24%	0.83%
Credit quality deteriorates and LGD deteriorates by 29% in Iceland	0.75%

A comparison of these results with those of the Riksbank study shows that the Icelandic banks have a higher expected loan loss than the four major Swedish banks. Iceland had a high default frequency, as pointed out above, but lending to financial companies was included

11. See *Modeling Default Risk* (2003), pp. 13-14.
12. The risk distribution of companies in the Icelandic loan portfolio was changed from 10% low-risk, 80% average and 10% below average, to 10%, 75% and 15% respectively.

in the Riksbank's calculations. Including lending to financial companies lowers expected loss from 0.53% to 0.47%.

The Swedish banks' credit loss allowance accounts were considerably larger than the credit quality estimates indicated was necessary. The same conclusion was found for the Icelandic banks.

Conclusion

According to the model simulation, provisioning by the Icelandic banks is sufficiently high to cover expected loan impairment. It is interesting to note how much of an impact the high share of lending in Iceland has on the expected loss figure. Banks take this into consideration and those with a larger share of lending to Iceland reflect this in a higher impairment provision. The banks' provisioning is resilient to a considerable change in the assumptions in the model. The next stage in this study will be a closer examination of portfolio distribution to provide an estimate of unexpected loan losses for comparison with the banks' capital ratios.

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Box 1

Methodology for estimating expected default

Data on expected default frequency for the model described in Appendix 1 were obtained from Moody's KMV database for foreign companies and from Lánstraust (Creditinfo) for domestic companies. The following is a more detailed description of the methodology used.

Lánstraust uses its LT-score model which merges data on financial positions and calculates expected default frequency (EDF) by logistic regression.[1] The data used are largely based on its registry of defaulting debtors and companies' annual accounts. A logistic regression for default frequency p_i may be stated as follows:

$$Logit(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 x_{1,i} + \ldots + \beta_k x_{k,i} = X_i' B \qquad \forall \quad i = 1,\ldots,n$$

where $x_{k,i}$ are variables affecting the operation of firm i and thereby the probability of default, and ß are coefficients. The number of firms is represented with *i* and number of variables with *k*. Lánstraust uses around 30 variables in its model.

Y_i is a logistic variable which takes the value 1 if firm *i* is bankrupt. The probability of a credit default by firm *i* is then:

$$p_i = E(Y = 1 | X_i) = \frac{e^{X_i' B}}{1 + e^{X_i' B}} \qquad \forall \quad i = 1,\ldots,n$$

where *X* is the variable vector and ß is the coefficient vector. Lánstraust estimates the coefficients by maximum likelihood.

Moody's uses its KMV model to calculate EDF. The KMV model implements the Vasicek-Kealhofer model, which in turn is an extension of Merton's (1974).[2] Merton's model assumes that the firm is financed with equity *H* and one zero-coupon bond *F*. The value of the firm's equity at time *T* can be expressed as an option:

$$H_T = \max[V_T - F, 0]$$

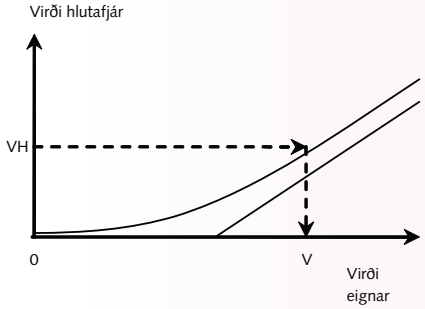
If asset value V_T is less than the principal of the bond *F* at time *T*, the firm defaults and the creditors receive the market value of its assets. Assuming that asset return follows a stochastic differential (Brownian motion):

$$\frac{dV}{V} = \mu dt + \sigma dW$$

where *V* is asset value, μ is expected return, σ is asset volatility and W is a Wiener process, then asset value is log-normally distributed.[3] Asset value at time *T*, from an initial asset value V_0, may be expressed as:

$$V_T = V_0 \exp\left\{\left(\mu - \frac{\sigma^2}{2}\right)T + \sigma W\right\}$$

Mynd 1
Kaupvilnun



1. Lánstraust assumes default point to be when a firm is bankrupt or its net market worth reaches zero. Moody's assumes default point to be non-payment of any scheduled payment, interest or principal, or when a firm is bankrupt or its net market worth reaches zero.
2. See Crosbie (2003), pp. 15-18
3. If asset value follows the Brownian motion, Ito's Rule can be used to find the path for ln*V* which follows a Wiener process with a fixed drift (μ-$\sigma^2/2$) and deviation σ^2. The change in ln*V* from time 0 to *T* is then normally distributed with the average (μ-$\sigma^2/2$)*T* and volatility $\sigma^2 T$, and the variable *V* is log-normally distributed.

Chart 4 illustrates asset value change over time.[4] EDF is the probability that market value of assets will be less than book value of liabilities *F*.[5]

$$p_T = pr[V_T \le F] = pr\left[\ln V_0 + \left(\mu - \frac{\sigma^2}{2}\right)T + \sigma W \le F\right]$$

Since $W = \sigma\sqrt{T}\varepsilon$ this resolves as:

$$p_T = pr\left[-\frac{\ln\left(\frac{V_0}{F}\right) + \left(\mu - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \ge \varepsilon\right] = pr[-d_2 \ge \varepsilon]$$

where ε is a standard normal variable and d_2 stands for distance to default measured as the number of standard deviations the firm is away from it.

Probability of default is estimated from asset value at time *T* and asset volatility, which are unknowns.[7] Asset value and volatility are found by simultaneously solving the following expressions:

$$H_0 = V_0 N(d_1) - e^{-rT} F N(d_2)$$
$$\sigma_H = \frac{V}{V_H}\Delta\sigma$$

The former is a Black-Scholes option-pricing equation in which *N* is the probability density function of normal distribution. The latter is equity volatility as a function of the volatility of the underlying asset:

$$d_1 = \frac{\ln\left(\frac{V_0}{F}\right) + \left(\mu + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$
$$d_2 = d_1 - \sigma\sqrt{T}$$

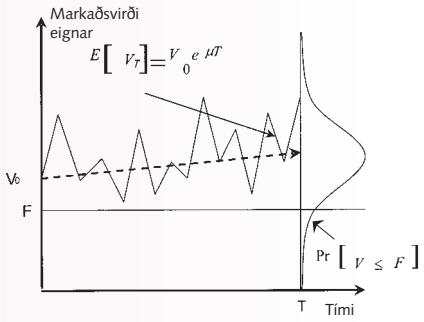
Merton's model allows only two types of liabilities, i.e. a single class of debt and a single class of equity.[8] To adjust for this, KMV estimates asset volatility with an iterative procedure. It also allows dividend payments.

Since d_2 is the number of standard deviations from default and the stochastic variable ε is normally distributed, probability of default may be defined by including a probability density function for normal distribution:

$$p_T = N\left[-\frac{\ln\left(\frac{V_0}{F}\right) + \left(\mu - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}\right] = N(-d_2)$$

In practice it is difficult to estimate the distribution of distance from default, i.e. it is not theoretically precise to use an assumption for normal or log-normal distribution for underlying asset value. Consequently, KMV first estimates distance to default as the number of standard deviations that an asset is away from default but also uses empirical data to determine the corresponding probability of default. KMV Moody's uses empirical data for default and bankruptcy to find the relationship between distance to default and default frequency.

Mynd 2
Þróun undirliggjandi eignar



4. Thus six variables determine the default frequency of firms from the start until time T: Asset value, distribution of asset value at time T, volatility of future asset value at time T, default point, expected asset value growth over the period and duration T. See Chart 4.
5. For further details of the calculations see Crosbie (2003) and Hull (2000).
6. Distance to default also combines country, industry and size effects through asset value and fluctuation.
7. Crosbie (2003) assumes that the point of default is not where asset value equals book value of total liabilities, but between total and short-term liabilities.
8. The model holds only instantaneously because leverage moves around too much for the relationship between asset volatility and equity to remain steady.

Payment and settlement systems

Providing a sound foundation for business

Considerable changes have taken place in Iceland's payments infrastructure since the publication of the 2006 Financial Stability *report. A new arrangement was introduced for netting of payment orders in the FGM netting system and full collateral is now provided for overdrafts between participants. Technical locks were activated in the netting system to ensure that agreed overdrafts cannot be exceeded. Other technical locks were introduced to prevent large payments from being split, which is unauthorised under Central Bank rules. Collection and processing of payment system data is under review and user fees are being brought into line with real costs. The Central Bank has reviewed its rules on the activities of netting systems and the RTGS system. Its contingency plans with the Financial Supervisory Authority have also been reviewed and a dedicated payment system contingency exercise was held in January 2007. More focus will be given to contingency exercises and measures to ensure payment system business continuity. The need for new technological solutions in the RTGS system will be assessed over the next few months. Securities settlement procedures will be reviewed with an assessment of feasible arrangements for settlement of payment orders in other currencies. The Central Bank of Iceland is keeping a close watch on international developments such as the Single Euro Payments Area and plans for the euro area's centralised Target2-Securities system.*

Systemically important payment systems in Iceland

Three systemically important payment systems are in operation in Iceland. Two are also settlement systems, one of which handles settlements of securities transactions.

The Central Bank's real-time gross settlement (RTGS) system is the largest and most important payment system in Iceland. It handles final settlement of individual payment orders between participants of 10 m.kr. or above as soon as the deposit in the payer's account allows this to be done.

Smaller payments are handled by the netting system operated by Fjölgreiðslumiðlun (FGM). This calculates net credit or debit positions between all participants which are then settled at a scheduled time on participants' accounts in the Central Bank, through the RTGS system.

The third system, the securities settlement system, uses a comparable method to settle securities transactions, i.e. payment orders are netted and the resulting settlement is made before opening for business the following day. Settlement is made on a DvP basis.

At the end of 2006, OMX AB acquired Eignarhaldsfélag Verðbréfaþings hf., the holding company for Iceland Stock Exchange (ICEX) and the Iceland Securities Depository (ISD). As a result, Icelandic credit institutions, securities companies and traders are no longer involved in these companies as owners. A similar development has taken place in other Nordic countries. OMX operates exchanges in Denmark, Finland and Sweden, while Norway's Oslo Børs is under the ownership of local financial companies. Nordic depositories also have other owners besides OMX. The main owners of OMX are Investor

with a 10.7% holding, the Swedish state with 6.6% and Nordea with 5.3%. Other owners hold stakes of less than 4%.

Separation of payment systems and assessment of system efficiency and security

Work has been ongoing on separation of the RTGS and netting systems as far as possible in the current technological environment. A large part of the two systems is in effect the same and they can only be separated to a limited extent. FGM has now formally acquired access and user rights for the netting system and is also responsible for its day-to-day operation.

Collection, storage and processing of data from the payment systems is under review with the aim of enhancing communication and establishing a firmer foundation for assessing the systems' efficiency and operational security.

Technical locks were introduced in 2006 to prevent payments over 10 m.kr. from being split and then sent through the netting system after the RTGS system has closed, which is unauthorised under current rules.

Technical locks in payment systems

On a Central Bank initiative, preparations were made in 2006 for technical locks on overdrafts in the FGM netting system, which were activated on April 17, 2007. Comparable locks were activated in the RTGS system on September 16, 2005 and have functioned well.

It is crucial to ensure that payment flows are smooth and unhindered, and that technical locks on overdrafts are never actually applied. To prevent the likelihood of this happening, ample overdraft limits were set in the netting system and credit institutions were also authorised to make deposits in their netting system accounts during RTGS system business hours on days when flows are heavy. It was also decided to transfer unused collateral in the RTGS system to the netting system to raise the overdraft limits there, in order to prevent locks from being applied outside RTGS system opening hours.

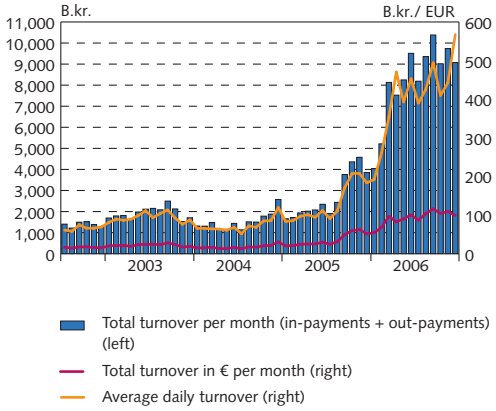
Changes in the netting system

In consultation with system participants, it was decided in March 2007 to adopt multilateral netting instead of bilateral netting. This change reduced the number of technical locks from 30 to 5, simplified system administration and increased transparency. Participants now decide for themselves their overdraft limits with respect to the system, based on their own requirements, and provide full collateral for them. The new arrangement entered into effect on April 17, 2007.

Central Bank rules on payment systems

The Central Bank of Iceland set rules in 2003 on the RTGS system (No. 788/2003) and activities of netting systems (No. 789/2003). In light of subsequent changes in the payment system environment it was considered necessary to adapt the rules to the new conditions. In 2005, for example, a broader range of collateral was deemed eligible for credit institutions to provide as security for settlements. In 2006 the frequency

Chart 1
RTGS system turnover
July 2002 - December 2006



Source: Central Bank of Iceland.

of settlements made in the netting system was increased and the timing of securities settlements was altered.

In December 2006, it was decided to undertake a thorough review of the rules on payment systems in effect at that time. The review of netting system rules was completed in April 2007. Of the considerable changes made, the main ones involved netting procedures, collateral requirements and calculation of individual participants' risk. Eligibility of collateral was specified more closely, as were arrangements for deploying it between payment systems. A review of rules on the RTGS system was completed as well and new rules entered into force in April 2007.

Payment system fees

The Central Bank commenced operation of the RTGS system in December 2000 but only began collection of user fees in 2005. However, the fee structure announced then did not reflect the real cost of operating the RTGS system. Fees were reviewed at the end of 2006 with the aim of bringing them closer into line with actual cost. The tariff is posted on the Central Bank website.

In January 2007, the Board of Governors appointed a committee to assess the real cost of operating the RTGS system and draw up proposals for disaggregating it to establish a basis for setting user fees. The aim is that RTGS system fees should reflect the actual cost of operating it. The committee is expected to present its findings in the coming weeks.

FGM's user fees for the netting system were reviewed on May 1, 2006. Before then, fees had been solely based on the charge that FGM had to pay to the Icelandic Banks' Data Centre (RB) for operating the system. FGM is currently redesigning its fee structure. One aim is to reduce transaction charges in line with increased use of the system.

Collateral securities in the payment systems

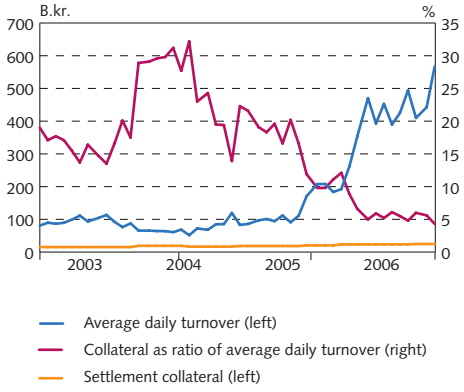
Adequate collateral for payment system settlement is vital for ensuring the sound and efficient operation of the financial system in the event that a credit institution cannot honour its settlement obligations. Collateral security amounts in the RTGS system are set so as to meet in full the single highest amount that credit institutions have agreed on at any time. Hitherto, the Central Bank has recorded the highest daily settlement exposure to give a benchmark for the collateral requirement. However, collateral provided in the netting system covered only part of the highest possible settlement exposure.

When new netting system arrangements went into effect on April 17, 2007, it was decided to insist on full collateral for overdrafts by each participant, and collateral amounts were reviewed at the same time. At the beginning of 2006, collateral of all credit institutions amounted to 23.3 b.kr. in the RTGS system and 5.9 b.kr. in the FGM netting system, a total of 29.2 b.kr.

Payment system turnover

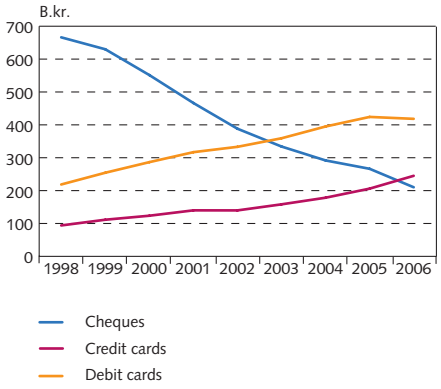
Monthly turnover (deposits and withdrawals) in the RTGS system averaged 8,203 b.kr. in 2006, equivalent to 404 b.kr. per day, compared with 129 b.kr. per day in 2005.

Chart 2
Average daily turnover in the RTGS system and settlement collateral
January 2003 - December 2006



Source: Central Bank of Iceland.

Chart 3
Turnover: Payment cards and cheques
1998-2006



Source: Central Bank of Iceland.

Almost 69 million transactions were made in the netting system in 2006, a 5% increase year-on-year. Total turnover in the netting system amounted to 2,500 b.kr. and average monthly turnover 209 b.kr., equivalent to 2.5% of total turnover in the RTGS system.

In 2006, 22 thousand transactions were made through the Icelandic Securities Depository (ISD) system to the value of 1,273 b.kr., an increase of 127%. A further 155 thousand transactions were made in connection with off-exchange trading, up 38% from 112 thousand in 2005. A large share of transaction types which were previously settled outside the system, such as asset transfers relating to the winding-up of estates, etc., are now settled in the system.

Payment system business continuity

Payment intermediation between credit institutions may be described as a major part of social infrastructure. Any disruption to systemically important payment systems may easily amplify into threats to financial stability. Iceland's payment systems generally operate smoothly and serious problems are rare, although minor operational disruptions and incidents occur from time to time. Increased turnover and transaction volume have been matched by larger and higher-capacity payment systems. Risks in payment system operations are constantly monitored and a priority is to identify and manage underlying risks.

Payment system business continuity involves both preventive measures attempting to preclude problems in the operation of systemically important payment systems, and systematic predetermined responses aimed to restore and maintain business continuity if serious problems arise relating to the operation of individual payment systems or the payment infrastructure as a whole. Such measures aim as far as possible to maintain the agreed level of service, or at least ensure that it will be attained.

External events such as September 11 are examples of threats that may persist for days, weeks or even months on end. Following these events, the focus has increasingly turned to the organisation and operation of systemically important systems, such as the framework for and development of payment infrastructure. Other contributing factors have been faster and more advanced technology and an emphasis on real-time payment processing, combined with massive growth in turnover and transaction volume. Numerous stakeholders are involved, such as central banks, financial supervisory authorities, credit institutions and a wide range of service providers, power companies and operators of data transmission systems. From a central bank viewpoint, a far-reaching problem in payment intermediation, for technical or other reasons, could threaten financial stability and the conduct of monetary policy. Priority is therefore given to identifying and managing underlying risks and organising responses to any emerging problems in payment intermediation.

One common characteristic of all payment intermediation is the speed at which a scenario can unfold, which calls for a disciplined response and decision-making process to minimise operational disruptions and costs incurred. The aim is to reduce the probability of multiplier effects and chain reactions. Since time for decision-making may

be limited, it is important for the decision-makers at any time to have a clear remit for action and fully understand the impact of their decisions on the whole process.

Contingency plans for payment systems

On October 3, 2006, the Central Bank and the FME renewed their cooperation agreement which includes provision for a joint contingency plan for payment systems. The Central Bank's earlier plans were updated in 2006 and a new joint contingency plan confirmed in April 2007. RB is informed about this plan and will take its provisions into account when implementing its own contingency plan if technical problems arise in its operations which have a bearing on payment intermediation in one way or another. The aim of payment system contingency plans is to create a framework for addressing difficulties in payment intermediation while causing the least possible disruption in the financial system.

Payment system contingency exercise

A contingency exercise for payment systems was held on January 25, 2007. The first of its kind dedicated to payment systems, this exercise tested cooperation, communications, responses and decision-making connected with the events in the scenario. In addition to the Central Bank, RB, FGM and the FME participated in the exercise.

The exercise scenario was partly based on real conditions, although the credit institutions involved were fictional. Events presented in the scenario could easily arise in day-to-day operation of payment systems, but must be considered unlikely to coincide on a single day. Staged in real time, the exercise consisted of the following three tests:

- A problem in netting system settlement in the morning
- A technical problem at RB, the payment system operator
- Problems caused by tight liquidity in payment systems

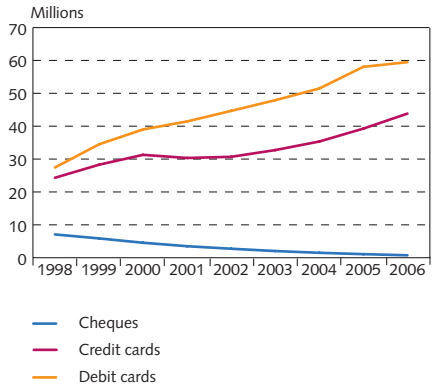
Participants agreed that the exercise was fruitful and provided valuable experience to draw upon in further design of solutions and adjustment of outstanding issues. Contingency exercises of this type will in future constitute part of the Central Bank's regular payment intermediation functions.

International developments in payment system infrastructure

Payment system infrastructure is in a process of considerable change in Europe and elsewhere, and the trend is likely to continue in the years to come. The main drivers of change are globalised trade, market liberalisation, and advances in information and communication technology.

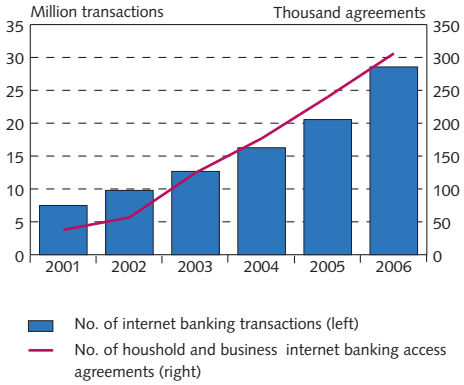
The European Economic Area (EEA) agreement introduced the "four freedoms" – free movement of goods, services, people and capital – in Iceland. Market liberalisation and Iceland's membership of the EEA have proved to be a watershed for Icelandic business and integrated it into the process of change now sweeping Europe in

Chart 4
Number of payment card and cheque transactions 1998-2006



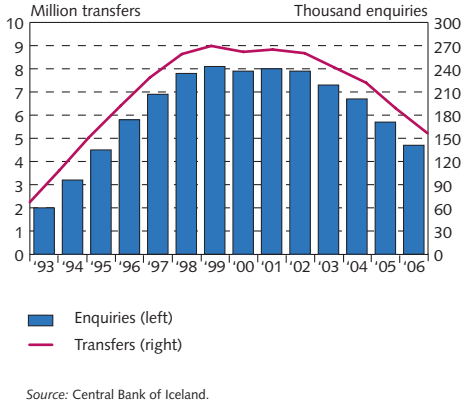
Source: Central Bank of Iceland.

Chart 5
Internet banking access agreements and transaction numbers 2001-2006



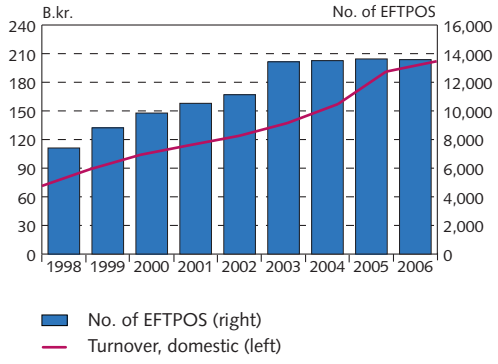
Source: Central Bank of Iceland.

Chart 6
Commercial banks' and savings banks' telebanking 1993-2006



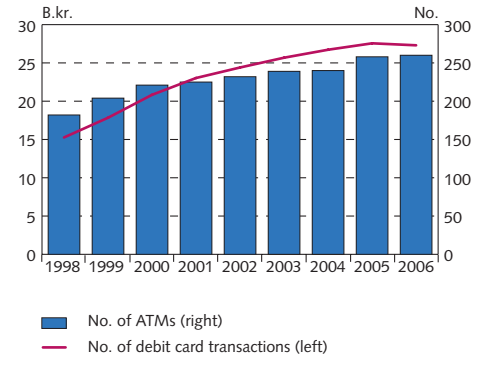
Source: Central Bank of Iceland.

Chart 7
EFTPOS: Domestic debit card turnover and volume 1998-2006



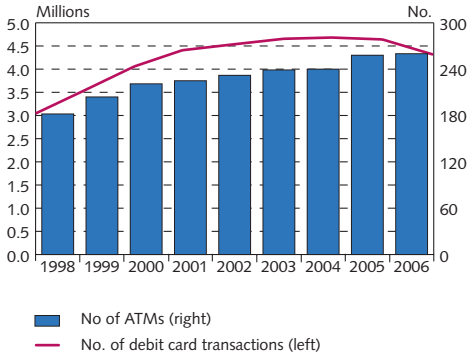
Source: Central Bank of Iceland.

Chart 8
Debit card turnover in ATMs 1998-2006



Source: Central Bank of Iceland.

Chart 9
Debit card use in ATMs 1998-2006



Source: Central Bank of Iceland.

various fields, including payment system infrastructure. This is because secure payment intermediation between parties to business transactions is a precondition for the free movement of goods, services, people and capital.

A regulatory review and definition of communications protocols are under way in Europe, aimed at ensuring active competition in payment services and enhancing efficiency and security. The goal is to ensure high levels of service, regardless of where parties to business transactions and banks are located. Payment transfers are to be simplified through technical and legislative integration of computer systems between countries. The requirement is for secure, efficient and economical capital flows between payers and payees within and across borders, irrespective of the amount involved or the nature of the transaction.

Cross-border payment orders

Iceland is party to the Single Euro Payments Area (SEPA) project and has a representative on its self-regulatory body, the European Payment Council (EPC). The project has been ongoing for five years and the preparation and design stage is now complete. The next major step will be implementation of the first phase in January 2008, which will reform traditional structures for transferring funds to establish a single price for them in euros, regardless of whether payment orders involve national or cross-border transfers.

New RTGS systems

In 2007, the European Central Bank (ECB) will launch a new centralised RTGS system for euros, Target2, replacing the national systems of euro area countries. Sweden and Norway are also introducing new, sophisticated RTGS systems offering more advanced technical solutions than their current payment infrastructure.

New securities trading arrangements

Preparations have been underway in 2006 and so far in 2007 to bring the settlement cycle in Iceland into line with the T+3 norm in neighbouring countries, i.e. shares are settled and delivered three days after being bought or sold. The new arrangement is scheduled to take effect in late April or early May 2007. Subsequently, trading in derivatives is expected to begin on OMX Nordic Exchange in Iceland, with settlements made through the payment systems by special arrangement with OMX and Kaupthing/Arion.

Since the middle of 2006, the ECB has been exploring the development of its centralised Target2-Securities system for settlement of national and cross-border securities transactions. In the ECB's view this project is commercially, legally and technically feasible. In cooperation with market agents, securities depositories, national central banks and other stakeholders, the ECB has now begun assessing the requirements of individual participants. This phase of the project is expected to be completed at the beginning of 2008, when a decision on whether to go ahead will be made.

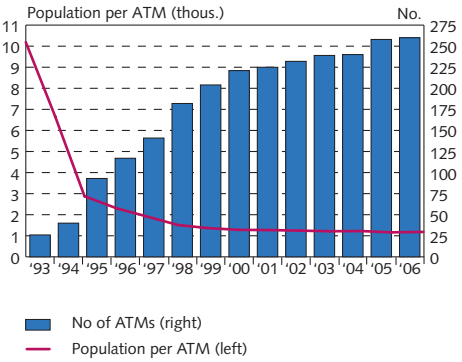
Settlements in euros

There has been some discussion in Iceland in recent months about the use of the euro as an accounting currency by companies that conduct the bulk of their business in currencies other than the króna. Several companies have been granted permission by the government to keep their accounts in other currencies. Per se, a decision by individual companies to use a different currency from the króna has no effect on domestic payment intermediation. These companies still have the same need for krónur in their operations and such payments will continue to be transferred as before through domestic payment systems. Payment transfers by these companies in other currencies will presumably also be made under a similar arrangement to the current one, i.e. mainly through SWIFT and correspondent banking services in cooperation with the credit institution of which they are a client.

However, transactions with equities denominated in euros are a more complex matter. Only two securities settlement systems are currently operative in Europe that handle cross-border securities settlements: Euroclear and Clearstream. All other securities settlement systems still operate on a national basis. The basic principle in payment transfers is that all systemically important systems make their final settlements through the RTGS system of the respective national central bank using its funds, i.e. the national currency. In order to conduct payment settlements in euros, that bank must handle and guarantee final settlement of the transactions and have secure access to funds in euros. The settlement process must also fulfil the Basel Committee's 10 Core Principles, and DvP must be ensured. Furthermore, credit and liquidity risks in connection with the settlement must be taken into account. All these requirements would need to be met in order to enable securities transactions to be settled in euros in Iceland.

Chart 10

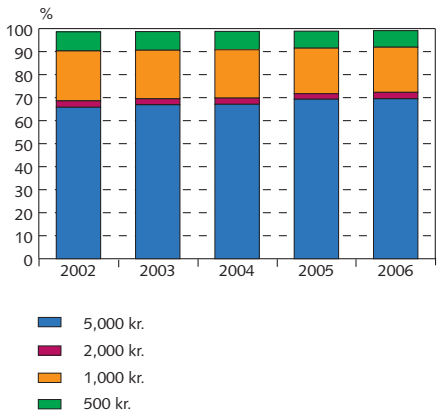
No. of ATMs and access to them 1993 -2006



Source: Central Bank of Iceland.

Chart 11

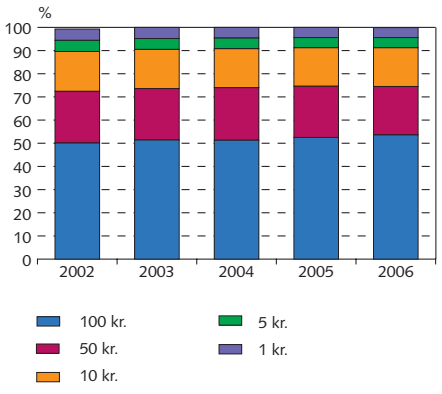
Banknotes by denomination at end of year



Source: Central Bank of Iceland.

Chart 12

Coin by denomination at end of year



Source: Central Bank of Iceland.

Box 1

The impact of an influenza epidemic on the financial sector

There is growing awareness of the impact of external factors that can pose a threat to business continuity and financial stability. The terrorist attacks on the US in September 2001 brought such events into the spotlight. The SARS outbreak in Asia was another example of an external economic shock, and most recently bird flu has shifted the focus towards responses to a situation where a large proportion of the workforce could be absent. As a rule, current contingency plans address short-term problems, but in such cases the effects may last for weeks or months. Over the past 400 years there have been 2-3 serious influenza epidemics each century. Since the last occurred some 40 years ago, the next one can be expected relatively soon.

Contingency preparations in Iceland

In October 2005 the government of Iceland established a task force to study the local economic impact of a possible global influenza epidemic. It also delegated the Chief Epidemiologist and the Civil Protection Department of the National Commissioner of Police to appoint a project management team to prepare contingency plans in cooperation with public agencies, businesses and organisations. The task force then appointed 20 groups, including one for the banking and financial intermediation sector. In September 2007, the public health authorities plan to organise a contingency exercise for responses to an epidemic.

The banking and financial intermediation sector group began work on October 24, 2006. It was led by the Central Bank, which called in representatives from the Banks' Data Centre (RB), Association of Financial Institutions in Iceland (SFF), Confederation of Icelandic Employers (SA) and the Fjölgreiðslumiðlun netting service provider. The group presented the Civil Protection Department with an overview of factors that were particularly relevant to financial companies. Each company/agency also supplied general information on its internal contingency plans and level of service based on different levels of crisis.

Conclusions of the working group

The working group concluded that a considerable reduction can be made in banking system services if a situation of danger or emergency is declared. However, all basic services must still be at hand, such as payment and settlement systems and unlimited access by customers to their accounts.

Access to computers and home banking services enables most households and businesses to purchase necessities and pay for them at the same time. Financial companies have increasingly expanded the opportunities for distance working by allowing their employees conditional access to systems. Technically speaking, employees could therefore temporarily perform certain tasks from home if needed. The crucial consideration is to have effective liquidity management and settlement systems as well as ensuring necessary access to notes and coin.

In order to ensure basic services of the banking sector, the following components of system infrastructure need to be in place and functional:

- RB, which provides basic banking sector services such as technical operation of the payment infrastructure.
- Electricity companies. Most commercial banks and savings banks operate reserve generators that take over immediately in the event of a power supply outage. Computers of households, companies and agencies would be rendered inoperative, however, as would EFTPOS terminals of shops and service providers.

- Telecommunications companies with data transmission lines used by banks.

If the above services are functional, it should be possible to rely primarily on the economical and sophisticated electronic payment systems that characterises the Icelandic financial markets' infrastructure.

Experience in other countries shows that, in such situations, people tend to prefer having more cash than normal. Iceland has a highly effective and efficient payment infrastructure that, other things being equal, makes a rise in demand for cash less likely. If necessary, the Central Bank can increase the quantity of notes in circulation by three- to five-fold almost instantaneously, and also boost its reserves in storage at short notice.

Prudential regulation on liquidity ratio and foreign exchange balance

Prudential regulation in financial markets aims to contribute to secure and reliable practices in financial services. This is a fairly broad concept, including regulations on requirements for management practices in financial companies, liquidity, consumer protection and effective internal and external supervision of their activities. Prudential regulation also aims to contribute to financial and economic stability. By law, the Central Bank of Iceland sets rules for the liquidity ratio of credit institutions and for their foreign balance.[1] Other prudential regulations in financial markets are either sanctioned by law, or set by a government minister or the Financial Supervisory Authority (FME).[2] Financial companies have also set their own internal prudential rules, such as for risk management. The main content of the Central Bank's rules on liquidity ratio and foreign balance is as follows:

Liquidity ratio

A credit institution's liquidity ratio may be defined as the ratio between its liquid claims and liquid liabilities. Central Bank Rules No. 317 of April 25, 2006 (cf. Article 12 of the Central Bank Act No. 36/2001) stipulate the liquidity ratio of credit institutions. The Rules aim to ensure that credit institutions always have sufficient liquidity to meet foreseeable and conceivable payment liabilities over a specified period. They are obliged to submit a monthly report to the Central Bank containing data on which calculation of the liquidity ratio is based. Claims and liabilities included in these calculations are classified according to their nature, maturity and risk, and assigned a weighting. The liquidity ratio is calculated for four periods, namely within one month, from one and up to three months, from three and up to six months, and from six and up to twelve months. The ratios of claims to liabilities which fall due or can be liquidated within one month and three months shall not be lower than 1. If an institution fails to fulfil these requirements, the Rules provide for periodic penalty payments (per diem penalties) which are levied on the shortfall. Credit institutions must also report their liquidity ratios for other periods, although no specific levels are required to be maintained.

Foreign balance

A credit institution's foreign balance may be defined as the difference between its foreign currency-denominated assets and liabilities, on and off the balance sheet. Foreign balance is therefore a measurement of an institution's foreign exchange risk. Rules No. 318 of April 25, 2006 (cf. Article 13 of the Central Bank Act No. 36/2001), stipulate the foreign balances of credit institutions and financial intermediaries.

1. These Rules are published on the Central Bank of Iceland website (http://www.sedlabanki.is)
2. See the websites of the Ministry of Commerce (http://eng.idnadarraduneyti.is/laws-and-regulations//nr/1254) and FME (http://www.fme.is/?PageID=612)

The regulation aims to limit foreign exchange risk by preventing the foreign balance from exceeding certain limits. Two types of limit are stipulated. One is exposure in individual currencies, and the other applies to the total foreign exchange position in all currencies, which is the sum of positions in individual currencies. Exposures in individual currencies may neither be long nor short by more than 20% of equity according to the most recently published financial statements, nor the total foreign exchange position by more than 30%. Credit institutions are obliged to submit regular monthly reports on their foreign balances to the Central Bank. Credit institutions with a balance exceeding the limits shall take immediate measures to adjust it, and it shall be brought inside the permissible limits within three business days. If an institution fails to correct its balance within this time limit, the rules provide for periodic penalty payments. The Central Bank may allow credit institutions to maintain a separate positive foreign balance outside their total foreign balance as a hedge against the effect of exchange rate movements on their capital adequacy ratios. The development of credit institutions' foreign exchange balances is discussed in Box 4 on p. 54, in the section on Financial companies.

Alex Bowen[1]

The Financial Stability Report of the Central Bank of Iceland: a review

Introduction

This review of the Central Bank of Iceland's Financial Stability Report was commissioned by the Central Bank in September 2006. It has focused on the 2006 issue, but in the context of the financial stability analyses published by the Central Bank since 2000. The review first considers in general the role of financial stability reports in central banks' work to promote financial stability and then, in the light of that discussion, examines the Icelandic Report. It concludes with an overall assessment and a summary of recommendations.

Financial Stability Reports and the Maintenance of Financial Stability

The objective of financial stability

The maintenance of financial stability has become a more prominent objective of policy-makers around the world over the past quarter century as it has become more evident that economic growth does not by itself guarantee the absence of financial crises. The incidence of banking crises has increased over time. One study, for example, covering 21 countries, identified just one banking crisis between 1945 and 1970, but 19 since then.[2] Such crises, by disrupting financial intermediation between lenders and borrowers, can be very harmful. In one study, the cumulative output losses incurred during crisis periods were found to be roughly 15%-20% of annual GDP, on average.[3] Moreover, output losses during crisis periods in developed countries appeared to have been significantly larger – 10%-15% – than in neighbouring countries that did not at the time experience severe banking problems. The crises also entailed fiscal costs, complicating the conduct of economic policy generally. Developed market economies are not immune to such problems. Indeed, when a banking crisis has occurred, the costs in developed economies have been on average as high as or higher than in emerging-market economies.

The increasing salience of financial stability as a public policy issue has been reflected in the greater attention given to it by the IMF and World Bank, which jointly set up the Financial Sector Assessment Program in May 1999 to promote the soundness of financial systems in member countries. The recognition that increased financial integration of capital and banking markets across countries entailed an international dimension to this issue led to the setting up of the Financial Stability Forum, also in 1999, to promote international financial stabil-

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1. Senior Policy Fellow, Monetary Analysis, Bank of England. This report was prepared in a personal capacity, and views expressed are not necessarily those of the Bank of England. The author was formerly head of the Financial Stability Assessment Division of the Bank of England.
2. Bordo et al. (2001).
3. Hoggarth, Reis and Saporta (2001); Hoggarth and Saporta (2001).

ity through information exchange and international co-operation in financial supervision and surveillance. But perhaps one of the most telling signs of the growing importance of financial stability work has been the growth in the number of financial stability reports (FSRs) published by central banks. According to the IMF, which has encouraged such publications, almost 50 central banks were publishing FSRs by the end of 2005.

An FSR is a tool to support a central bank's efforts to maintain financial stability and make financial systems more robust. To be used effectively, the publishing central bank needs to be clear about what it is trying to achieve. Perhaps surprisingly, central banks' formal financial stability responsibilities have usually not been very explicit or precise. A survey of all central banks in the OECD area found that, as of 2003, the responsibility for financial stability was generally not explicitly formulated in law. There was considerable heterogeneity in the way central banks pursued the financial stability objective, and no common and unambiguous definition of financial stability or systemic risk.[4] To a large extent, central bank staff have defined and elaborated their financial stability objective themselves. It is important to undertake this exercise to provide guidance to FSR authors about what they should be trying to achieve, as well as, more generally, to focus the central bank's financial stability work and provide a way of making it more accountable.

As the variety of current practice indicates, the financial stability objective can be defined in a range of ways. At one end of the spectrum, a narrow view is taken. The central bank focuses on ensuring that the underpinnings of a monetary economy – the payment and settlements system and the acceptability of bank deposits as money – are not disrupted. This is often seen as the natural role for a monetary policy institution. At the other end of the spectrum, the central bank concerns itself with financial intermediation more generally and seeks to ensure that its efficiency is not subject to significant adverse shocks. This entails a wider scope, encompassing non-bank saving institutions, insurers and other financial intermediaries, and the efficiency of capital markets. In many countries, these broader concerns are seen as the territory of supervisory and competition authorities outside the central bank. Definitions of financial stability also differ along another dimension, from the absence of crisis to the absence of fragility and hence even of the possibility of crisis. Whatever view is taken, 'microprudential' supervision – focusing on the soundness of individual institutions – is inadequate by itself. Financial stability is a public good, and 'macroprudential' policy must focus on the externalities of financial firms' behaviour.[5]

A number of authors have tried to encapsulate the complex macroprudential concerns of central banks in a short definition. Andrew Crockett, for example, argued that financial stability is a state in which "… the key institutions in the financial system are stable, in that there is a high degree of confidence that they continue to meet their

4. Oosterloo and de Haan (2004); their results also suggested that the democratic accountability of the financial stability function of central banks is often poorly arranged.

5. Schinasi (2006) discusses in depth the concept of financial stability.

contractual obligations without interruption or outside assistance; and…. the key markets are stable, in that participants can confidently transact in them at prices that reflect the fundamental forces and do not vary substantially over short periods when there have been no changes in the fundamentals."[6] Frederick Mishkin focuses on the source of the economic problem by defining financial instability as that which occurs "when there is a disruption to financial markets in which asymmetric information and hence adverse selection and moral hazard problems become much worse, so that financial markets are unable to channel funds efficiently to those with the most productive investment opportunities."[7] Such definitions help to clarify in general terms what FSR authors should be analysing. However, there is (as yet) no analogue of the inflation target in monetary policy. Operational definitions of financial stability that enable one to tell where the financial system is on a scale of instability are rare. A review of existing FSRs found that, as of the end of 2005, none of them had such an operational definition.[8]

The benefits of publishing

FSRs are a useful tool in the armoury of central banks in two broad ways. First, they can reduce risks to financial stability directly. Second, they can improve the transparency of the central bank's work, increasing its accountability and sharpening the incentives facing its staff.

The direct benefits include:

(i) Improving the understanding of the economic environment: the central bank can add value to the analysis carried out by private agents by virtue of its macroeconomic expertise and the market intelligence it can glean as a participant in payment systems and financial markets

(ii) Alerting financial institutions and financial market participants to the possible collective impact of their actions taken together: in a competitive environment, the central bank has a greater incentive than do private agents to identify possible harmful spill-overs from the actions of individual players in banking and financial markets. But once these are identified, private agents can sometimes club together to internalise the associated externalities (for example, through trade bodies setting standards)

(iii) Promoting ways of mitigating risks to financial stability: given that externalities are involved, and given the desire to avoid fostering collusive private-sector behaviour too widely, central banks sometimes need to promote measures to change the incentives facing the private sector or otherwise constrain their behaviour. These measures may entail actions by the central bank, supervisory authority or other policy-makers, such as adopting appropriate legal arrangements, codes and standards.

(iv) Building public support for the maintenance of financial stability: the legitimacy and efficacy of central banks' actions to preserve

6. Crockett (1997).

7. Mishkin (1996).

8. Cihak (2006); the Bank of England took a step towards providing a qualitative scale in its May 2006 FSR.

financial stability ultimately depends on the public's understanding and acceptance of the central bank's objectives.

There are also several potential benefits with respect to the central bank's own performance:

(i) It allows the analysis of the central bank to be scrutinised by a wide range of outsiders from different perspectives, thus sharpening up incentives for the staff producing the analysis;
(ii) It provides a discipline for the central bank's financial stability work with respect to its internal organisation, frequency and timing;
(iii) It provides a means for outsiders to judge whether the central bank is fulfilling its remit;[9] and
(iv) It can strengthen co-operation on financial stability work among the relevant authorities.

There is also one major potential disadvantage of publishing which needs to be borne in mind. At a time of financial fragility, publication could trigger precisely the behaviour that is likely to provoke a financial crisis. For example, drawing attention to heightened credit risk may provoke a cessation of new lending and precipitate solvency crises for otherwise sound borrowers. This is akin to shouting 'Fire!' in a crowded hall. A theoretical study of this issue showed that there is a danger of private agents over-reacting to public information disseminated by the central bank.[10] Hence the central bank needs to ensure it is clear about its evidence base and about the risks and uncertainties around its analysis.

This suggests that publication on a regular schedule with broad and similar coverage from issue to issue is usually desirable, so that timing and content are not 'over-interpreted' by readers. It also suggests that it is very important for the central bank to have a strategy for mitigating the risks identified, and thus for altering private-sector behaviour where necessary. The danger is likely to be reduced if the central bank is able to establish a good track record in unbiased analysis before the risk of a financial crisis rises significantly. But the argument for transparency and comprehensiveness may have to be modified in some circumstances.

The coverage of an FSR

The discussion above points to the need for any FSR to survey and explain the risks to financial stability, defined in a clear, consistent and coherent way, and to propose ways in which these risks can be mitigated and by whom.[11] The risks have two dimensions: the probability of a shock from any particular quarter and the impact on the financial system if the shock materialises. The latter depends on the channel(s) through which the shock hits the financial system and the resilience of the system, given the channel. At any particular time, some shocks

9. Accountability might be enhanced further if that remit from the executive or legislature were less opaque than it is in most cases.
10. Gai and Shin (2003).
11. Surveillance and mitigation could be treated in different publications, but, as the arguments for specific mitigatory measures depend on the analysis carried out under the surveillance heading, it seems desirable for them to be brought together in the same place.

may be working their way through the economy while others are still on the horizon and not certain to arrive, so the FSR should be explicit about the temporal structure of its analysis.

In more specific terms, the discussion above leads to the view that FSRs should cover:

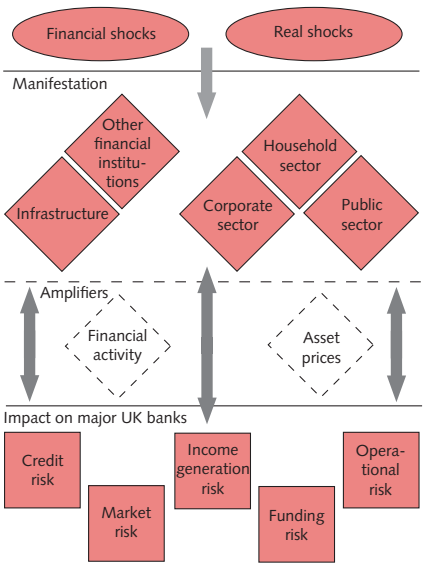
(i) Past and prospective macroeconomic developments: empirically, macroeconomic developments have been central to the majority of past banking crises, so it is important to assess regularly the news from the macroeconomic environment about recent shocks and about the probabilities of future shocks. Indicators based on financial market prices are a potentially useful source of information about the expectations of financial market participants. The central bank's own macroeconomic forecasts should provide a cross-check. This may require interdepartmental work, especially as monetary policy and financial stability policy have overlapping but not coincident needs. Financial stability analysis has to focus more on the downside risks than the central outlook and more on the factors affecting financial intermediation of saving and investment. The shocks in which FSR authors should be particularly interested are those that surprise borrowers and lenders and alter their behaviour.

(ii) Vulnerabilities of the financial system's major counterparties: it is important to be able to map the pattern of the financial system's exposures, in terms of their size and distribution across sectors and countries, the 'expected loss' they entail, and the expected volatility of losses. Thus economic analysis of corporate and household balance sheets, income and liquidity, and of the pricing of loans to firms and individuals, is useful, as it bears on both the ability of debtors to repay loans and the size of losses in the event of defaults. Other important classifications are wholesale versus retail, domestic counterparties versus foreign counterparties, domestic currency versus foreign currency, and on-balance-sheet versus off-balance-sheet. Capital market developments are relevant because, first, they can reveal information about the distribution of participants' expectations about market and credit risk and, second, they affect the credit, counterparty, liquidity and market risk faced by financial intermediaries using the markets.

(iii) Risks to the financial system: given (i) and (ii), it is desirable to assess the likelihood of losses to financial institutions, the danger of liquidity problems, institutions' buffers of profits, capital and liquidity, and the scope for contagion (either through financial intermediaries' exposures to each other or through their exposures to financial system 'infrastructure'). It is therefore important to have some sense of the size and structure of intra-system exposures (e.g. via the interbank market) to assess the system's resilience.

Categories (i) and (ii) concern the assessment of the probability of a range of possible shocks to the financial system, and (iii) is relevant to the assessment of losses given the shock (i.e. 'probability of default' and 'loss given default'). In assessing the risk of externalities, the pat-

Figure 1



tern of interbank links and the role of central counterparties are likely to be among the key factors.

The coverage needs to be organised in a coherent way, reflecting the causal links believed to be at work. The Bank of England's latest FSR summarised one way of organising material in diagrammatic form (Figure 1).

The extent of coverage will depend in part on the definition of financial stability driving the central bank's work. If the roles of insurers, life insurers and pension funds are seen as within the ambit of financial stability work, for example, that requires analysis of a wider range of phenomena, such as variations in longevity risk.

The style of an FSR and its role in the broader communications strategy

Realising the potential benefits of an FSR depends upon reaching the appropriate audience. It is a challenge to design a product that is equally effective addressing financial market practitioners, academics, policy-makers in other institutions (nationally and internationally) and the general public. With a professional audience in mind, it is important to demonstrate technical competence and knowledge. With policy-makers in mind, it is helpful to write persuasively about how to mitigate financial stability risks, bearing in mind the political economy aspects. And with the general public, it is vital to write clearly, concisely and in plain language. These varied requirements need to be balanced against the resource constraints of the central bank.

This suggests that particular care needs to be taken to present the FSR in such a way that key messages are easy to locate and extract, and readers with different interests are able to choose how deeply to pursue particular issues. If a central bank has sufficient resources, it may be helpful to publish more than one document (e.g. a traditional FSR for a professional audience and a much shorter, simpler document for the press and public). The medium of the internet makes it easier, by means of embedded links, to keep the basic presentation uncluttered while allowing those interested to delve deeper. It also makes it easier to relate background work to the FSR.

The key requirement is to see the FSR as part of the central bank's broader communications strategy, which has to tackle several objectives, not just financial stability. The strategy has to take account of the fact that communications are the means by which the transparency, accountability and reputation of the central bank are established.

The Financial Stability Report of the Central Bank of Iceland

The Central Bank of Iceland has been publishing financial stability assessments since 2000, first as part of the Bank's *Monetary Bulletin* and, since 2005, in a free-standing annual Financial Stability Report. During that time, the Icelandic economy has been subject to a wide range of macroeconomic shocks,[12] rapid growth and institutional

12. Relative to the size of the economy, these shocks have been large by international standards. See Honjo and Hunt (2006).

reform, notably with respect to the role of the central bank (e.g. the adoption of inflation targeting). Icelandic banks have expanded very rapidly, both domestically and abroad, taking advantage of privatisation (completed by 2003) and changing their character in the process. This has helped to bring the issue of financial stability to the fore. As the IMF noted following its Article IV consultations in 2006,[13] concerns have arisen that the macroeconomic imbalances and the rapid pace of banks' growth has generated vulnerabilities that could threaten financial stability should the imbalances unwind sharply. Hence this is a timely point at which to assess the contribution of the Financial Stability Report to assessing vulnerabilities and explaining how financial stability can be promoted.

This review does not attempt to assess the detailed analysis presented in past FSRs; that would be beyond the competence of the author. Rather, it considers the Central Bank of Iceland's publications in the light of the broad principles sketched in Section 2 above, under six headings:

a. The statement of aims.
b. The overall assessment of financial stability offered.
c. The issues covered.
d. The data, assumptions and tools used.
e. How the FSRs relate to the communications strategy of the Central Bank.
f. International comparisons.

In so doing, it adopts broadly the framework for assessment suggested recently in an IMF Working Paper[14] that reviewed international experience with FSRs and proposed that an assessment of a FSR should focus on its clarity, consistency and coverage with respect to the first four of these headings.

The statement of aims

The Central Bank of Iceland's FSR does well under this heading. The Bank's definition of financial stability is presented concisely opposite the introduction to the Report, together with a statement of the purpose of publishing a Report. The definition takes a relatively broad interpretation of financial stability, focusing on the financial system (not just payment systems, for example) and its roles in mediating credit and payments and in redistributing risks appropriately. This is consistent with the coverage of the financial system in the FSR, encompassing internationally active banks, savings banks, domestic capital markets and financial infrastructure.

The definition is not operational, in the sense that it does not define what standard should be used to judge whether the system is "equipped to withstand shocks" or whether it is redistributing risks "appropriately." The former phrase suggests a concern with avoiding systemic crises (acknowledging the inevitability of shocks) whereas

13. IMF (2006a).
14. Cihak, op. cit.

the latter hints at a broader efficiency concern. However, it is a clear and pithy definition, consistent with what the FSR goes on to cover. And no central bank has ventured an operational definition or measurement of financial stability or fragility.

The Central Bank has shown that it is aware of the debate about definitions, with a perceptive discussion in its 2005 FSR under the heading "Financial stability and central bank tasks." It acknowledged that changes in the definition may be necessary over time as the financial system and analysis evolves. This author agrees with the FSR's quotation from Schinasi: "What is crucial is how the central bank formulates its policy in accordance with the role assigned to it, and how it works towards furthering it."[15] The current broad definition of financial stability may be consistent with the Central Bank's perceived mandate, but staff may wish to revisit this issue, given that many central banks take a narrower view.

The statement of purpose covers most of the potential benefits of publishing a FSR reviewed above, including enhancing accountability, which Cihak suggested is not always borne in mind. The 'campaigning' aspect of central bank work is not mentioned, but the FSR itself does not baulk at recommending institutional changes (e.g. in Box 6 of the 2006 FSR on the Housing Financing Fund). It is perhaps inappropriate to stress the benefits internal to the central bank in a public declaration of purpose, which should concentrate on the potential benefits to society at large; they are implied in the reference to accountability.

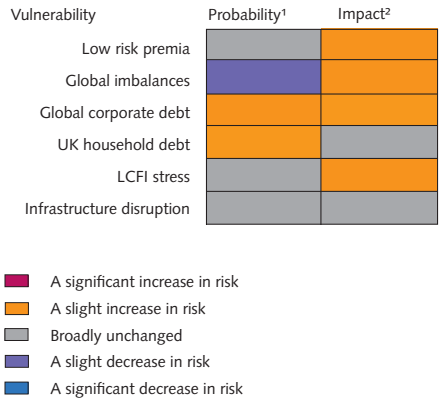
The overall assessment

The FSR gives a clear statement of its overall assessment in its Introduction. Not only is an overall assessment offered there, but the opening italicised statement gives a punchy summary. The use of summaries at the beginning of chapters and short sentences as sub-headings within chapters also helps to convey the overall assessment. The Introduction clearly draws on the more detailed analysis presented later. The 2006 FSR opens with a reference back to the 2005 FSR, thus emphasising the consistency of approach over time and beginning to establish a metric to judge whether fragility has increased or decreased. The main changes over the previous year are explained clearly at the beginning. It would be straightforward for the Central Bank of Iceland to emulate the innovation in the Bank of England's most recent FSR, in which a short list of the key risks was drawn up, together with a staff assessment of how they had changed (Figure 2).

The combination of the definition of financial stability, statement of aims, and overall assessment at the beginning of each Report is a significant improvement over the financial stability discussions in the *Monetary Bulletin* prior to 2005, which were not so clear about the purpose of the material.

Cihak commented in his study that FSR assessments are overwhelmingly positive, tending to suggest that everything is "as good as it gets." That may reflect to some extent the benign conditions faced

Figure 2



1. Assessed change in the probability of a vulnerability being triggered over the next three years. 2. Assessed change in the expected impact on major UK banks' balance sheets if a vulnerability is triggered.
Source: Bank calculations.

15. Schinasi (2004).

by most countries in recent years, but it is also suggestive of a certain lack of candour. This is not an accusation that can fairly be levelled at Iceland's FSR, the most recent issue of which flags "more challenging waters… ahead," "growing pains", and the fact that "a slower pace of growth is long overdue."

Issues covered

The coverage of past FSRs has been comprehensive and well organised. The structure adopted in 2005 works well, leading the reader from a discussion of the broad macroeconomic environment and the condition of the main borrowers from the banking system to an analysis of the key elements of the Icelandic financial system, split into financial companies and payment and settlement systems. Some special topics are considered at the rear of the Reports (e.g. contingency planning in 2006). This broadly accords with the schematic representation in Figure 1, and ensures a comprehensive coverage of issues.

The analysis of the functioning of domestic financial markets goes beyond what is covered in most FSRs, and reflects the broad definition of financial stability used by the Central Bank of Iceland. If length is regarded as a constraint, this is one area where economies could be made, given the current amount of detail (for example, the relevance of the Box on the new takeover panel in the 2006 FSR was not immediately evident). Capital market developments are covered in the chapter on macroeconomic developments and financial markets. It might be helpful to distinguish between general developments in markets, which reveal something of the shocks to which the financial system has been subjected (e.g. the international 'search for yield'), and market assessments of the financial system itself, which might sit more comfortably in the chapter on financial companies as diagnostic measures (e.g. credit default swaps and bond prices for Icelandic issuers in the financial sector).

As far as the chapter on macroeconomic developments and financial markets is concerned, the text conveys a good sense of what staff believed were the key issues relevant to financial stability: in 2006, macroeconomic imbalances, the threat of a large exchange rate adjustment, the housing market, and the perils of managing rapid economic growth. The discussion of the Icelandic housing market was particularly thorough. The choice of topics for appendices – what kind of macroeconomic 'landing' and Iceland's external assets and debt – fitted in very well with the broader analysis. The former explored forward-looking macro stress tests; FSRs tend to spend too much time looking backward into history rather than trying to assess the risks in the future. The second explored a crucial issue for financial stability given the volatility of Iceland's floating exchange rate. Some more discussion of the risks entailed by mismatched balance sheets, by means of a simple stress test for example, and the extent of foreign currency mismatches given the aggregate balance sheet for Iceland would perhaps have been helpful. Financial hedges essentially move around exposures to foreign exchange movements rather than eliminating them.

There are a few extra topics that the Central Bank could consider reviewing, subject to the caveats that the data are available and that the overall length and complexity of the FSR need to be kept within bounds (see later sub-section on communications):

(i) Financial analysts' and international institutions' views about prospects for the Icelandic economy and the outlook implicit in market indicators: how uncertain is the outlook and does the Central Bank differ from the external consensus in any important ways?

(ii) Measures of market implied volatility to inform the discussion of the level of risk in the external environment (are there any traded derivatives that would provide useful information about prospective exchange rate risk, for example?)

(iii) Determinants of the terms of trade: what is the broad mix of Iceland's exports and imports and does that have any implications in the current conjuncture? How are prices and quantities for fish and aluminium likely to evolve? What is the relative importance of different countries/regions in Icelandic trade? This would help the reader get a sense of the relative importance of some of the issues raised in the macroeconomic discussion. This raises a more general point, the desirability of putting more of the data reported in context by providing benchmarks from history and other countries (for example, to what extent are Iceland's exports more concentrated in certain commodities than other commodity exporters?). This was done in the appendix on external debt and assets, which was very helpful, particularly to the reader less familiar with the specifics of the Icelandic economy. The sub-section on misleading comparisons of the housing market in Reykjavik with that of other cities was similarly very helpful. Brief cross-references to other Central Bank of Iceland publications might help the interested reader to follow up some of the macroeconomic risks raised.

(iv) Survey-based evidence on households' financial positions.

(v) Measures of corporate liquidity and of the dispersion of corporate profits (and does Iceland have data available to model disaggregated default probabilities, as is done by Norges Bank?)

(vi) 'Distance to default' calculations for quoted firms.

(vii) Commercial property: lending to this sector has been a recurring source of financial stability concerns in a number of countries. This sector might warrant more coverage, if only to point out how Iceland is different.

Turning to the chapter on financial companies, this has also been thorough in its coverage, covering income, credit, market, liquidity and refinancing risks and the buffers available to the commercial banks; and also savings banks and other miscellaneous financial companies. There is scope for more comparisons of Icelandic banks with international norms (as with the chart on Nordic banks' funding in the 2006 FSR). The IMF made some such comparisons in their 'Selected Issues' paper in 2006, which also usefully calculated some 'distance to default' estimates.[16] The discussions of stress testing by the Financial

16. IMF(2006b), Figure 2, p. 16, and pp. 17-18 respectively.

Supervisory Authority and the estimation of potential loan losses in the 2006 FSR were very useful additions to the main text. So was the review of the treatment of Icelandic banks by the rating agencies, particularly in the light of the way in which their decisions appear to have triggered reassessments of risks in the foreign exchange market; downgrades of banks could seriously prejudice their ability to refinance funding at reasonable cost.

The comprehensive analysis leaves little to suggest in the way of additional ideas for future work. The only areas where this reader thought that more analysis would be beneficial were connected lending and the interconnectedness of the commercial banks. The first was an issue raised by the IMF Financial Sector Assessment Program in 2001, when the IMF concluded that "measured indicators give an unduly optimistic assessment of the underlying health of the banking sector," and flagged again in the 2006 Article IV review. Mishkin and Herbertsson also noted the lack of transparency due to cross-ownership (as well as to the growth of off-balance-sheet items) in their review of financial stability in Iceland.[17] The 2006 FSR touched on aspects of this issue, for example, leveraged stock purchases, but the Central Bank's overall view did not emerge clearly. On the second, there may be scope for empirical work on the co-movements of commercial banks' stock prices, bond spreads and CDS premia to examine interlinkage empirically,[18] and on the interlinkage of Iceland's commercial banks with other banks overseas and each other, through interbank lending.[19] In due course, it will be helpful to examine how the new capital adequacy rules affect the commercial banks' capital buffers.

As far as payment and settlement systems are concerned, the FSR again is very thorough, laying out clearly the nature of the risks involved and the principles guiding the Central Bank's oversight. In this chapter, some of the material does not pertain to financial stability as such, even on a broad definition (e.g. the box on measures to combat money laundering in the 2006 FSR). The Central Bank might wish to consider whether a separate regular report on the wider aspects of payment and settlement systems would be appropriate.

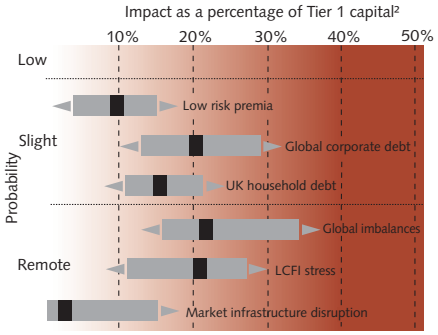
Data, assumptions and tools

The FSRs use a wide range of data covering macroprudential indicators and the IMF's financial soundness indicators. Data are presented on the liquidity and market risk of the commercial banks, topics for which, Cihak observed, few countries' FSRs have much data. Market-based indicators are also deployed, but there may be scope to do more on this front (e.g. with respect to market measures of uncertainty). Economic modelling techniques are brought to bear in useful ways, such as the modelling of Iceland's likely macroeconomic adjustment and of aggregate loan losses.

17. Mishkin and Herbertsson (2006).
18. See, for example, Hawkesby et al. (2005).
19. On the role of interbank exposures and the risks of contagion, see, for example, Elsinger et al. (2002) and Wells (2004).

Figure 3

Impact and likelihood of 'severe stress scenarios' affecting vulnerabilities.[1]



1. Central band shows best current quantified estimate of scale of oss under each scenario; wider bands include allowances for some uncertainties around these calibrations. A number of potential channels are not included in the bands. 2. Total impact for major UK banks of individual scenarios over a three-year horizon, relative to base. The impact is expressed as a percentage of current Tier 1 capital but, given UK banks' current profits, does not necessarily imply a loss of capital.

Source: Bank of England calculations.

The 2006 FSR reports the results of stress testing by the Financial Supervisory Authority. The question arises as to whether the Central Bank can work with the FME to develop stress testing as a regular diagnostic instrument, and thus move towards an operational measure of financial fragility, at least for the three main commercial banks' credit risk. Macro stress tests can be used in two ways. First, standard shocks can be applied, so that the impact on financial stability of changes in the banks' mix of activities and in their various buffers can be assessed. Second, the shocks can be varied over time to reflect the changing macroeconomic and market context in which the banks operate. An example of how this can be done was presented in the Bank of England's Summer 2006 FSR, where scenarios linked to the key risks identified in the conjuncture were combined with modelling of impacts on banks' balance sheets (see Figure 3).

In his IMF Working Paper, Cihak suggests that it would be helpful for central banks to publish the data lying behind the graphs, to enable observers outside to carry out further analysis if they wish. Similarly, it is helpful for rating agencies, international banks and others to be able to compare countries' financial systems regularly according to a standard set of indicators. The Central Bank of Iceland might wish to consider making the charts in the FSR available on its website, together with Excel files of the data used, and also publishing the standard IMF Financial Soundness Indicators. Oosterloo et al.[20] note that the Icelandic FSR already publishes more of the FSIs than do most FSRs, and a cursory examination of their tables suggests that many of the omissions are balanced by a discussion of the relevant concept in the text. Nevertheless, filling in some of the gaps in publication of what the IMF call the 'encouraged' set of FSIs would make it easier for readers to make their own assessments and cross-country comparisons.

Communications strategy

The FSR communicates the Central Bank's analysis of financial stability in Iceland clearly and comprehensively. Its thoroughness is striking, especially given the resource constraints. The structure and physical layout of the FSR since 2005 have helped to make it accessible and easy to navigate. Charts, boxes and appendices are used well. The Central Bank's website allows interested parties to reach the FSRs quickly.

It appears that the main audience addressed by the Central Bank is a professional one. The FSR is lengthy – on the long side for the 'core' of an FSR by international standards – and the material presented is in some cases very detailed. This raises the question of whether a broader readership might be encouraged by offering a little more exposition of the basic economics and financial stability issues at stake, and by supplementing the FSR with summary material more accessible to journalists and the general public, perhaps by some repackaging of the introduction and opening paragraphs of the existing FSR.[21] The

20. Oosterloo et al. (2007).

21. Mishkin and Herbertsson, op. cit., in some respects offered a more accessible discussion of some of the key economic issues, but were nowhere near as thorough as the FSRs in combining argument and evidence.

imaginative use of the website could help in this regard. That would probably entail a less detailed discussion of some of the data and a somewhat more rigorous prioritisation of material according to its relevance to the central bank's financial stability objective. There is also scope for separating some of the material on payment and settlement systems and other aspects of the financial infrastructure, as mentioned earlier.

International comparisons

The Icelandic FSR compares well with its peers. Cihak drew up a list of recommendations for developing FSRs, based on his assessment of their most frequent weaknesses:

(i) having a more standardised 'core' of conjunctural assessment: the Central Bank of Iceland took this route in 2005
(ii) making aims clearer and more specific, encompassing central bank accountability and provision of information to other participants in the financial system: also achieved by 2005
(iii) adopting an operational definition of financial stability: not yet achieved by any central bank
(iv) provision of more data tables, Excel files, FSI data: some scope for improvement
(v) more discussion of financial institutions' exposures to the various sources of risk: largely achieved in the chapter on financial companies
(vi) more use of disaggregated data: achieved, especially with respect to the three major commercial banks
(vii) more use of prudential/risk-based data: much relevant data deployed, some scope to go further
(viii) use of stress tests in the regular assessment, with a broader range of risks covered: initial steps taken, but room for further work.

Cihak does not publish his subjective ratings by country, but, using his criteria and summary statistics, this author would regard the Central Bank of Iceland's FSR as among the best.[22]

Conclusions

The Central Bank of Iceland's Financial Stability Report attains a high standard, judging by its own objectives, by general criteria for FSRs, and by international comparisons. While there are a number of additional topics that could usefully be explored over time, the clarity of the overall assessment would not be helped by allowing the FSR to become longer, so the decision to aim for a shorter report in 2007 is sensible. Rather, the challenge is to combine comprehensive coverage with a clear ranking of risks according to the probability of their crystallising and their severity if they do, and to lay out in an accessible way the economic analysis of those risks.

22. The author's reading of the IMF and World Bank's 2005 assessment of past Financial Sector Assessment Programs confirms this view. The Central Bank may at some stage wish to revisit the conclusions of its FSAP and show how improvements have continued to be made in Iceland's financial stability policies.

This review has made a number of recommendations, and the main ones are summarised below:

(i) Consider whether the current broad definition of financial stability employed is indeed consistent with the Central Bank's understanding of its mandate and the division of responsibilities among the Central Bank, Financial Supervisory Authority and government departments. That might require further discussion with the other authorities.

(ii) Consider the development of a more operational definition of financial stability/fragility, capable of generating an ordinal or cardinal metric to judge the extent of risk to financial stability at any time.

(iii) Be more selective about material on the institutional detail of Iceland's domestic markets and regulatory environment, by insisting on strict relevance to the financial stability objective.

(iv) Rebalance the text a little towards explaining the economics behind the issues at stake in simple terms.

(v) Separate material on financial markets as a source of potential shocks from the market diagnostics on the health of Icelandic financial institutions.

(vi) Assess the specific suggestions of additional topics made in Section 3(c) of this report (e.g. the implications of dispersion of views about economic prospects)

(vii) Introduce more 'benchmarking' by means of historical and cross-country comparisons.

(viii) Develop the regular use of stress tests integrating prudential and macroeconomic aspects.

(ix) Cover the issues of connected lending and the interconnectedness of Icelandic banks in more detail.

(x) Publish regularly as large a fraction as possible of the IMF's 'core' and 'encouraged' Financial Soundness Indicators.

(xi) Review the role of the FSR in the Central Bank's wider communications strategy and investigate ways of reaching out to a wider audience by imaginative repackaging and selection of material.

Several of these recommendations reflect aspirations for financial stability work generally rather than specific weaknesses of Iceland's FSR. Given its advanced starting position, the Central Bank of Iceland can make a significant contribution to improving international best practice. That should help the Central Bank sharpen its internal incentives to carry out high-quality work on financial stability issues, improve its communications strategy and, most important, continue to make Iceland's financial system more robust.

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