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FINANCIAL STABILITY

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 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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Statement of the Financial Stability Committee 15. March 2023

The Icelandic financial system is on a solid footing. The systemically important banks have delivered solid results and they have supported households and businesses. Their capital and liquidity positions are strong.

However, households' and businesses' financial conditions are tightening because of high inflation and interest rates. The outlook is for inflation to be stubbornly high and debt service burdens to grow heavier.

The headwinds facing financial institutions in international markets provide a reminder of how vital it is that deposit institutions maintain enough strength to perform their role of intermediating credit and payments and of analysing and managing risks appropriately through the financial cycle. Given that domestic demand is strong and developments in the financial markets are uncertain, it is important to preserve the resilience of domestic financial institutions.

Tension in the housing market has eased in recent months. Housing supply has increased and the average time-to-sale has grown longer. Real estate prices have begun to fall but remain high by nearly all measures. One indicator of this is the ratio of capital area property prices to construction costs, which is extremely high. Borrower-based measures have significantly reduced high-risk lending. Furthermore, Icelandic banks are strong enough to ease borrowers' debt service by converting their loans to other forms. The Financial Stability Committee (FSN) urges mortgage lenders to work with borrowers, as they have in the past, to minimize the likelihood of financial distress.

The FSN has decided to increase the countercyclical capital buffer rate from 2% to 2.5% of the domestic risk base. The banks are well prepared to satisfy increased capital requirements while maintaining the credit supply. The countercyclical capital buffer is an important element in banking system resilience. This increase is conducive to bolstering that resilience still further in the face of the risks that have accumulated and could materialise in the coming term. The Committee's decision will take effect twelve months from now.

The FSN reiterates the importance of establishing an independent domestic retail payment solution and supports the steps taken thus far towards achieving this goal. It is preferable that this work be expedited to the extent possible so that a conclusion can be reached within one year.

The Committee will continue to apply the policy instruments at its disposal so as to preserve financial stability, thereby enabling the financial system to mediate credit and payments and redistribute risks appropriately.

Symbols:

- * Preliminary or estimated data.
- 0 Less than half of the unit used.
- Nil.
- ... Not available.
- . Not applicable.

Icelandic letters:

ð/Ð (pronounced like th in English this)

þ/Þ (pronounced like th in English think)

In this report, ð is transliterated as d and þ as th in personal names, for consistency with international references, but otherwise the Icelandic letters are retained.

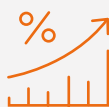
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Financial Stability in a nutshell



Inflation has proven persistent, both in Iceland and elsewhere, prompting central banks to respond by raising interest rates. The macroprudential policy stance has been tightened as well. These actions combine to slow down economies worldwide, as can be seen in falling asset prices, among other things. The same effects can be seen in Iceland, albeit to a lesser degree, as Iceland's key export sectors have not been profoundly affected. The GDP growth outlook has deteriorated, however, and growth is expected to lose momentum this year.



Growth in household debt has continued to ease and is now slightly negative in real terms. Corporate debt is accelerating, however, although growth is still very limited in real terms. Private sector debt is historically low. Higher interest rates and inflation have pushed debt service upwards, however, although the increase is offset by wage rises, a high employment level, and strong GDP growth. Financial distress is still very limited, and financial institutions should be able to offer borrowers ways to lower debt service if arrears begin to increase.



Imbalances in the housing market have receded in recent months, in line with the slight drop in prices. House prices are still high by nearly all measures, though, and well in excess of their long-term trend. The number of homes for sale has risen, fewer purchase agreements are concluded, and the average time-to-sale has grown longer. Rent prices have risen somewhat in recent months, and the expected increase in demand for rental housing, driven partly by labour importation, will put continued upward pressure on rent in the coming term. Strong turnover and rising prices have characterised the commercial property market. Limited supply and robust demand support higher prices.



The financial position of the three large commercial banks is strong. Their capital ratios are high, returns on core operations have increased, expense ratios have fallen, and private sector arrears are at a low. The banks are well cushioned against external economic shocks. One way they can use this extra scope is to support borrowers, households and businesses alike, to withstand financial shocks. The banks must be prepared for the past few years' tailwinds to turn into headwinds.



The banks' liquidity ratios have been broadly unchanged in recent months. In all cases, their liquidity is above the minimum required by the Central Bank. Their market funding has been limited in recent months, both in Iceland and abroad, and there is increased competition for deposits. Credit spreads on their foreign market funding have narrowed somewhat in 2023 to date, and the banks have begun in the past few days to take advantage of this by issuing foreign-denominated bonds, thereby reducing their foreign refinancing risk.



Cyberattacks and attempted cyberattacks are continually increasing. In order to ensure business continuity and guarantee the security of financial market infrastructure, it is vital to bolster financial institutions' and infrastructure operators' preparedness for cyberthreats. Coordinated action plans play a key role in this preparedness. In coming months, the Central Bank will invite systemically important entities to participate in standardised testing to determine their resilience against cyberattacks. It is crucial to guarantee the robustness of the system, particularly regarding payment intermediation. Financial institutions, financial market infrastructure operators, the Central Bank, and the Government are currently responsible for in this work.

Financial Stability: Developments and prospects



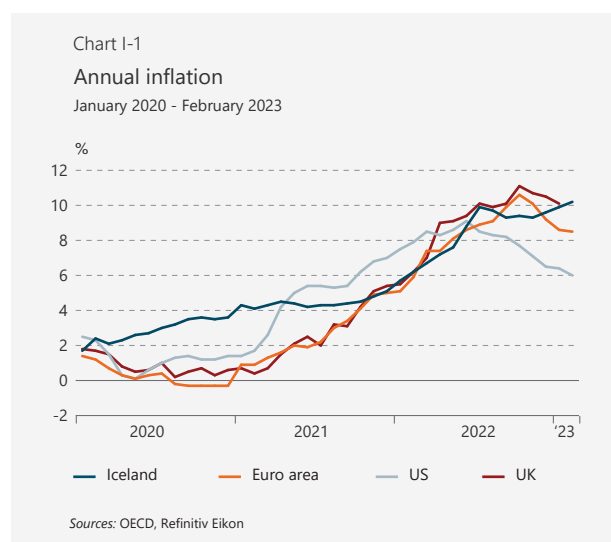
Risks relating to the external position and currency flows

Tighter monetary stance and poorer inflation and GDP growth outlook

Most central banks worldwide are battling high inflation, and policy interest rate hikes have characterised the global economy in the past year. Even though inflation has subsided in some places – in the euro area, the US, and the UK, for instance – recent measurements have exceeded the expectations of analysts who expected a more rapid turnaround. Interest rate hikes are therefore expected to continue in coming months. The GDP growth outlook has deteriorated since 2022. According to the International Monetary Fund's (IMF) January forecast, global GDP growth is projected to measure 2.9% in 2023, or 0.5 percentage points less than in 2022. For 2024, growth is projected at 3.1%, well below the twenty-year average of 3.8%. The poorer GDP growth outlook is due, among other things, to steeply rising interest rates and the war in Ukraine. Last year's surge in COVID-19 case numbers in China and the tight public health measures imposed by the Chinese authorities also cut into output growth. The outlook is for high inflation and the Russo-Ukrainian War to remain challenging this year, although there are hopes of positive effects from the relaxation of public health measures in China.

For Iceland, the inflation outlook has deteriorated, and inflation looks set to be more widespread and persistent than previously anticipated. The January and February CPI measurements were well above analysts' expectations. According to Statistics Iceland's first figures, GDP growth measured 6.4% in 2022, the strong-

est single-year growth rate since 2007. The surge is due primarily to robust private consumption, supported by a positive contribution from investment and exports. The Central Bank's most recent macroeconomic forecast assumes much weaker growth this year, however, or 2.6%, owing to the expectation of slower private consumption growth and less favourable external trade than in 2022.¹ The labour market is expected to remain tight. The labour participation rate has risen, and unemployment is down. Terms of trade for goods and services improved marginally in 2022 but are expected

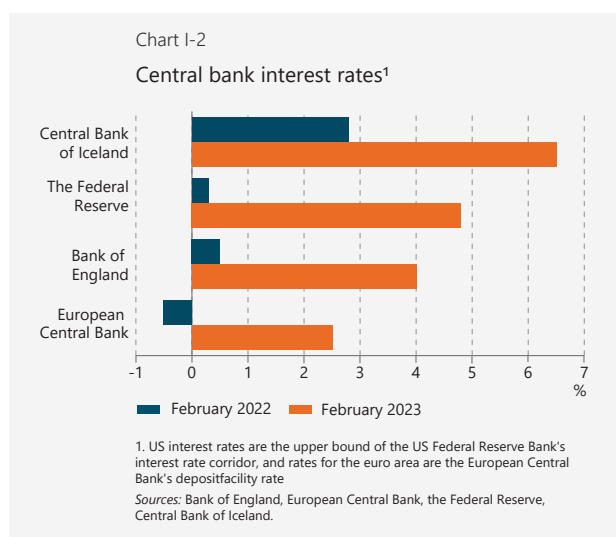


to deteriorate over the next two years. This is due primarily to expectations of falling marine and aluminium product prices and rising imported goods prices.

1. Further discussion of the Bank's macroeconomic forecast can be found in *Monetary Bulletin* 2023/1.

Widespread monetary tightening

Central banks throughout most of the world tightened their monetary stance last year by raising interest rates higher and faster than previously expected and by selling bonds. In Iceland, the policy rate has risen from 2.75% since February 2022 to 6.5% as of February 2023. It bottomed out at 0.75% in May 2021. Elsewhere, the US Federal Reserve has raised its policy interest rate by 4.5 percentage points in the past year, to the current 4.5-4.75%. The Bank of England has raised its key rate by 3.5 percentage points over the same period, to 4%, and the European Central Bank has raised its key rate by 3 percentage points, to 2.5%.



When the pandemic broke out, most European countries relaxed the capital requirements imposed on financial institutions so as to enable banks to support households and businesses by creating the scope for loan write-offs and new lending. Now, three years later, the situation has reversed. Many countries have raised capital requirements once again – particularly the countercyclical capital buffer (CCyB), used in response to increased systemic risk.² In most economies, capital requirements are back to their pre-pandemic level. In deciding to increase them, authorities frequently cite rising asset prices, elevated economic uncertainty, and financial institutions' strong capital and liquidity as grounds for their decision. In Iceland, the CCyB was set at 0% in March 2020 but increased back to 2% as of September 2022. Denmark and Norway raised their CCyB to 2% this past December and are raising it to

2. The main objectives of the countercyclical capital buffer are to strengthen financial institutions' resilience to cyclical risk and to strengthen credit intermediation during contractionary episodes, thereby mitigating the impact of the financial cycle on the real economy. In recent years, the buffer has been built up for precautionary reasons.

2.5% at the end of March. Furthermore, in Sweden and the UK it has been decided to raise the CCyB to 2%, effective in June and July, respectively.

Second consecutive current account deficit, with no turnaround in sight

Iceland's net international investment position (NIIP) was positive by 24% of GDP at the end of 2022; i.e., Icelanders' external assets exceeded foreign nationals' Icelandic assets. By mid-2022, it had fallen markedly since the beginning of the year, mainly because of falling foreign asset prices, while the depreciation of the króna in H2 pulled in the opposite direction. The NIIP declined by 15 percentage points year-on-year in 2022.



The current account deficit for the year totalled 58 b.kr., or 1.5% of GDP. It was Iceland's second consecutive full-year current account deficit. According to the Bank's most recent macroeconomic forecast, the current account is projected to show a deficit averaging 3% of GDP per year over the next three years.³

Foreign tourist numbers rose markedly year-on-year, and tourism-generated export revenues were broadly in line with those from the pre-COVID period. The goods account deficit has ballooned in recent years, however, and doubled since 2019. It was strikingly large in H2/2022, at 7.9% of GDP. For comparison, goods trade generated a deficit of nearly 10% of GDP in H2/2007.

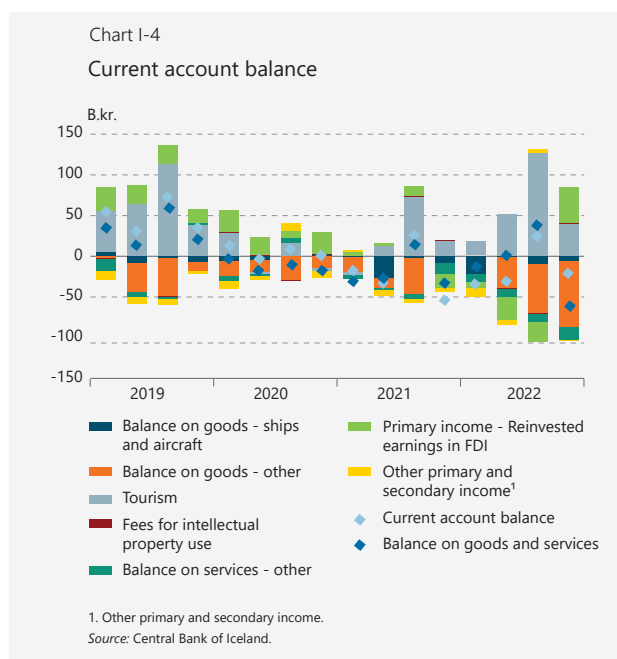
In 2022, goods imports grew by 34% year-on-year, partly because of increased imports of commodities (such as fuel) and investment goods.⁴ Statistics

3. See *Monetary Bulletin* 2023/1.

4. Crude oil prices surged in the wake of Russia's invasion of Ukraine, to around 120 US dollars per barrel by mid-2022. Since then it has fallen markedly, to 80 US dollars per barrel at the end of February 2023.

Iceland revised its treatment of aircraft leasing agreements in external trade data, reverting to the method used previously (prior to the change made in August 2021) and in accordance with international standards.⁵ This shows as a decrease in aircraft imports for 2018-2022 in the cumulative amount of 52 b.kr., thereby reducing the deficit on goods trade over that period.

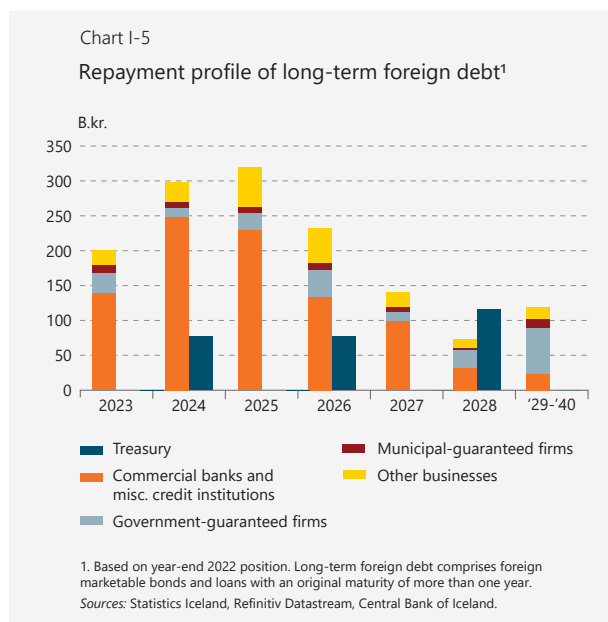
As in the recent term, the balance on income was negative in 2022, mainly because of secondary income outflows and profits generated by foreign-owned domestic subsidiaries. Aluminium company profits weighed heavily in the results for the year as a whole.



DMBs' foreign funding grew year-on-year in 2022 despite unfavourable developments in foreign credit markets

Secondary market yields on the commercial banks' marketable bonds give a fairly reliable indication of developments in terms on foreign funding for domestic entities. Yields rose steeply in 2022, and far more than, for instance, at the beginning of the COVID-19 pandemic, but as is noted in Chapter II, they have fallen just as swiftly in 2023. Few domestic entities have issued foreign bonds in recent years, as corporate borrowers obtain direct foreign financing primarily through foreign banks or through seller loans. Over the coming three years, only the Treasury, the commercial banks, and State-owned enterprises will pay instalments on foreign marketable bonds. Despite poorer

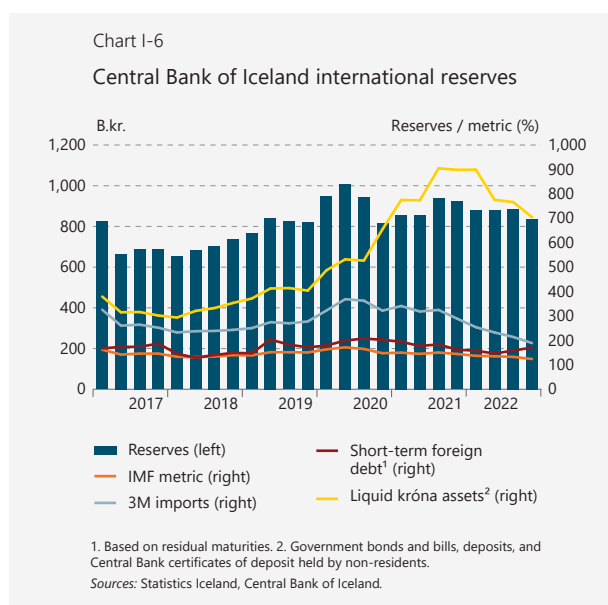
5. In line with the previous practice, operational leasing agreements for aircraft are no longer recognised as aircraft imports. The change made in August 2021 is also discussed in *Financial Stability 2022/1*.



funding terms, the commercial banks sold foreign bonds for around 213 b.kr. in 2022, nearly 19% above the 2019-2021 average. Excluding covered foreign bonds issued for own use.

In terms of residual maturity, Iceland's foreign short-term debt declined markedly between years, partly because the Treasury retired foreign bonds in the amount of nearly 90 b.kr. in 2022. The Treasury last issued a foreign bond in spring 2021.

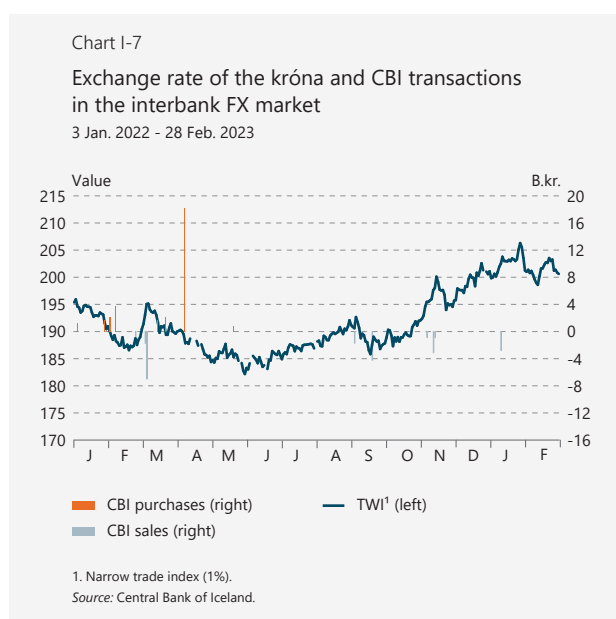
The ratio of the international reserves to short-term debt therefore rose somewhat, to 171% at the year-end. The reserves declined relative to most other reserve metrics, however. Iceland's reserves equalled 124% of the International Monetary Fund's (IMF) reserve adequacy metric at the end of 2022, after



declining by 20 percentage points during the year. Nevertheless, the reserves are strong and well above key benchmarks.

Expectations-driven appreciation of the króna in H1/2022 ...

The króna strengthened by about 7.4% over the first five months of 2022. The appreciation appears to have been driven somewhat by expectations, as the commercial banks' forward foreign currency position grew markedly when customers hedged against the appreciation of the króna or took positions with it. It appears that, investors expected sizeable inflows, possibly because of the post-pandemic rebound in tourism and large capital movements then in the offing; i.e., due to a foreign infrastructure investor's investment in an Icelandic telecom company and to stock listed in Iceland which were to be moved up to the secondary emerging market category by index provider FTSE Russell. Furthermore, the short-term interest rate differential with abroad widened in H1/2022.



... followed by a reversal in the autumn

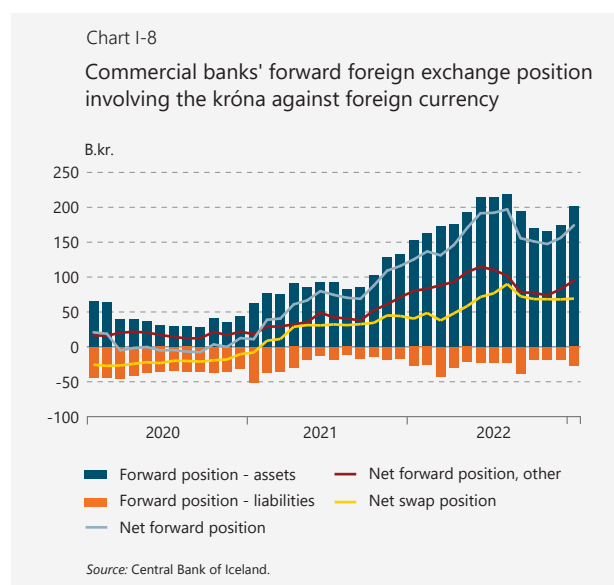
The króna began to slide in June and had depreciated by 8.8% by the end of the year. Downward pressures on the króna intensified somewhat in mid-September, around the time market expectations reversed. By that time, a large share of the expected inflows had materialised, and Iceland's promotion to FTSE Russell's secondary emerging market had to some extent failed to deliver the expected foreign currency inflows. Foreign investors had built up positions in domestic securities early in the year, presumably for the sole purpose of selling them, immediately upon Iceland's promotion,

to funds that invest according to FTSE Russell indices. Foreign currency inflows were therefore below expectations in September, and the commercial banks' net forward FX position shrank by 41 b.kr., or more than one-fifth, during the month, and would fall further in October and November.

Other factors in addition to expectations of known future foreign currency flows doubtless made an impact on expectations. One such factor was the increase in yields on the commercial banks' foreign bonds, which peaked late in the year. This exacerbated uncertainty about domestic entities' financing, whether through foreign issues or via loans from the commercial banks.⁶ Forecasts of the current account balance deteriorated as the year advanced, and the goods account deficit widened substantially during the autumn, which directly affected flows.⁷

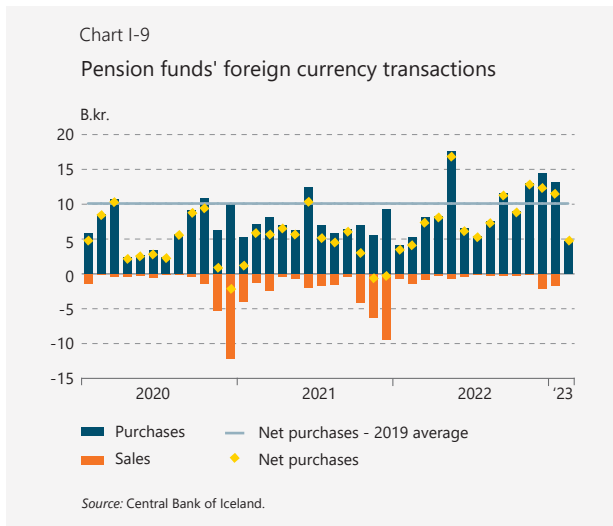
Pension funds dampened volatility, but only on one side of the market

The pension funds' increased foreign exchange transactions from September through the year-end may well have affected expectations as 2022 drew to a close. Their net currency purchases roughly doubled year-on-year, to 104 b.kr. in 2022, including 45 b.kr. in the final four months of the year. Closer scrutiny of their day-to-day transactions shows that they made most of their larger purchases on days when the króna



6. Less favourable terms on foreign-denominated financing could potentially have prompted Icelandic firms to obtain financing in krónur instead and retire their foreign debt. This could have put pressure on the exchange rate. There are hardly any signs that this has already occurred to some degree, according to data on net new lending.

7. For example, see the Central Bank's forecast of the current account balance in the quarterly issues of *Monetary Bulletin* in 2022.



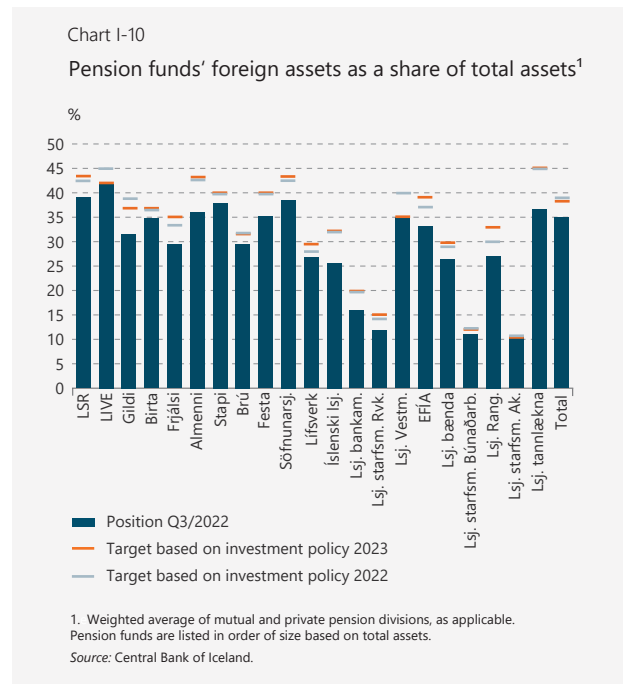
appreciated, even if the exchange rate had fallen during the month in question. The pension funds therefore appear to have played a mitigating role in the foreign exchange market, but mainly on one side.⁸

The pension funds bought foreign currency for 11.3 b.kr. in January 2023. This represents a threefold increase year-on-year but is in line with their market behaviour at the end of 2022. Their purchases in February were more in line with previous years, however. Lower foreign market prices have afforded the pension funds increased scope for foreign investment, and if the bill of legislation raising the maximum ratio of foreign-denominated assets to total assets is passed, that scope could increase still further. On the other hand, it is uncertain how much of the extra authorisation the pension funds would use. If the pension funds' targets according to their investment strategies are weighted by total assets, for instance, it can be seen that they fell by an average of 0.4% year-on-year. Two of the largest funds lowered their targets by 2-3% between years.

The pension funds' investment strategies for 2023 show that their ratio of foreign-denominated assets to total assets as of end-September 2022 was approximately 3.5 percentages below their target for the coming years.⁹ The funds have only sold a small amount of foreign currency since the above-mentioned bill of legislation was introduced before Parliament in spring

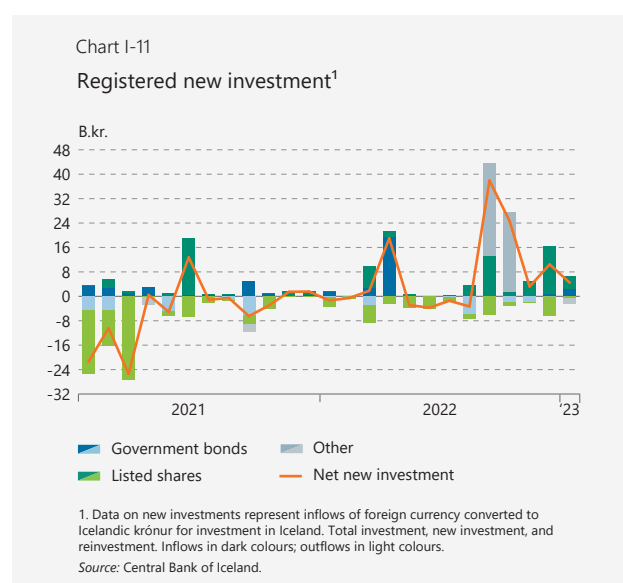
8. Even though data indicate that the pension funds are patient foreign exchange market participants to the extent that they absorb overflows, they can be expected to demonstrate a certain level of demand for currency because of specialised foreign investments that are less sensitive to the market situation.
9. The pension funds are as diverse as they are numerous. They are also long-term investors and give themselves varying lengths of time to achieve their targets. These are targets for positions, which depend on expected price and exchange rate movements and reinvestment. Therefore, a target above their current position need not imply plans for large-scale foreign currency purchases in the coming term.

2022. They will probably conduct their purchases in 2023 in accordance with foreign currency inflows and outflows, as they have in recent years.



One-off items characterised foreign entities' investment

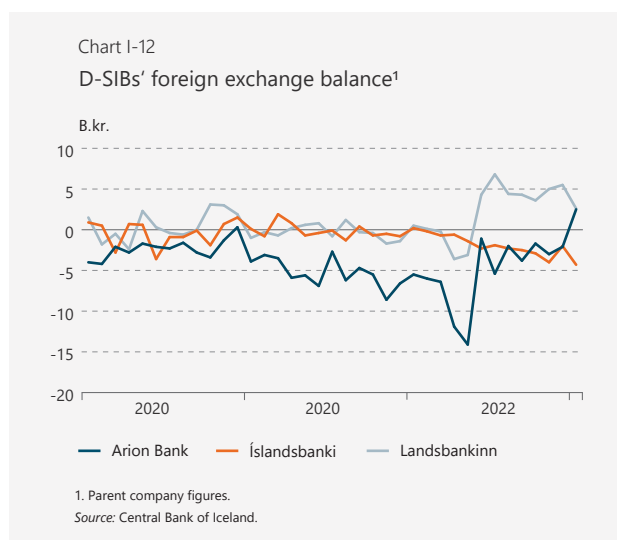
The pension funds' currency purchases in 2022 coincided to an extent with increased inflows from foreign investors for portfolio investment in Iceland. Net registered new investment totalled 81 b.kr., including 25 b.kr. invested in listed equities and Treasury securities in roughly equal measure. If foreign investment is estimated from data on foreign-owned holdings in securities listed on Nasdaq, however, inflows into equity securities were 16 b.kr. higher. However, foreign currency inflows



as a whole were most strongly affected by foreign entities' large one-off investments in unlisted Icelandic shares, which totalled over 50 b.kr. in 2022.¹⁰

Total interbank market turnover rose marginally year-on-year

Total turnover in the interbank foreign exchange market amounted to 385 b.kr. in 2022, an increase of 6% year-on-year. The Central Bank accounted for about 15% of the total, with net purchases of 13 b.kr.¹¹ Foreign currency flows in the market differed from one market maker to another, as they often have in the past. One of the three market makers bought much more currency than it sold, with most of the purchases taking place in H2. This is far from unique, as it primarily reflects customers' demand for currency, which can differ from one customer to another and can change over time.¹² The commercial banks' foreign exchange balance was broadly in equilibrium over the course of the year, rising most in June, by nearly 20 b.kr. combined. It remained relatively stable thereafter.



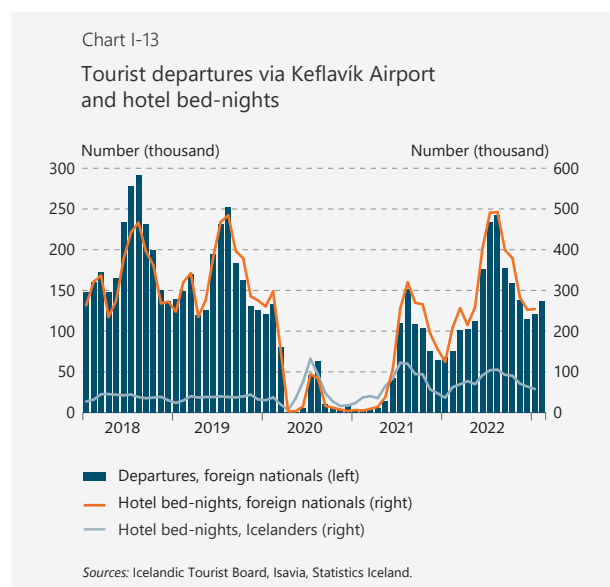
It appears that a variety of factors combined to weaken the króna in H2/2022. The foreign exchange market has been quite stable in 2023 to date, however, and the exchange rate of the króna was about the same at the end of February as at the turn of the year. Thus far, the Central Bank has only needed to intervene in the market once to sell foreign currency, in spite of

10. Some of these transactions were financed in Iceland.
11. The Central Bank trades in the interbank foreign exchange market in order to mitigate excess exchange rate volatility. The Bank's foreign exchange market transactions in 2022 were affected somewhat by *ad hoc* trades in April, when the Bank bought 18 b.kr. in foreign currency at a time of substantial inflows for investment in Treasury securities.
12. Market makers may also trade for their own account, but only to a limited degree, as they are bound by the Central Bank's Rules on Foreign Exchange Balance.

some volatility. The market is shallow, though, and expectations can change at short notice, as can be seen in the past two months' increase in the commercial banks' forward foreign currency position. The decline in yields on the commercial banks' foreign bonds also appears to have calmed the market. Furthermore, trade-related inflows have increased, possibly because of rising interest rates in Iceland, and one-off investments have generated some inflows as well.

Tourism sector activity back to the pre-pandemic level

The tourism industry is now operating at close to full capacity, after pandemic-related public health restrictions were lifted early in 2022. Tourist numbers skyrocketed last summer, and 1.7 million visitors came to the country in 2022 as a whole. Forecasts assume that visitor numbers will continue to rise in 2023, as international flight offerings have increased markedly, not least due to the rapid growth of the airline PLAY. On the other hand, several foreign airlines have cut back flights to Iceland, including Wizz Air, which discontinued flights to three destinations, and United, which discontinued its service between Keflavík and New York. The cutback in flights is not limited to Iceland, however, as some foreign airlines are having difficulty hiring staff for the coming summer. Uncertainty about demand for travel to Iceland, owing to the worsening economic outlook among Iceland's main trading partners, has not materialised as yet. In this context, it is worth noting that the depreciation of the króna in H2/2022 boosted the tourism sector's competitiveness, all else being equal. The strength of the US dollar partially explains the strong demand among Americans for travel to



Iceland. Furthermore, Asian tourists have increased in number in recent months with the abolition of public health measures in China early this year.

Tourist arrivals through points other than Keflavík Airport will also increase this year, although overseas flights from other Icelandic airports are limited.¹³ Hotel capacity puts certain constraints on growth in tourism in many parts of regional Iceland, as new hotel construction has been concentrated in Reykjavík in recent years. This could prove to be a limiting factor during the coming summer season.¹⁴ Furthermore, there is uncertainty about peak season staffing in the sector, as more than half of firms in transportation, transit, and tourism reported worker shortages last summer in Gallup’s corporate survey. Furthermore, tourist arrivals via cruise ship are estimated to increase by 80% year-on-year, according to an analysis by the Icelandic Tourist Board.¹⁵

Hotel bed-nights increased by 91% year-on-year in 2022. Occupancy rates were very high in historical terms last summer but have been broadly at the pre-pandemic level since Q4/2022. Icelanders’ hotel bed-nights increased substantially during the pandemic and remained high well into 2022, even though their travels abroad grew rapidly over the same period. In 2022, Icelanders’ bed-nights in domestic hotels were more than twice as many as in 2019. Concurrent with the rise in bed-nights, the price of hotel accommodation as measured in the consumer price index has risen steeply after plunging in 2020.

Tourism-related systemic risk declines

The domestic systemically important banks’ (D-SIB) loans to tourism operators have increased only slightly since mid-2020. They grew by 7% in nominal terms in 2022, or by 6.2% at constant exchange rates, and they account for some 9% of the banks’ total customer lending and just under 20% of their corporate lending. Loan quality also appears to be improving, and loan write-downs have been falling quarter by quarter ever since Q1/2021. This suggests that tourism companies’ financial position is improving and that arrears have declined.

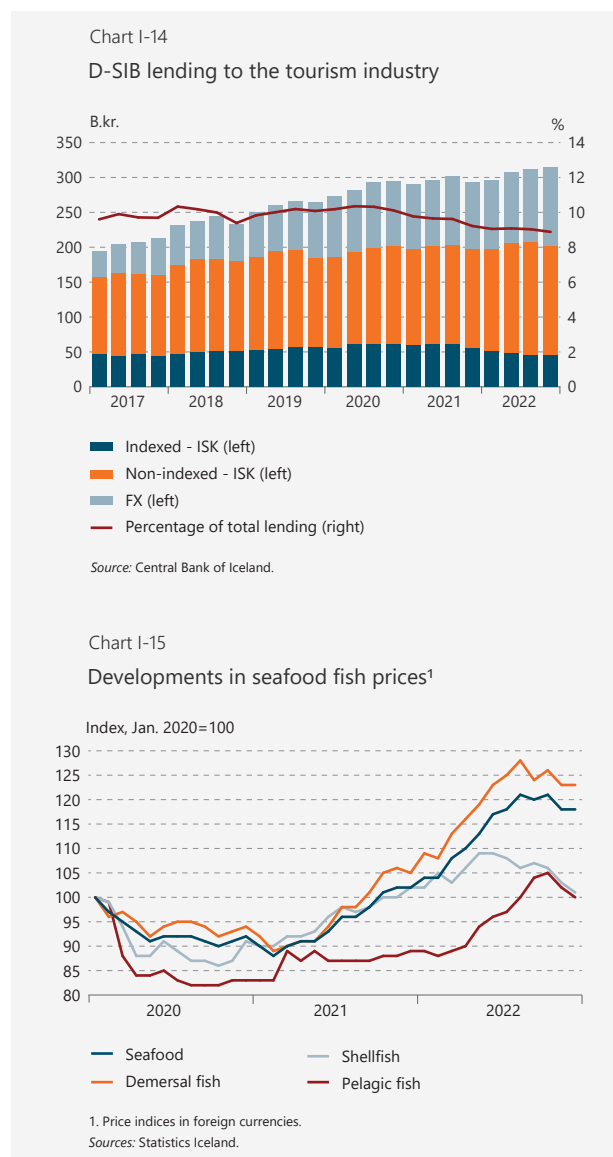
13. Direct overseas flights to Akureyri are now available, and German airline Condor plans to offer flights to Egilsstaðir from May to October.

14. It can be considered likely that tourists who do not stay in regional Iceland generally stay in the country for shorter periods of time.

15. <https://www.ferdamalastofa.is/is/um-ferdamalastofu/frettir/mikid-metar-skemmtiferdaskipa-framundan>

Icelandic marine product export values surged in 2022

The value of Iceland’s marine product exports rose 18% in 2022, owing mainly to significant price increases in foreign markets and a large capelin quota and offset by a contraction in the quota for cod. The foreign currency price of marine products rose by nearly 21% in 2022 as a whole, driven largely by higher demersal fish prices, as can be seen in Chart I-15. The price increase stems in part from an upsurge in demand with the elimination of pandemic-related public health measures and a reduction in supply caused by restrictions on Russia’s access to the markets following its invasion of Ukraine. According to the Central Bank’s most recent macroeconomic forecast, prices are assumed to fall this year, in part because of a weaker economic outlook for Iceland’s main trading partners.¹⁶ As a whole, marine product



16. Published in *Monetary Bulletin* 2023/1.

exports grew by 0.6% year-on-year in 2022, but the outlook is for a contraction in 2023, owing to a reduction in the total allowable catch (TAC) for cod and capelin.

Aluminium prices down sharply after peaking in March 2022

Global aluminium prices soared in 2021, partly because of reduced manufacturing output in China – itself the result of the Chinese authorities’ environmental policies – coupled with a simultaneous increase in demand, in line with the global economic recovery. Prices rose still higher in the wake of Russia’s invasion of Ukraine, primarily because of elevated uncertainty about aluminium supplies at the time, as Russia accounts for some 6% of global production. In the past year, however, prices have fallen swiftly, as have other commodity prices. By December 2022, aluminium prices had fallen by an average of 31% from their March 2022 peak. They are now lower than before the invasion, owing to the worsening global economic outlook, although they remain somewhat above the pre-pandemic level.

Risk associated with domestic asset markets

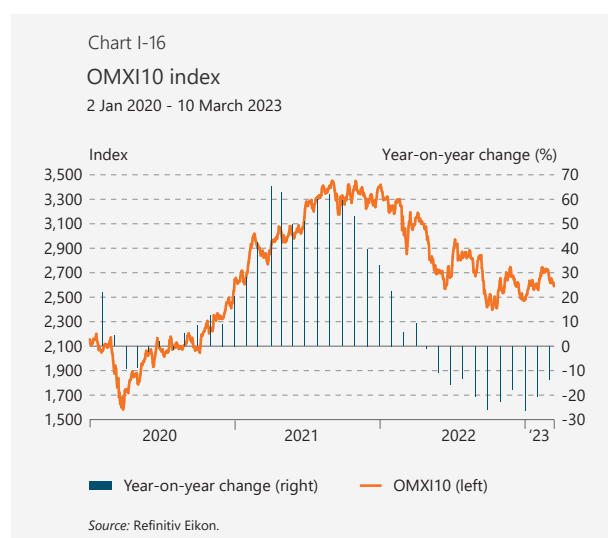
Share prices down sharply in 2022

The domestic equity market, like most of its counterparts abroad, saw prices fall markedly in 2022, owing in part to increased global economic uncertainty and interest rate hikes aimed at curbing inflation. The Nasdaq Iceland Main List fell by 16.8% during the year (12% adjusted for dividend payments), and the OMXI10 index fell 26.5%. Developments in share prices have differed somewhat across companies and sectors. Among Main List companies, the price of shares in Origo rose most, or by 37.5%, whereas other tech and telecom shares lost ground. Iceland Seafood shares fell the most, by 59%, and shares in Marel, which accounts for roughly one-fourth of the OMXI10, were down 43%. Other manufacturing companies’ shares rose in price. All of the insurance and financial companies’ shares fell. Of the 23 companies on the Nasdaq Iceland Main List, 14 saw their share prices fall.

Equity market turnover totalled 1,051 b.kr. in 2022, after contracting by just under 2% year-on-year. Despite marginally lower turnover, transaction numbers rose 21% between years, to a year-end trade count of 117,015. The number of individuals who own stock has more than trebled over the past three years. Four new companies were listed in 2022: Ölgerðin and Nova on the Main List and Alvotech and Amaroq Minerals on

the First North market. Alvotech moved to the Main List in December 2022, and in that same month it became the highest-valued company on the exchange, after its share price rose 68%. Alvotech is also listed on Nasdaq in New York. The Icelandic equity market has been promoted to the secondary emerging market category by index provider FTSE Russell. Iceland’s reclassification is to be implemented in three equal tranches. The first two took place in September and December 2022, and the third is scheduled for 20 March 2023.

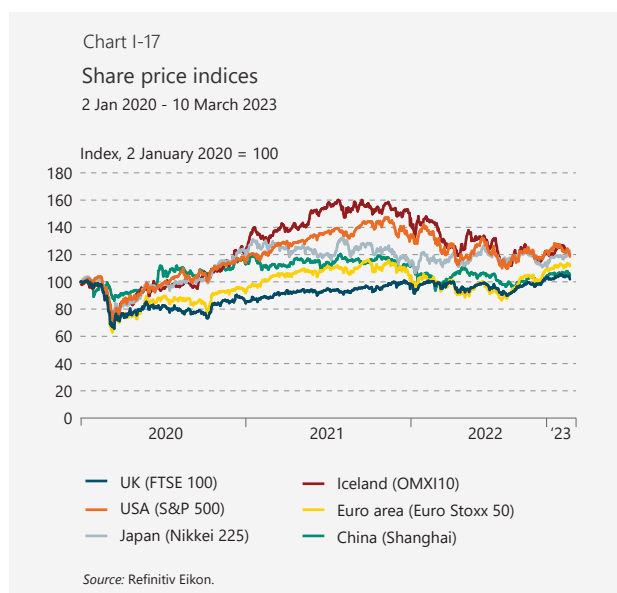
In spite of higher inflation and expectations of further interest rate hikes, domestic stock prices have risen marginally in 2023 to date. Turnover in the first two months of the year totalled 175 b.kr., roughly 3% less than in the same period of 2022. On the other hand, the trade count increased by nearly 3%.



Share prices also fell in most foreign equity markets in 2022. In the US, the S&P 500 fell by over 19%, in its worst performance since 2008, after rising 27% in 2021. European markets have behaved similarly, with the Euro Stoxx 50 falling nearly 12% after jumping 21% in 2021. The British market stood out from the rest with an increase of just under 1%, but it had also risen less strongly than European and US markets did in 2020 and 2021. The markets have been highly uncertain and have shown increased volatility as measured by the VIX implied volatility index, which is designed to reflect economic uncertainty worldwide. Chart I-17 shows how Icelandic stock prices have been in line with foreign markets, particularly those in the US.¹⁷

17. The increased correlation between domestic and foreign share prices has been discussed in an article in *Kalkofninn*, a web-based forum for the publication of articles by Central Bank staff members. For further information, see the Central Bank website: <https://www.sedlabanki.is/utgefid-efni/kalkofninn/grein/2022/06/02/Aukin-fylgni-a-verdi-innlendra-og-erlendra-hlutabrefa/>

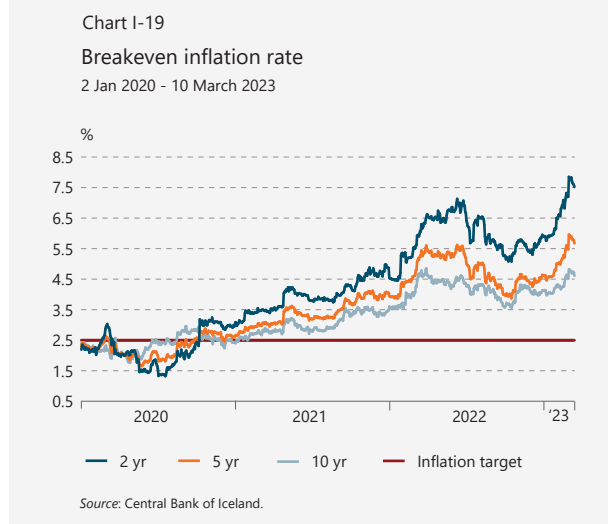
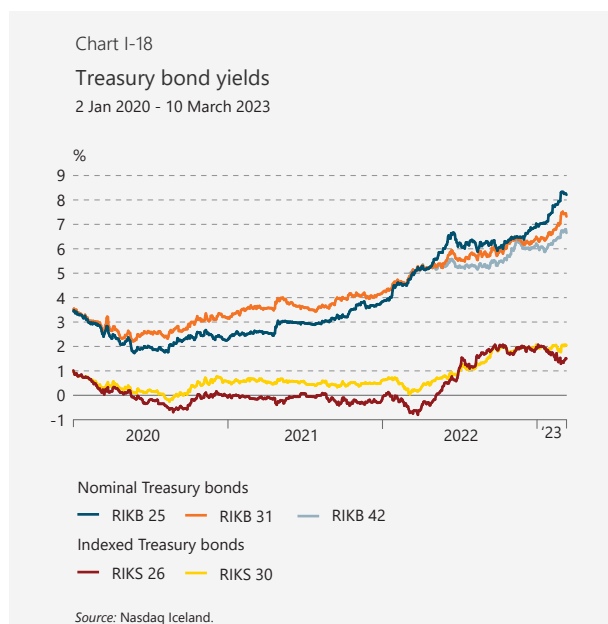
Global share prices have risen year-to-date, but news of the failure of Silicon Valley Bank in the US put downward pressure on equity markets the world over, bank shares in particular.



Downward-sloping Treasury yield curve

Yields in the domestic bond market – particularly on nominal Treasury bonds – rose in 2022, alongside Central Bank policy rate hikes. The increase was greater at the short end of the yield curve. It stemmed primarily from the rising breakeven inflation rate. The nominal yield curve inverted in 2022 and is now downward-sloping; i.e., Treasury bond yields are higher for short maturities than for long ones. A downward-sloping yield curve could reflect investors’ expectations of a forthcoming contraction, with the associated drop in interest rates. Indexed Treasury bond yields followed the same pattern, rising more for short maturities than at the long end of the yield curve. Domestic bond market turnover increased by 4% year-on-year in 2022, to 1,214 b.kr.

Nominal Treasury bond yields have risen marginally in 2023 to date. Inflation measurements were well above analysts’ expectations in January and February, and nominal bond yields surged after the measurements were published, particularly on short bonds. Yields also rose following the policy rate hike in February. Thus far in 2023, indexed Treasury yields have fallen at the short end of the yield curve but are broadly unchanged at the long end. As a result, the breakeven inflation rate has risen this year. In mid-March, the five-year breakeven rate was 5.7% and had risen by roughly 1% since the turn of the year.

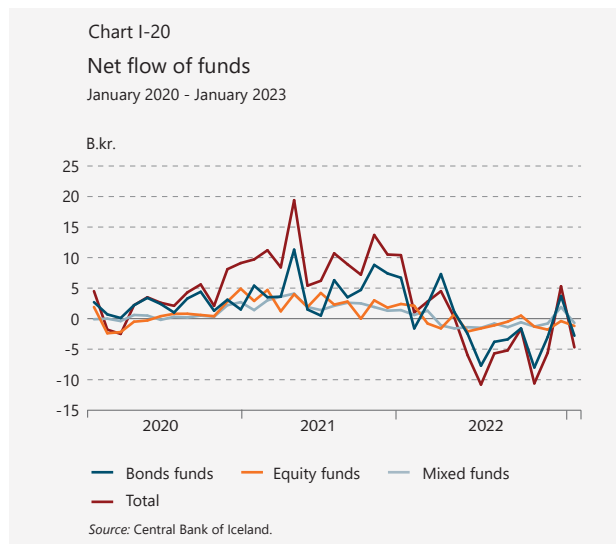


As in Iceland, government bond yields in major advanced economies rose in 2022, in tandem with policy rate hikes and expectations of continued monetary tightening. The US government yield curve also began to slope downwards last year when the Federal Reserve Bank began raising interest rates. For decades, a downward-sloping yield curve in the US has been considered a reliable predictor of a forthcoming economic contraction in the country. Thus far in 2023, yields on advanced economies’ government bonds have fallen marginally this year.

Redemptions from equity and bond funds on the rise

Redemptions of holdings in equity, bond, and mixed funds were significant in 2022, in line with falling asset

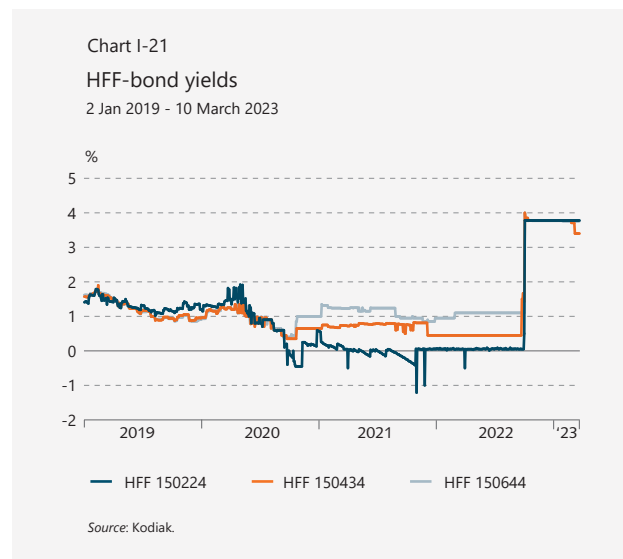
prices.¹⁸ Inflows into the funds declined, and outflows increased at the same time. Net equity fund flows – i.e., redemptions less inflows – were negative by 8 b.kr. in 2022, after having been positive by 31.3 b.kr. in 2021. This could reflect, among other things, expectations of continuing interest rate hikes aimed at curbing inflation. Net bond fund flows were negative by 17.2 b.kr. in 2022 but were positive by 63.2 b.kr. in 2021. Net mixed fund flows were negative by 6.7 b.kr. in 2022 but positive by 27.2 b.kr. in 2021. Net bond fund flows have fluctuated widely from month to month, however: in December 2022, inflows exceeded outflows by 3.7 b.kr. Redemptions have continued in 2023, and net flows associated with the above-mentioned funds were negative in January.



Winding up the ÍL Fund

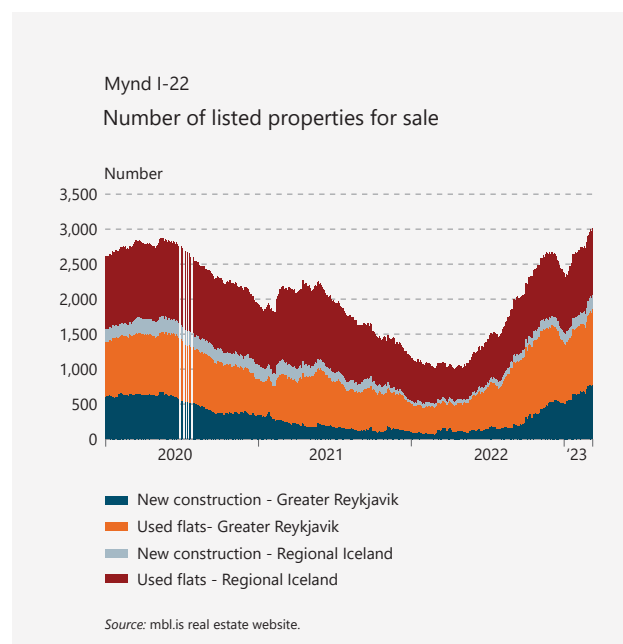
On 20 October 2022, the Minister of Finance and Economic Affairs presented the results of a report on the processing of ÍL Fund’s assets and liabilities. All else being equal, the Fund will clearly generate sustained losses in coming years. The Minister engaged an advisor to hold discussions with bondholders concerning the possibility of winding up the Fund. The largest bondholders – domestic pension funds – are of the opinion that there are no grounds for negotiations. The next steps in winding up the Fund are therefore undetermined. News coverage of the possible winding-up of ÍL Fund pushed housing bond yields up strongly, causing the price of the bonds to fall. Trading with the bonds is sparse, however, and there is no market-making. The news coverage did not have much impact on Treasury bond yields, however.

18. Mixed funds invest in both equities and bonds, in accordance with their investment strategy. No particular preference is given to either asset type.



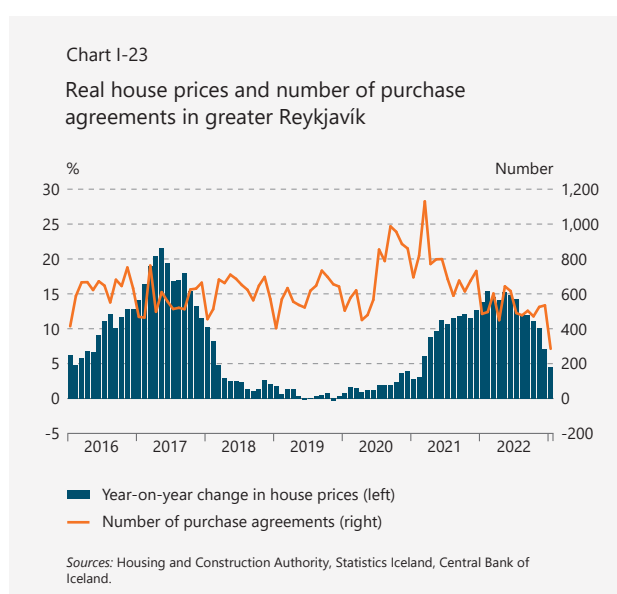
Continued growth in supply of homes for sale

The supply of homes for sale in the capital area has increased rapidly since May 2022 and is now broadly back to the pre-pandemic level. The number of properties advertised for sale in regional Iceland has increased as well. The number of newly built properties on the market has risen sharply, particularly in greater Reykjavík, where just over 750 newly constructed homes were available for sale in early March, up from 100 a year earlier. Part of the increase in new construction advertised for sale is due to the fact that contractors put homes on the market earlier than before, but with a long delivery time – over twelve months in some cases. Rising interest rates, tighter borrowing requirements, and house price inflation far in excess of fundamentals have dampened demand in the market, thereby lengthening the time-to-sale for advertised properties.



House price inflation reverses course

The twelve-month rise in the capital area house price index measured 4.5% in real terms (14.9% in nominal terms) in January. The increase was due entirely to price movements in H1/2022. In real terms, house prices peaked in June 2022 and have fallen by 3.4% since then. Market turnover has contracted sharply, as can be seen, for instance, in a marked year-on-year decline in the number of purchase contracts finalised. In greater Reykjavík, an average of 450 purchase contracts per month were concluded in November through January, some 30% fewer than over the same period a year earlier. In January alone, only 290 contracts were finalised, the smallest single-month total since February 2011.



The turnaround in the housing market in mid-2022 can also be seen in the distribution of purchase prices relative to asking prices nationwide.¹⁹ In Q2/2022, nearly a third of properties sold at a discount on the asking price, but by Q4 that share had risen to 62%. For comparison, the same share was around ¾ from 2018 through mid-2020. During the housing boom of 2016 and 2017, it fell to a local trough of 58%. Furthermore, the share of properties selling at 5% or more above the asking price declined by nearly 13 percentage points between H1 and H2/2022, from 19% in H1 to 6% in H2. Between 2018 and mid-2020, the same share was around 1%, but from 2012 until then it had peaked at 4.2% in Q2/2017. The large proportion of properties selling at a premium on the asking price

¹⁹ The premium or discount is calculated as the purchase price less the advertised asking price for the property. Data extend only to purchase agreements for which it is possible to link the purchase contract to the advertised asking price. They include about three-fourths of all purchase contracts made during the period.

in H1/2022 is a manifestation of the strong demand pressures then characterising the market. Since then, increases in mortgage lending rates and other factors have moved the market towards equilibrium, although prices are still relatively high. There are signs that this distribution of purchase prices relative to asking prices has moved closer in recent months to the pattern seen before the pandemic.

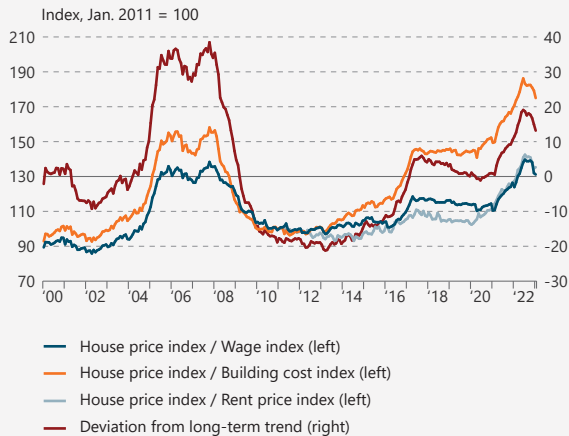


House prices have also begun to fall relative to fundamentals. The deviation of prices from long-term trend peaked at 19.1% in June 2022 but has narrowed since, to 13.2% as of January 2023. The ratio of house prices to construction costs has behaved similarly, falling by 6% between June 2022 and January 2023. The ratio of house prices to rent prices peaked in July 2022 but had fallen by 5% in January 2023. Rent prices have diverged from house prices in the recent past. The capital area rent price index rose by nearly 6% in H2/2022, but from the beginning of 2020 until then it had only risen by 8.4%. The capital area house price index, on the other hand, jumped nearly 50% over the same period. The general wage index has also risen in excess of house prices recently. The ratio between the two peaked in July 2022 but had fallen just over 6% by January 2023.

Furthermore, in recent months, the generalised supremum augmented Dickey–Fuller (GSADF) test for the ratio of capital area house prices to the general wage index has indicated that imbalances in the market are receding. However, the GSADF test, which is designed to pinpoint bubble formation in asset markets, still shows signs of a housing bubble in the

Chart I-25

Capital area house prices and their determinants¹

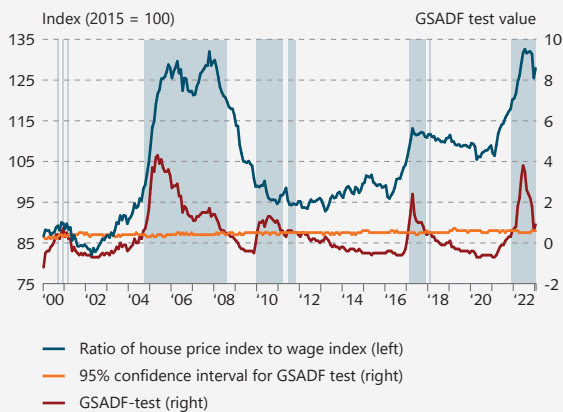


1. Long-term trend estimated using the capital area house price index, deflated with the CPI. Trend is determined using a Hodrick-Prescott filter with a multiplier of $\lambda = 32,400,000$, in accordance with Ravn, M.O., and Uhlig, H. (2002). Notes on adjusting the Hodrick-Prescott filter for the frequency of observations. Review of Economics and Statistics.

Sources: Housing and Construction Authority, Statistics Iceland, Central Bank of Iceland.

Chart I-26

Ratio of house prices to wage index¹



1. The generalised supremum augmented Dickey-Fuller (GSADF) test is a unilateral unit root test [Phillips, Shi, and J. Yu (2015)] that seeks an explosive root in asset prices. Tolerance levels are determined using Monte Carlo simulation. The shaded areas indicated periods when it is not possible to reject the explosive root hypothesis. Seasonally adjusted figures.

Sources: Housing and Construction Authority, P. C. B. Phillips, S. Shi, and J. Yu (2015), "Testing for multiple bubbles: Historical episodes of exuberance and collapse in the S&P 500", International Economic Review, 56, 1043-1078, Statistics Iceland, Central Bank of Iceland.

greater Reykjavík property market, although that could change in coming months if the current trend holds.

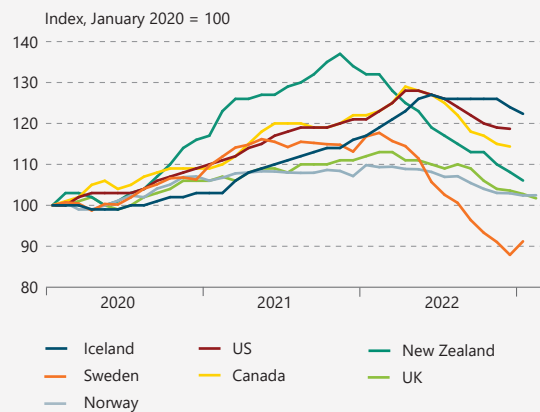
House prices have begun to seek a new equilibrium, even though they are still quite high and diverge widely from fundamentals. This trend is likely to continue in coming months, and the possibility of a drop in real prices – or even in nominal prices – cannot be excluded. Developments will depend for the most part on the interactions between inflation, interest rates, and households' disposable income.

Property prices are falling in many economies

In several countries, house prices have continued to fall significantly in recent months. As is discussed in *Financial Stability 2022/2*, the decline is due to rising interest rates in the countries concerned, plus the high inflation that has eaten into households' real disposable income. This trend has been ongoing since mid-2022. In Sweden it has been particularly rapid: House prices climbed nearly 18% in real terms (25% in nominal terms) between January 2020 and February 2022, and from then until January 2023, real house prices fell by 23% and nominal prices by 14%. By late 2022, real house prices in Sweden were at their lowest since June 2015. In Norway, house prices rose less steeply during the pandemic than they did in Sweden – by just over 9% in real terms and 18% in nominal terms – from January 2020 through March 2022. From March 2022 through February 2023, real prices declined by just over 6% and nominal prices by 1%. In Canada and the US, house prices peaked in April and May 2022 and have been falling since. According to the most recent data, real prices are down just over 11% in Canada and just over 7% in the US.

Chart I-27

Real house prices in chosen countries¹



1. Indices for US and Canada measure changes in single-family home prices and are Case-Shiller indices. The CPI for New Zealand is published quarterly; therefore, value for January 2023 is deflated with the CPI for Q4/2022. Otherwise, the CPI is linearly interpolated where values are missing. Comparability between indices from different countries cannot be guaranteed.

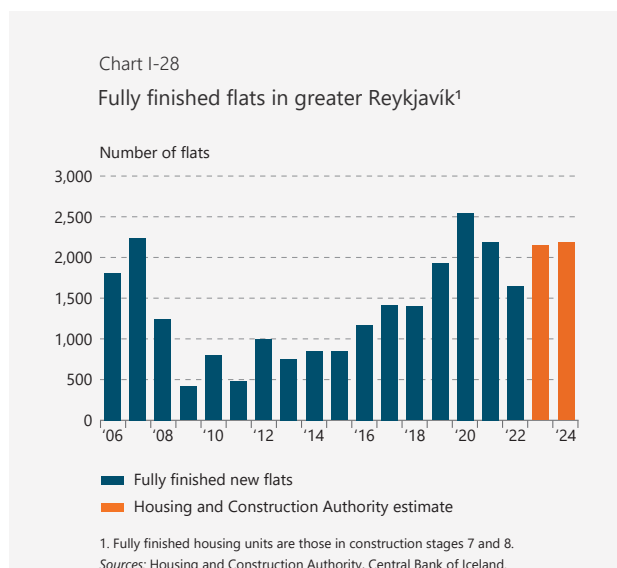
Sources: Macrobond, Nationwide, Real Estate Norway, Statistics Iceland, S&P Global, Teranet, Valueguard, Central Bank of Iceland.

Large number of homes under construction

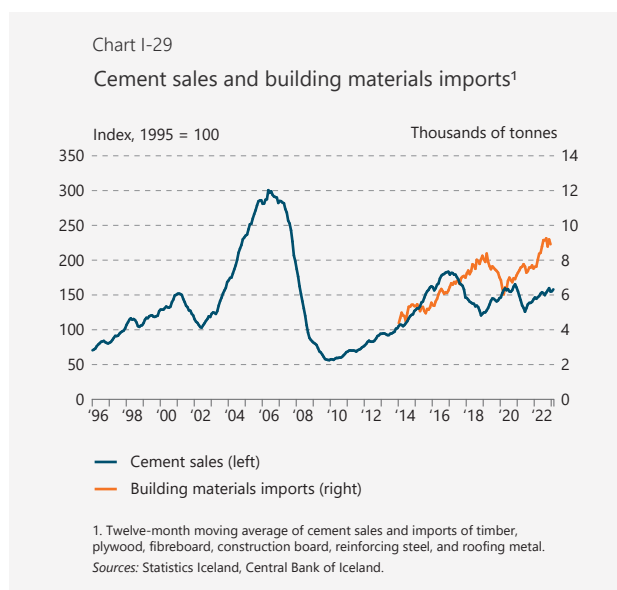
The number of fully finished homes declined somewhat between 2021 and 2022, from nearly 2,200 to just over 1,600. That number is nevertheless on the high side relative to 2008-2018, when an average of 940 new properties were completed each year. Since 2019, however, the average has exceeded 2,000 per year. According to a recent forecast from the Housing and

Construction Authority, more than 4,300 new homes are set for completion in the next two years.

Other indicators also suggest that the construction market is still quite tight. According to figures from Statistics Iceland, there were nearly 1,500 available jobs in the construction industry in Q4/2022, or roughly 8.1% of jobs in the sector. The number of persons employed in the construction sector was up nearly 14% year-on-year in Q4/2022.



Steep increases in the price of various inputs following Russia's invasion of Ukraine – timber and reinforcing steel, for instance – have reversed rather quickly. This price volatility does not appear to have made a significant impact on the volume of imported construction materials, which has been very high since March 2022. According to the most recent figures, there are no signs of a downturn in imports of con-

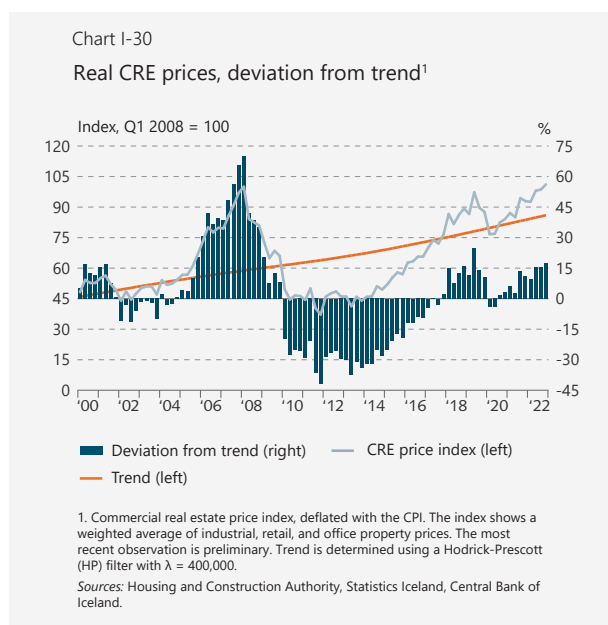


struction inputs, which accords well with the above-mentioned indications of strong activity in the sector at present.

It takes time for the construction industry to respond to changes in demand for housing. If inflation proves persistent in the coming term and interest rates are therefore higher than they would be otherwise, demand for housing is likely to remain considerably weaker than it has been in the past two years. The increased supply of newly built homes over the next two years could end up outstripping demand, thereby putting downward pressure on house prices.

High prices and strong turnover in the commercial property market

The commercial real estate (CRE) price index, a measure of real CRE prices in greater Reykjavík, rose by 8.8% in 2022, ending the year at an all-time high.²⁰ The index was then 17.5% above its trend level, the largest deviation from trend since mid-2019. Other price metrics also suggest that CRE prices are historically high. Turnover according to registered CRE purchase agreements in greater Reykjavík rose steeply in 2022, to the largest single-year total on record. Turnover outside the greater Reykjavík area has risen as well. It grew in particular in Q2 and Q3 but has contracted in the past few months.



Most measures suggest that demand for commercial property is strong. At the end of 2022, the number of persons employed in the labour market had

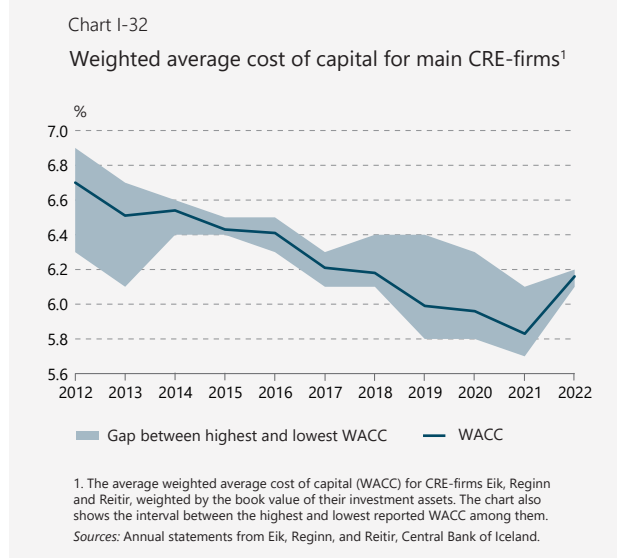
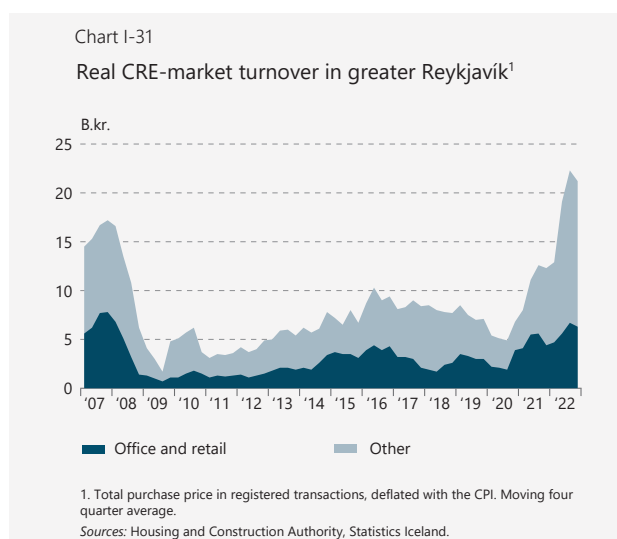
20. The most recent CRE price index value is preliminary and could change if purchase contracts are registered late.

risen by 5.6% year-on-year. Furthermore, both jobs and employers had increased in number since H1/2021. Strong GDP growth and swift growth in private consumption have also stimulated demand for commercial real estate.

Higher interest rates erode large CRE firms' earnings

The large CRE firms – Eik, Reginn, and Reitir – had a strong operating performance in 2022. Demand for property was strong, and a large proportion of the companies' properties were leased out. Most of the leases are indexed or linked to turnover, and growth in rental income slightly outpaced inflation during the year. Furthermore, rent arrears declined in 2022. Returns on investment assets measured 5.5% in 2022 and increased slightly between years. Risk-free returns increased somewhat during the period, and the calculated risk premium therefore declined by just over 0.3 percentage points at the same time. Rising interest

rates adversely affected the companies' earnings in 2022, particularly through investment asset valuations and increased financing costs. The general interest rate level affects investment asset valuations through the weighted average cost of capital (WACC). The CRE firms' combined cost of capital, weighted by book value of investment assets, rose by 0.3 percentage points in 2022, after having fallen continuously since 2014. This increase explains most of the 6.5 b.kr. decline in the value of the companies' combined investment assets in Q4/2022. The situation has changed markedly relative to the not-too-distant past, as valuation adjustments had made a strongly positive impact on the companies' earnings each quarter from H2/2020 onwards. Furthermore, higher financing costs, which stemmed mainly from increased indexation on index-linked debt, had also made a negative impact on their earnings in 2022. The CRE firms' combined equity ratio fell by just over a percentage point in 2022, to just under 32% at the year-end, while their debt-to-value ratio rose marginally, to a year-end value of 63%.



Increased lending to construction and real estate companies

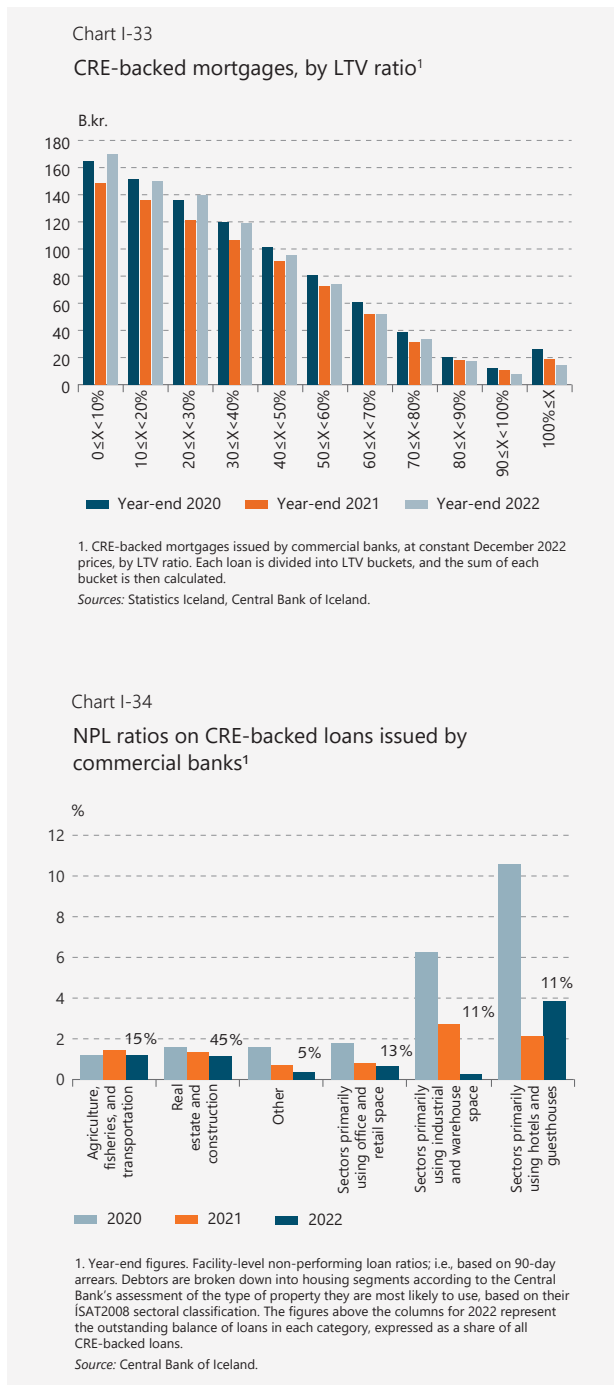
The commercial banks' CRE-backed loan stock totalled 873 b.kr. at the end of 2022, an increase of 8.2% year-on-year in real terms, after contracting over the three years beforehand.²¹ Most of the year's growth was due to a 13.6% increase in lending to the construction and real estate sector. The construction and real estate sector is also the largest in terms of CRE-backed loans. Despite the increase in lending, the amount of poorly hedged risk in these sectors – defined as the amount of loans with an LTV ratio over 90% – declined by over 5% in 2022. Poorly hedged risk associated with the banks' CRE-backed loans contracted overall by 25% in 2022, on the heels of a 22% contraction in 2021.²² This suggests that the banks' CRE-linked credit risk has decreased significantly. It should be noted, though, that rising commercial property prices could create a false sense of security by lowering recorded LTV ratios. If the high price is not well enough supported by fundamentals such as demand and revenue flows, or if it is supported by unusually favourable factors that could change suddenly – such as low interest rates – it

21. The figure is based on the total, excluding borrowers in sectors where loans backed by collateral other than real estate weigh heavier; i.e., fishing, agriculture, and transportation and transit. These sectors are not included in this section unless otherwise stated. The total including these sectors is 1,031 b.kr.

22. The weighted average LTV ratio was just under 40% at the end of 2022 and had held more or less unchanged between years.

could simply reflect a greater probability of a collapse in prices. This applies not least to shallow, relatively illiquid markets such as Iceland’s CRE market.

The facility-level non-performing loan ratio on CRE-backed loans declined by 0.3 percentage points in 2022, to 1.2% by the year-end. It has fallen for borrowers in all sectors except guest accommodation, where it rose from 2.1% to 3.8% during the year.

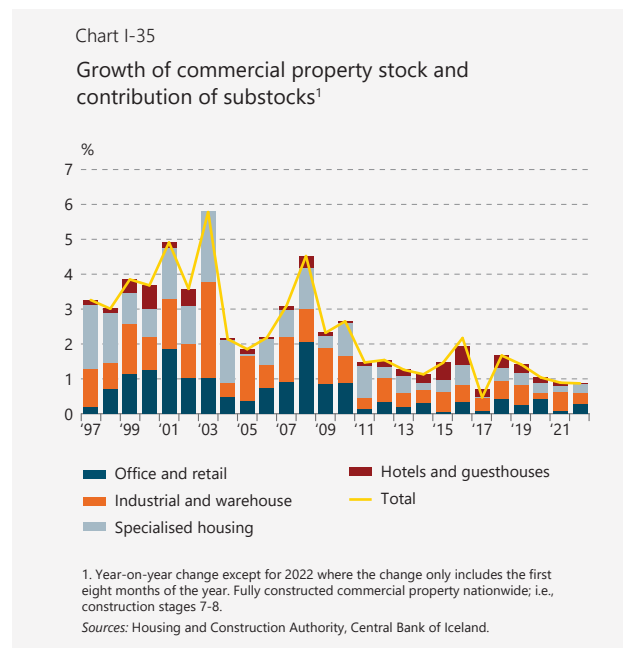


Supply inelasticity supports high market prices

The number of advertisements for vacant commercial property at the end of 2022 indicates that vacancies in

the capital area are few in historical context. Property available for leasing has declined as a share of the stock of fully finished commercial property for all property types. Demand for industrial and warehouse space in greater Reykjavík appears particularly strong.²³

The nationwide CRE stock increased by an average of 1.3% per year from 2011 to 2021. From 2000 to 2010, however, it grew by an average of 3.3% per year. Apparently, contractors have focused mainly on residential housing in recent years, as house prices have been very high and a number of neighbourhoods in Reykjavík have been rezoned for residential instead of commercial property. Limited supply and high prices appear to be the hallmarks of the CRE sector at present. This is due in large part to the aforementioned emphasis on residential construction, the limited supply of lots, and capacity constraints in the construction sector. The current downward trend in house prices could create the incentive for more CRE development, which would be a move in the right direction.



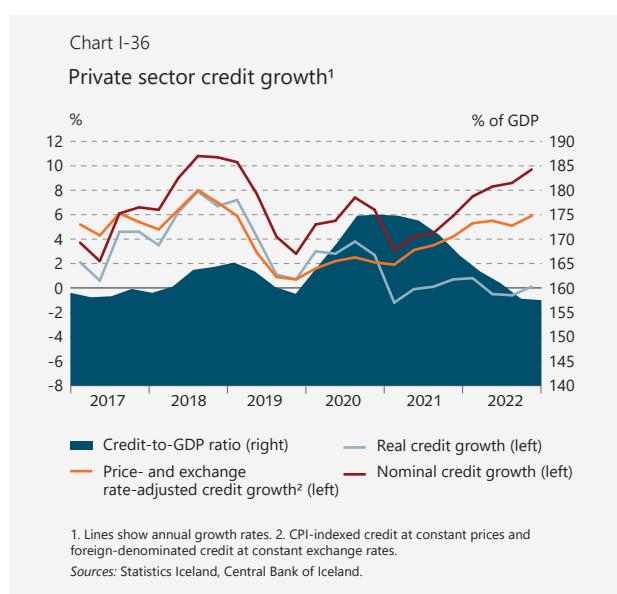
It is important to guard against the volatility that has characterised the commercial property market through the years. Harmful price volatility results when large supply-demand mismatches develop in the market. At present, there appears to be a need to limit such mismatches by containing demand-side expansion and creating conditions to facilitate increased supply.

23. Based on an analysis of the capital area commercial property market, carried out by Reykjavík Economics for the Central Bank at the beginning of 2023.

Risk associated with private sector debt

Private sector debt ratio declines

Private sector debt was flat in real terms in 2022.²⁴ It grew far more in nominal terms, or 9.6%, owing partly to high inflation and the depreciation of the króna over the period, both of which pushed nominal debt values upwards. In inflation- and exchange rate-adjusted terms, growth measured 5.9%. The private sector debt-to-GDP ratio was 157.3% at the end of 2022. It fell by 9.4 percentage points during the year, mainly because of strong GDP growth.



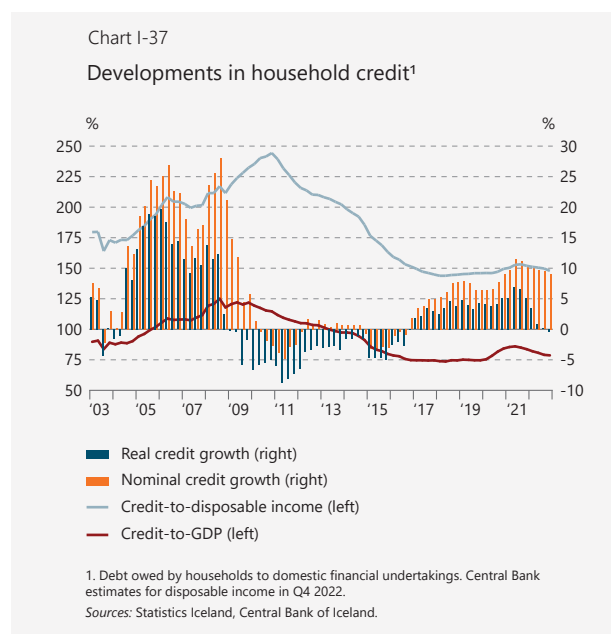
Growth in household debt loses pace

The household debt-to-GDP ratio declined by 5 percentage points year-on-year in 2022, to 78.6% at the year-end. The ratio of debt to disposable income fell as well, to 148% by the year-end. Households' debt position has been developing favourably and is low in historical context.

Household debt has been growing more slowly since the last *Financial Stability* report. At the end of January 2023 it had contracted by 0.1% year-on-year in real terms but grown by 9.9% in nominal terms. Indexation on indexed loans is one of the main drivers of nominal growth, whereas growth adjusted for indexation measures 5.3%. New lending to households has eased in recent months, particularly to include mortgage lending, as financial conditions have deteriorated. This trend is in line with declining housing market turnover. The outlook is for growth in house-

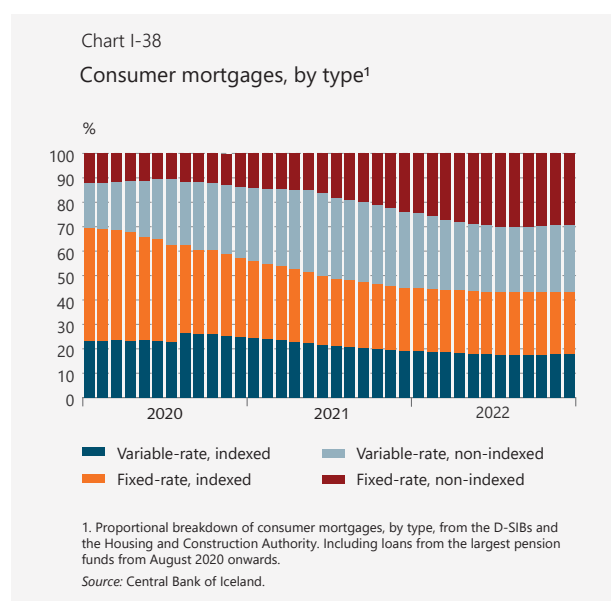
24. The private sector includes households and non-financial corporates.

hold debt to slow further in the coming term. The commercial banks' responses to the Central Bank's lending survey suggest that household demand for mortgage loans will continue to slowly taper off in the next several months.²⁵



Slight rise in share of indexed mortgage loans

Household demand for indexed loans has grown in recent months, whereas demand for non-indexed loans has subsided. Since November, the majority of net new credit system mortgage loans issued to households have been indexed, and indexed loans have therefore increased marginally as a share of the outstanding



25. The survey was conducted in January 2023.

mortgage loan stock.²⁶ A number of indicators imply that this trend could accelerate in the coming term, particularly if non-indexed lending rates remain high. This would mark a shift in the composition of household mortgage debt, as non-indexed mortgage loans have gained significant ground in the past few years.

Households' access to new non-indexed mortgage loans is now tighter than before. Because of more stringent borrowing requirements coupled with rising non-indexed mortgage interest rates and high house prices, fewer households satisfy the minimum debt service capacity requirements for such loans. Because indexed loans have a lower debt service burden at the beginning of the loan term than comparable non-indexed loans do, households have readier access to indexed loan financing.

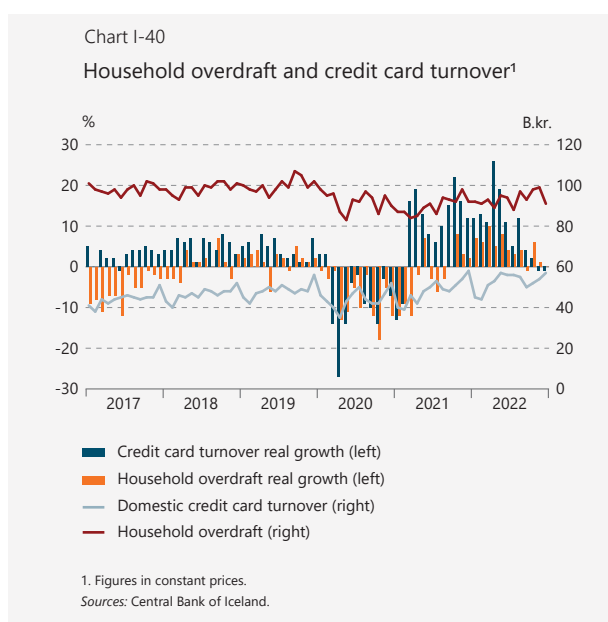
Interest rates on non-indexed mortgages have risen in recent months, in tandem with the increase in the Central Bank's key rate, whereas indexed mortgage rates have risen far less. The weighted average interest rate on outstanding non-indexed variable-rate mortgages was 7.76% in January 2023, more than double the lowest rate (from 2021). Mortgage lending rates have risen even further following the increase in the Central Bank's key rate in February 2023, but the effects of that rate hike do not yet show in Central Bank data. Over half of non-indexed mortgages, or around 707 b.kr., bear fixed interest. Rates on these loans are fixed for either three or five years from the date of issue. The fixed interest period on loans totalling 74 b.kr. will expire this year, and interest rates will then be reset. As can be seen in Chart I-39, even higher loan balances will be subject to interest rate reviews over the next two years. All else being equal, interest rate reviews will cause debt service on the affected loans to rise markedly, as most of them were granted on unusually favourable terms. Rising debt service on non-indexed loans could provide an incentive for households to refinance, swapping part or all of their debt for indexed loans in order to lower their monthly payments. As yet, however, there are few visible signs of such voluntary restructuring. It should be borne in mind that real rates on non-indexed loans are still negative, and considerably lower than on indexed loans. As a result, non-indexed loans are still a favourable option for households that can handle the debt service burden.

26. Net new loans are new loans less debt retirement and prepayments in excess of contractual requirements.



Overdraft loans grow in tandem with credit card use

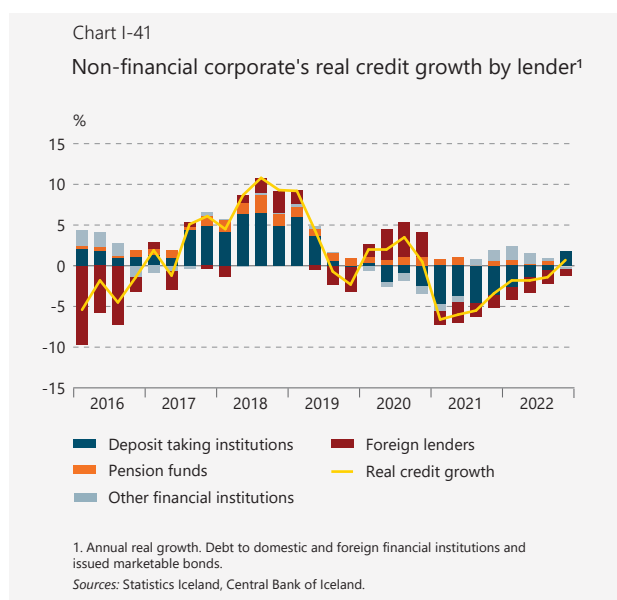
Households have increasingly sought out overdraft loans from deposit institutions in the recent term. The overdraft loan stock is still small in historical context, however, whether in terms of the outstanding overdraft balance or the ratio of overdraft loans to either GDP or disposable household income. Furthermore, it should be borne in mind that the Central Bank's monthly figures on credit institutions' household overdraft loans also include month-end credit card balances, among other things. As a result, changes in the total balance of overdraft loans also reflect changes in credit card use over time. Credit card turnover shrank markedly during the pandemic, as did the stock of overdraft loans. That



trend reversed after public health measures were lifted, and credit card turnover has grown rapidly since then.

Banks' lending growth drives growth in corporate debt

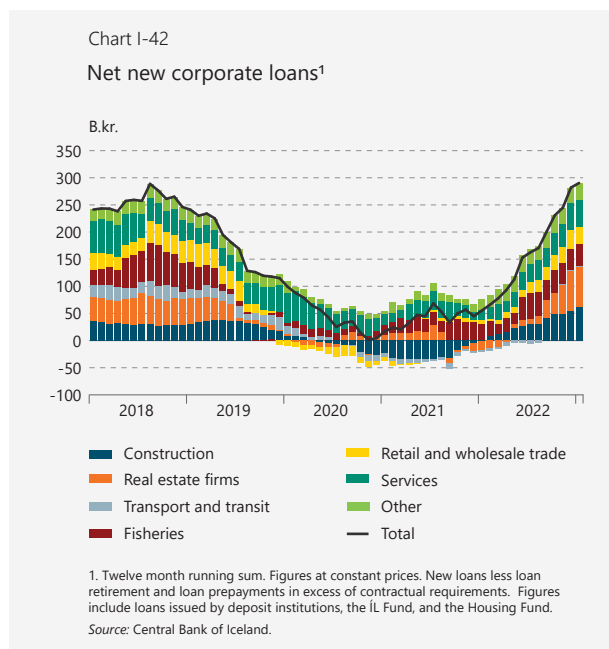
Year-on-year growth in corporate debt turned a corner in 2022, flipping from being negative (at constant prices) in H1 to being positive by 0.4% at the year-end. It was driven by an increase in D-SIB lending, as debt owed to other domestic and foreign lenders contracted in real terms. Real growth in corporate debt is still moderate, and debt in the sector as a whole is historically low. The corporate debt-to-GDP ratio was 78.8% at the end of 2022, after falling by over 4 percentage points during the year. This is Iceland's lowest corporate debt-to-GDP ratio since 1998.



The banks' corporate lending gained momentum in early 2022. For the year as a whole, net new lending to businesses amounted to 302 b.kr., the largest single-year total on record. D-SIB loan growth was most pronounced to companies in retail and wholesale trade, real estate, and construction. It was particularly strong in the construction sector, at 16.7% in real terms. This swift growth rate is due both to strong demand fuelled by buoyant construction activity and to slower sales of newly constructed buildings, which have hindered retirement of development loans.²⁷

Terms on corporate loans have not been excluded from the effects of rising interest rates. About 55% of the banks' corporate loans are non-indexed and bear variable interest rates. As of end-January 2023, the weighted average interest rate on such loans was

27. See the section on the residential housing market in Chapter I.



nearly 9.1% and had risen by 3.5 percentage points in a single year. Another third of corporate loans are foreign-denominated, and rates on these have been climbing rapidly in recent months, in line with foreign central banks' policy rate hikes. In spite of these developments, firms' demand for credit has remained strong, and according to the results of the Central Bank's most recent lending survey, the banks do not expect it to change much in coming months.

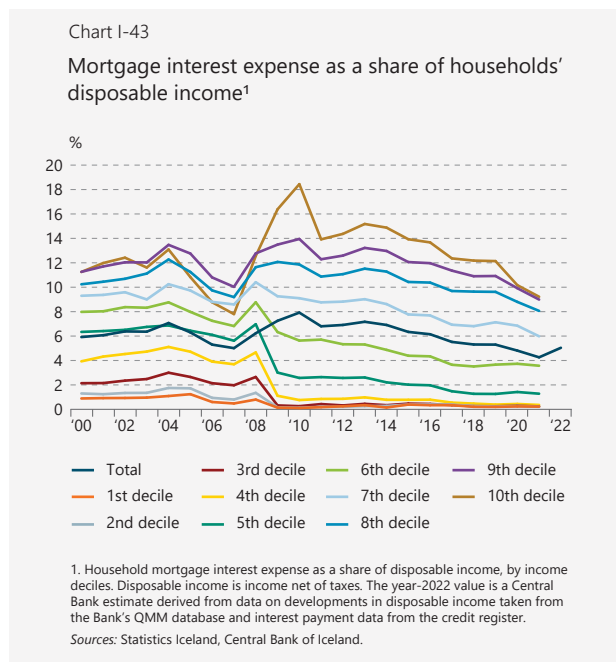
Corporate financing through the domestic bond market has declined concurrent with this more rapid growth in bank lending. Corporate bond issuance contracted year-on-year in 2022, particularly among real estate firms. Furthermore, corporate lending by alternative investment funds contracted by over 3 percentage points in real terms in 2022.

Risk associated with households' and businesses' position

Interest rate hikes add to households' interest burden

As is discussed in the section on private sector debt, interest rates on loans to households and businesses have risen sharply since mid-2021. Interest expense can be expected to keep climbing in the near term, in tandem with rising nominal interest rates and upcoming interest rate reviews on fixed-rate non-indexed mortgages. Chart I-46 shows how households' interest burden, calculated as the ratio of household mortgage interest to disposable income, fell for all income groups from 2013 through 2021, but then rose overall

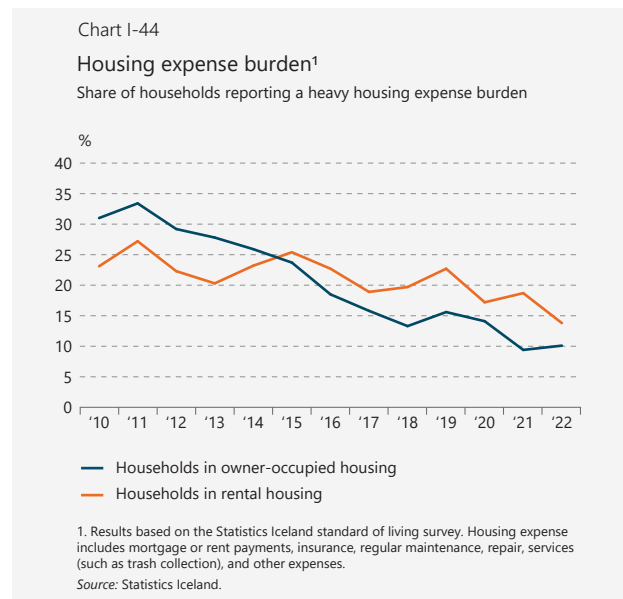
in 2022.²⁸ It remained low in historical context, however. Year-2022 figures for each income decile are not yet available, but it is clear that the effects varied from one case to another, depending on the mortgage debt structure of the household concerned. Some 70% of household mortgage debt is hedged against nominal rate hikes – temporarily, at least – through fixed-rate clauses or through indexation and an annuity format. It should also be borne in mind that some households have a mixture of different types of debt.²⁹ The increase in the interest burden in 2022 is due in part to the proportional increase in the number of households living in owner-occupied homes and carrying mortgage debt.



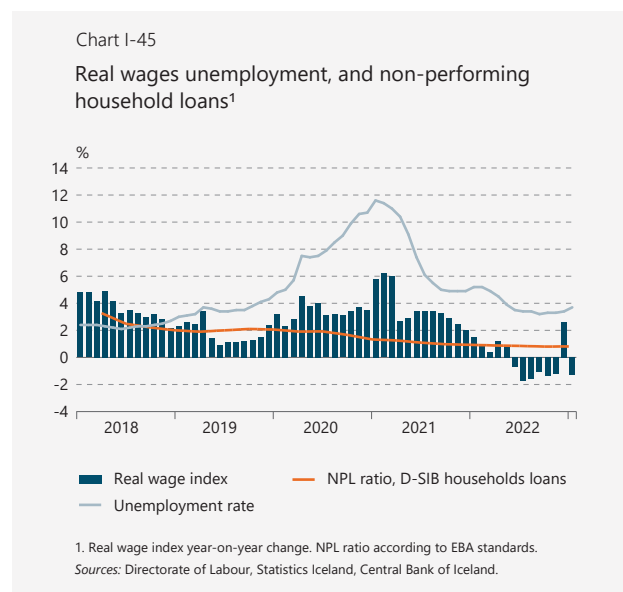
On the whole, households are still highly resilient, and most of them should have some scope to absorb the additional interest burden that comes with higher interest rates. Household debt is historically low, as is unemployment, and despite high inflation, real wages were down only marginally year-on-year in January 2023, with the real wage index falling 1.3% over the period. Furthermore, recently landed wage agreements entail relatively sizeable pay rises, which could boost households' debt service capacity. Figures based on Statistics Iceland's 2022 standard of living survey show that the share of households living in owner-occupied housing and reporting a heavy housing cost burden had risen only a little relative to 2021, in spite of rising prices and interest rates.³⁰ Household arrears are also very

28 The calculated figure for 2022 is the Central Bank estimate.
29 For further discussion, see the Box on households' debt service burden.
30 Data for the standard of living survey are compiled in H1 of each year.

low: the facility-level non-performing loan (NPL) ratio on the D-SIBs' household loans was 0.7% at the end of 2022. There was a marginal increase between the third and fourth quarters, however, and the number of frozen household loans has risen slightly in recent months.³¹ Moreover, the banks' analysis of their own loan portfolios indicates that only a small share of borrowers would not pass a credit assessment at higher interest rates.



If inflation proves more persistent than is currently assumed and interest rates remain high for a protracted period, private sector financial distress can be expected to increase, which could lead to rising arrears. Households that anticipate difficulties due to nominal

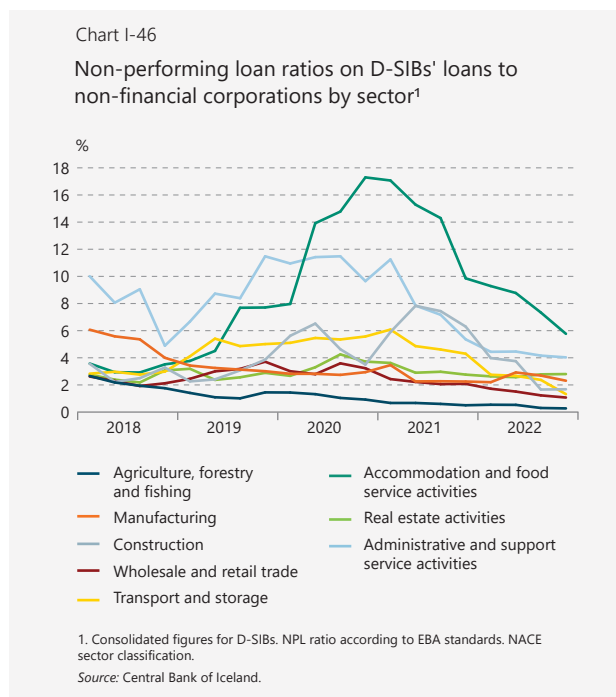


31 The NPL ratio is calculated in accordance with European Banking authority (EBA) standards.

interest rate hikes could take a number of measures to lower their debt service, such as lengthening their loan maturities, swapping out part or all of their non-indexed debt for indexed loans, or even requesting a temporary freeze on payments.

Corporate arrears still on the decline

Data taken from businesses' profit and loss accounts and balance sheets, compiled by Statistics Iceland from tax returns, indicate that firms' financial position was relatively solid in early 2022. Their equity ratios rose over the course of 2021, returns increased, and liquidity grew stronger. This positive trend extended to nearly all business sectors. Furthermore, corporate arrears have been declining across all sectors, and the NPL ratio on the D-SIBs' corporate loans was 2.2% at the end of 2022. It is highest in the accommodation and food service sector, at 5.6%, but has been falling rapidly as the tourism industry rebounds.



The greatest challenges currently facing businesses centre on cost increases and uncertainty. The vast majority of corporate debt is non-indexed and bears variable interest. Indebted companies are therefore sensitive to interest rate hikes and have few ways to hedge against them. In addition, wage costs have climbed higher and input prices are on the rise. There is some uncertainty about the overall economic outlook, both in Iceland and abroad. But as is mentioned above, corporate debt is moderate overall, and companies appear quite resilient in historical context.

Financial cycle and cyclical systemic risk

Financial cycle still in an upward phase

On the whole, the financial cycle was still in an upward phase at the end of 2022. The quantitative summary of the cycle, illustrated in Chart I-47, shows it to be above zero for the third quarter in a row, with a relatively stable increase in the recent term. The rise was driven by all of the sub-cycles – debt, housing, and banking system funding – with the housing cycle rising the fastest.

The above stands somewhat in contrast to falling property prices and slower real growth in private sector debt over the past few months. In this context, however, it should be noted that the indicator shows medium-term cycles and not short-term movements. A separate indicator has been developed in order to capture short-term shifts in financial conditions in a comprehensive way. It is discussed in Box 2 in this report. This indicator shows a relatively abrupt decline in recent months, thereby illustrating short-term developments, which are also highly important.

An indicator based on using a band-pass filter on economic data, as is shown in Chart I-47, requires cautious interpretation. This is particularly the case when the filter is conditioned to identify cycles only over a specified frequency range. For example, the estimated shape of the housing cycle has changed markedly in the recent term, as can be seen in Chart I-48. The previously estimated peak from 2018 is now disappearing rapidly. The level of the cycle at that time has declined by more than half a standard deviation relative to the estimate in *Financial Stability 2020/2* and has changed signs. If house prices continue to fall, the assessed cycle position at the end of 2022 could also change significantly, probably moving higher. It is conceivable that with the advent of macroprudential tools such as borrower-based measures that can directly affect housing cycles, the cycles will be shorter in the future than they have been in the past, possibly requiring a revision in the methods used to estimate them.³² This also underscores the importance of expert assessment of conditions and policy options at any given time.

32. The conventional application of a band-pass filter to statistical data in order to identify medium-term cycles such as financial cycles aims at a frequency range of 8-30 years. If the actual frequency content lies outside this range – for instance, if it is shorter than 8 years – there is an increased risk that the method will give an inaccurate view of developments by identifying a spurious cycle that is not a significant part of the data being analysed.

Mixed messages about financial cycle developments through 2023

It is not clear how the financial cycle will develop in the coming term. Several factors indicate that the upward phase will continue, chiefly among them the modest private sector debt position. The non-financial private sector debt-to-GDP ratio is more than 16% below its long-term trend, its lowest measured value since 1999. The increase that occurred because of the pandemic has therefore reversed in full, and with room to spare. The debt burden is unevenly distributed between households and businesses, but overall, this suggests that there is considerable scope to add on debt. Although house prices have begun falling, the price of both residential and commercial property is still very high, sug-

gesting that businesses and households have considerable collateral capacity. According to currently available information about firms' operating performance over the past two years and executives' responses to questions in the Central Bank's investment survey, there is substantial capacity and appetite for business investment in the coming term. This could foster increased credit growth. This year's growth in tourism could also support house prices, owing to the impact of labour importation and short-term home rentals.

On the other hand, there are also signs of a turnaround in the financial cycle. Interest rates are rising rapidly, and given how persistent inflation has proven, they look set to remain high for a while to come. This could contain credit growth, not least if the banks remain cautious in taking on risk and keep their lending requirements unchanged. Moreover, the Central Bank's caps on debt service-to-income (DSTI) and loan-to-value (LTV) ratios limit some households' ability to take on additional debt. All of this is reflected in negligible real growth in private sector debt and in falling debt ratios. Declining real estate market turnover, a growing supply of residential property, and dwindling growth in lending also indicate that the current house price correction is still underway.

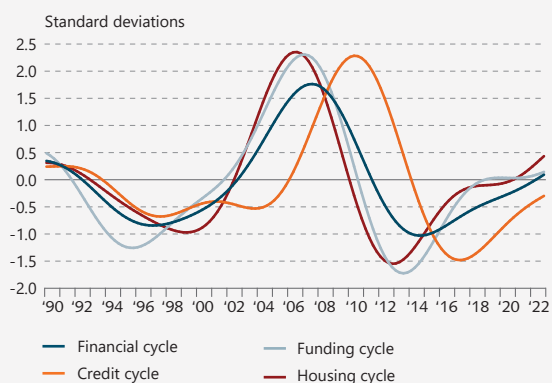
Given how modest the vast majority of household debt is and how relatively brief the period of an excessively tight housing market proved to be, conditions overall do not suggest that the drop in prices will be excessive. In other words, the outlook is for the decline in house prices to be ultimately a sign of diminishing cyclical systemic risk rather than a harmful, disorderly realisation of it. A fall in the price of the economy's most valuable asset class will probably never be entirely painless, however, and the associated negative wealth effect on Icelandic households could dampen aggregate demand.

Cyclical systemic risk

The domestic systemic risk indicator (d-SRI) declined in Q4 and has now fallen four quarters in a row, after a continuous increase lasting two years. This is shown in Chart I-49. The most recent decline is driven mainly by falling asset prices and a narrowing current account deficit. When all factors are considered together, the indicator suggests that cyclical systemic risk is close to its historical average.³³

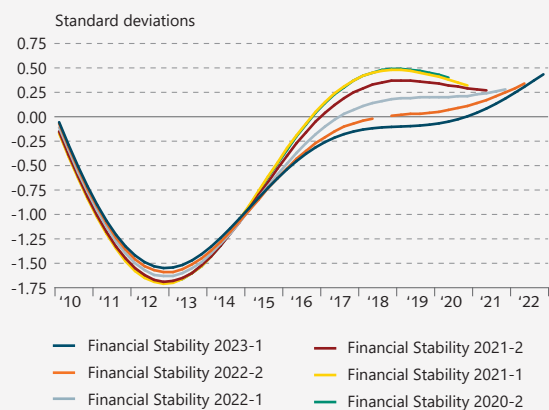
33. At present, however, the indicator somewhat underestimates risk, as new data on developments in DSTI ratios are lacking because of changes in the Central Bank's data compilation methods. This variable carries limited weight, though, so that the results are not skewed substantially.

Chart I-47
Financial cycle and subcycles¹



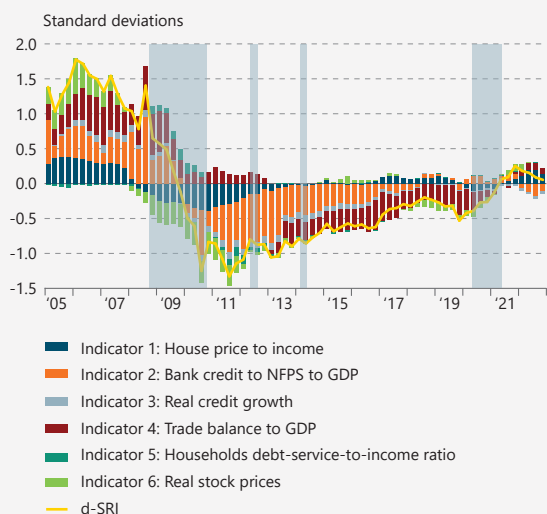
1. The financial cycle itself, the blue line, is the simple average of the subcycles. Each subcycle is the simple average of cyclical components from variables related to credit, housing and bank funding, respectively. Cyclical components are obtained with a Christiano-Fitzgerald band-pass filter with a frequency band of 8-30 years. Sources: Registers Iceland, Statistics Iceland, Central Bank of Iceland.

Chart I-48
Recent revision of the housing cycle¹



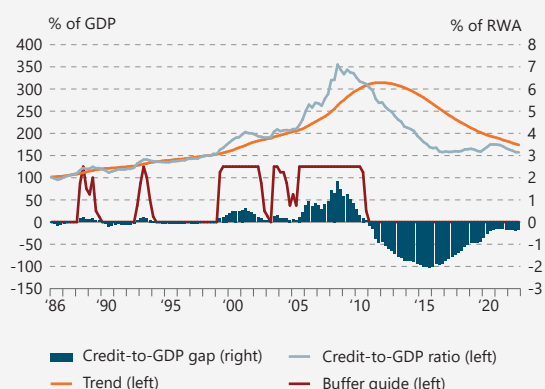
1. The latest cycle estimate in this chart is identical to the housing cycle in chart I-47. Sources: Statistics Iceland, Housing and Construction Authority, Central Bank of Iceland.

Chart I-49
Domestic systemic risk indicator (d-SRI)¹



1. An aggregate debt-service-to-income ratio is missing from Q1 2020 onwards. The last value is maintained from that point to minimize the break in the series. Shaded areas imply quarters with an economic contraction.
Sources: Statistics Iceland, Housing and Construction Authority, Central Bank of Iceland.

Chart I-50
Credit-to-GDP gap and buffer guide¹



1. Total credit to the non-financial private sector over GDP for the last four quarters. Trend component is obtained with a one-sided HP-filter with $\lambda=400,000$. The buffer guide is a linear projection of the credit-to-gdp gap.
Sources: Statistics Iceland, Central Bank of Iceland.

The European Systemic Risk Board’s (ESRB) countercyclical capital buffer (CCyB) guide, shown in Chart I-50, still indicates a 0% buffer rate, as it has consistently since 2011. By and large, this benchmark has not been followed in the calibration of Iceland’s CCyB. Because the structure of the Icelandic financial system has changed and households’ and businesses’ risk awareness has grown since the 2008 financial crisis, it can be considered likely that the debt ratio will not follow the same path as it did before that time. The adjustment of the debt ratio to a new equilibrium continued until 2016. The ESRB benchmark can perhaps be

accorded greater weight as time passes and the effects of the last debt cycle on trend calculations taper off.

Growth-at-risk increased marginally in the latter half of 2022, in the sense that the fifth percentile of the estimated probability distribution of GDP growth over the next two years indicated a slightly more pronounced economic contraction than half a year earlier. The increase is due in part to the high financial cycle position, as well as to Iceland’s strong GDP growth in 2022. Historically, a strong GDP growth period has been followed by an economic contraction more often than not; therefore, the recent growth spurt makes it more likely that a contraction will occur in the near future.

Households' debt service burden

Icelandic households' rising mortgage debt service burden – an accompaniment to rising Central Bank interest rates – is prominent in public discourse at present. Commentators often give examples of an individual or couple whose entire mortgage debt is non-indexed and bears variable interest. Such a presentation shows only part of the reality facing Icelandic borrowers, however. A large number of borrowers have taken a mixture of fixed- and floating-rate loans, and indexed and non-indexed loans. As a result, the Central Bank's recent rate hikes have only affected debt service on a portion of these borrowers' mortgages.

Since the beginning of 2020, the Central Bank has gathered detailed consumer mortgage data from the three large commercial banks and the ÍL Fund, and since August 2020 it has gathered data from the nine largest pension funds as well.¹ This enables the Bank to examine with considerable accuracy the developments in debt service from the date of loan issue through 31 January 2023, the date of the most recent records.

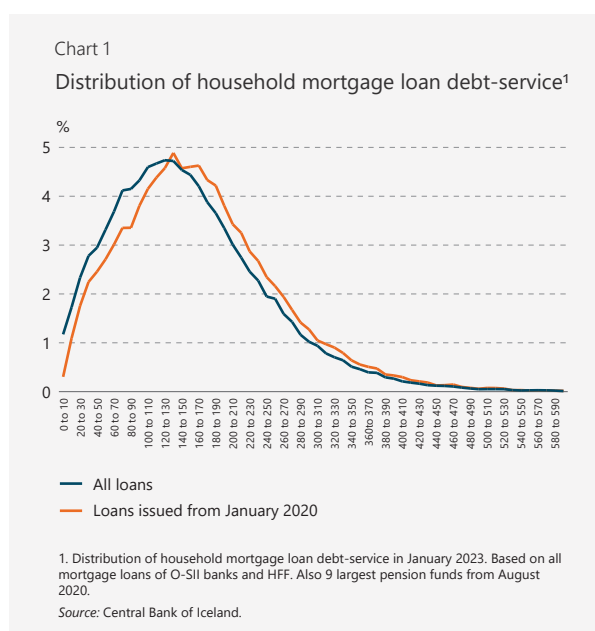
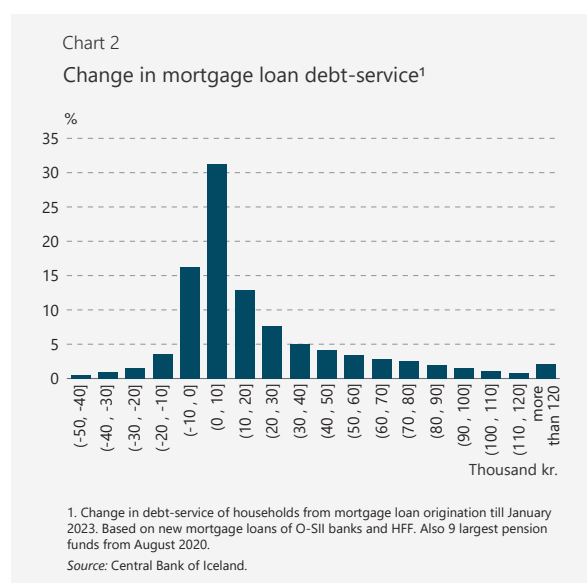


Chart 1 shows the distribution of households' mortgage debt service as of January 2023, both all households and those that took out loans from January 2020 through

1. The pension funds in question are Almenni lífeyrissjóðurinn, Birta lífeyrissjóður, Brú lífeyrissjóður, Frjálsi lífeyrissjóðurinn, Gildi lífeyrissjóður, Lífeyrissjóður verzlunarmanna, Lífsverk lífeyrissjóður, LSR, and SL lífeyrissjóður.

January 2023. These more recent loans extend to about 60% of households and over 80% of the face value of household mortgages. It is important to bear in mind that this represents total debt service on all of the mortgage debt carried by the household in question. It refers to individual households, not individual loans, and the households are categorised by total debt service. Nearly 75% of households pay less than 200,000 kr. per month in mortgage interest and principal, and only 14% of all borrowers pay more than 250,000 kr. per month. For households that took loans in January 2020 or later, these ratios are 68% and 17%, respectively.

In general, households that took loans from January 2020 onwards have seen their debt service rise in the interim. Just over half of them have seen it rise by less than 30,000 kr. per month, just over a fourth have seen it rise by more than 30,000 per month, and in just under one-fourth of cases debt service has remained flat or declined. Naturally, the increase is greater among households with non-indexed floating-rate loans. There are two main reasons for the decline in debt service among some households. On the one hand, some have made extra payments, lowering the outstanding loan principal and thereby reducing debt service.² On the other hand, for



2. Allocating third-pillar pension savings to loan payments is an example of such extra payments. The Central Bank does not have the data needed to evaluate the impact such payments have on debt service, however.

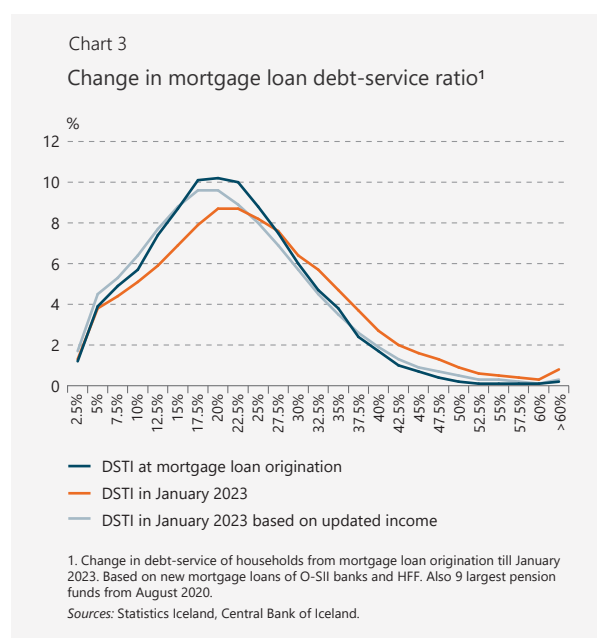
borrowers who have taken equal-installment loans rather than loans with equal payments, total debt service declines over the term of the loan – in nominal terms if the loan is non-indexed, and in real terms if the loan is indexed. Some lenders actually require that loans above a specified loan-to-value threshold – often called supplemental loans – be paid back in equal instalments. Such loans have higher debt service initially than loans with equal payments, but they are also paid down more quickly. Only a small proportion of households are facing vastly increased debt service.

Examining only how debt service has developed in krónur terms does not give an accurate view of the risks faced by borrowers, as such an approach does not take account of developments in income over the same period. A 10,000 kr. increase in monthly debt service, for instance, does not have the same significance for a household with high disposable income as it does for a household whose disposable income is lower. It has been shown that the debt service-to-income (DSTI) ratio – the ratio of debt service to disposable income – is a reliable measure of the risk that a borrower will end up in arrears.³ When this ratio rises above 35-40%, financial distress grows more likely. As a result, it is also interesting to examine how the DSTI ratio of households in the sample has developed over time. Chart 3 shows how the distribution of the DSTI ratio changed from

the date of loan issuance through January 2023, assuming that the borrower's income remained unchanged.⁴ The share of borrowers whose DSTI ratio exceeds 35% (the maximum for all but first-time buyers according to Central Bank rules), rises from 7% to nearly 15%. Because the borrower's income is assumed to be constant, this exercise overestimates risk, as it is likely that most borrowers' income has risen since the loan was taken. If the borrower's disposable income rises in line with the general wage index, the distribution of the DSTI ratio is broadly as it was when the loan was taken. The share of loans with a DSTI ratio above 35% increases, however, from just over 7% to around 9%. In general, then, mortgage debt service has not yet risen substantially in excess of borrowers' disposable income. It can be assumed that around 90% of borrowers have seen their disposable income rise faster than their debt service. For those with non-indexed variable rate loans that share is closer to 85%.

In 2020 and 2021, when interest rates were highly favourable, borrowers commonly took non-indexed loans with interest rates fixed for a period of either three or five years. Interest rates on these loans will be reset later this year and in the next few years. Based on the current inflation outlook, it is unlikely that rates as favourable as those initially offered will be available when the reset takes place.⁵ It is difficult to assess precisely what impact interest rate reset will have on borrowers' DSTI ratios. Doing so would require projecting developments in interest rates and disposable income over time and predicting whether borrowers choose to convert non-indexed loans to indexed ones when the reset takes place.

A simple way to estimate the potential impact of the reset is to assume that the reset will take place immediately. Chart 4 shows the effects of such changes, assuming that all non-indexed fixed-rate loans are converted to non-indexed variable-rate loans at the variable rate offered on 6 March 2023. Furthermore, it is assumed that the loan term remains unchanged and that borrowers will not switch to other lenders even though lower interest rates might be available.⁶ This causes a significant shift in the distribution of the DSTI ratio, increasing the share of borrowers with a DSTI ratio above 35% from 9% to 16.5%. This is a fairly large proportion, but it should also be borne in mind that many



3. See, for example, Conor O'Toole and Rachel Slaymaker (2021). Re-payment capacity, debt service ratios and mortgage default: An exploration in crisis and non-crisis periods, *Journal of Banking & Finance*, 2021, No. 133, 106271. and Erlend Nier, Radu Popa, Shamloo Maral, and Voinea Liviu. (2019). Debt Service and Default: Calibrating Macroprudential Policy Using Micro Data, IMF Working Papers, 2019(182), A001

4. The Central Bank's data contain borrowers' income information only at the time of loan issuance.

5. Interest rate reset on loans with temporarily fixed rates are shown in Chart I-34 earlier in this report.

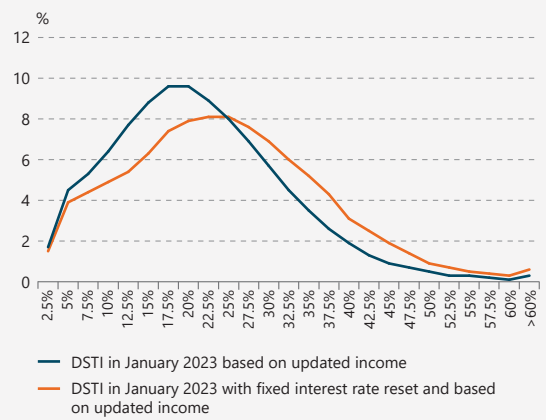
6. These assumptions make it likely that debt service will rise more rather than less.

households are debt-free. Placing the total here into the context of the total number of households in Iceland shows that fewer than 3% of households would have a DSTI ratio above 35%, and the increase would be less than 1%.⁷

Although interest rate hikes have thus far had only a limited impact on most households' debt service burden, it is quite likely that some of the households currently carrying non-indexed loans with temporary fixed-rate clauses will have difficulty affording the interest rates on offer when rates are reset. The possibility of switching to indexed loans dramatically reduces the likelihood that these borrowers will end up in financial distress, however, as monthly debt service on indexed loans is far lower.

7. According to Statistics Iceland, there were 158,714 households in Iceland in 2021. In this analysis, 3,339 of borrowers currently have a DSTI ratio above 35%, and when interest rates are reset, this total will rise to 4,293.

Chart 4
Effects of interest rate reset on households' debt-service ratio¹



1. Change in debt-service of households from mortgage loan origination till January 2023. Income updated according to wage index. Debt-service of non indexed mortgage loans with interest rate reset calculated according to non-indexed variable rates available on 6 March 2023. Based on new mortgage loans of O-SII banks and HFF. Also 9 largest pension funds from August 2020.
Heimildir: Hagstofa Íslands, Seðlabanki Íslands.

A financial conditions index for Iceland

Introduction

The Central Bank's policy actions, whether in the area of financial stability or monetary policy, are transmitted to the real economy through the financial system and financial markets. As a result, it is important that the Central Bank and its policy committees have a solid overview of developments in financial conditions at any given time. To this end, the Bank has developed a financial conditions index for the Icelandic economy.¹

The term *financial conditions* refers to households' and businesses' access to capital for investment and production. Financial institutions are included as well; therefore, the term also refers to whether conditions for financial intermediation in the economy – the intermediation of capital from savers to potential borrowers – are favourable or unfavourable at any given time.

For several years, the Central Bank has discussed financial conditions in its publications by analysing a range of information and risk indicators separately and then summarising them in writing. This analysis has not combined all key measures of financial conditions into a single indicator using quantitative methods, however. The new financial conditions index aims to fill this gap.

Large dataset

A wide range of information underlies the index, and the more information there is, the more accurately it should reflect financial conditions. The variables are of several types, including both prices and volumes, and they are linked to interest rates, exchange rates, asset prices, volatility, and developments in debt. It is necessary, though, to set requirements concerning the length of time series and the frequency of observation so that the index can be useful as an analytical tool. To that end, time series were required to have a monthly frequency and to span at least the period from 2002 to 2023. Fourteen time series that satisfy these requirements have been selected, and they fall under five

markets: the housing market, equity market, bond and money market, credit market, and foreign exchange market.

The first of these is linked to the price of housing, which pushes the index upwards when house prices rise, and to households' interest burden, which pushes the index down when it increases. Rising house prices increase the collateral capacity on homeowners' balance sheets, thereby giving them easier access to credit. On the other hand, a heavier interest burden fosters tight or growth-impeding financial conditions because it reflects both limited capacity for further indebtedness and reduced tolerance for income loss and rising interest rates.

The indicators linked to the equity market are share prices, measured using the Main List index, and monthly index volatility. Higher share prices push the index upwards, as they indicate that listed companies will have readier access to financing via share capital increases. Increased volatility has the opposite effect, as it is a sign of greater uncertainty.

Bond and money market variables include the Central Bank's key interest rate, the spread between it and the three-month interbank market rate, yields on indexed and nominal ten-year Treasury bonds, and the spread between yields on indexed and nominal ten- and two-year Treasury bonds. With all of these variables, a higher value lowers the index, as it indicates increased cost of financial intermediation.

The credit market includes growth in credit system lending to non-financial companies, on the one hand, and households, on the other, as measures of households' and businesses' access to credit. An increased growth rate pushes the index higher.

Finally, two variables fall under the foreign exchange market: the trade-weighted exchange rate index and the interest rate differential – in this case, the spread between Icelandic and German ten-year government bonds. Both a higher exchange rate index (which indicates a depreciation of the króna) and a wider interest rate differential with abroad push the index downwards.

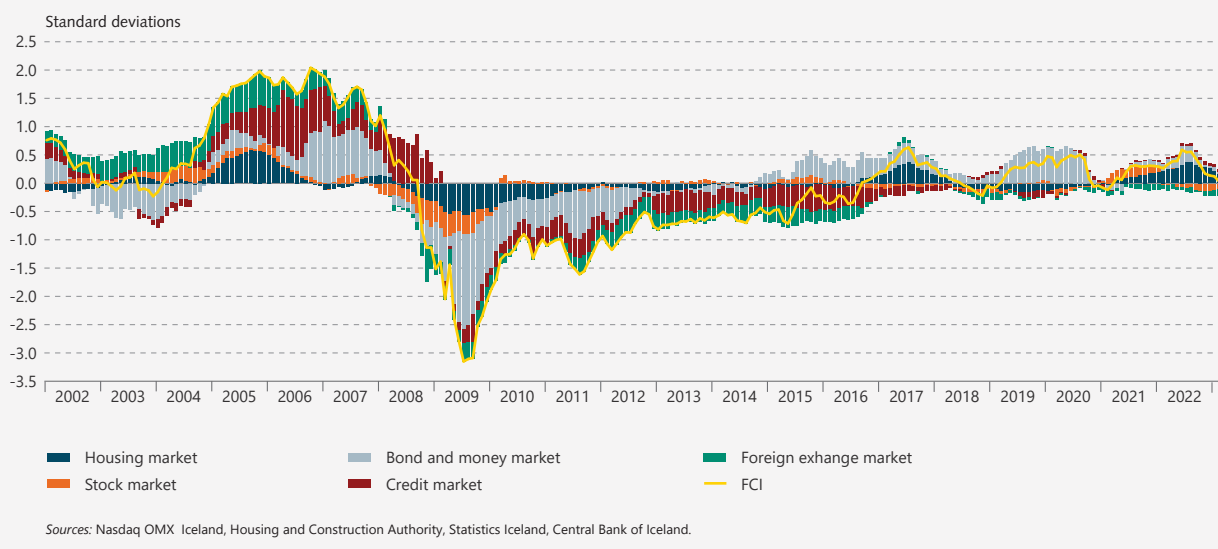
Facilitating and harmonising interpretation

The financial conditions index based on the above-described dataset is shown in Chart 1. It is generated by principal component analysis of the dataset.² Enough principal compo-

1. The index was developed by four summer employees who worked at the Bank in summer 2022 under the guidance of specialists from the Bank's Financial Stability and Economics and Monetary Policy departments. The summer employees were students of economics and financial engineering at the time. Their names are Eysteinn Einarsson, Stella Einarsson, Tómas Dan Halldórsson, and Védís Sigríður Ingvarsdóttir. Further discussion of their project is to be published in the Central Bank's *Working Papers* series: Eysteinn Einarsson *et al.* A Financial Conditions Index for Iceland. *Working Papers*, 2023 (forthcoming). Central Bank of Iceland.

2. Eysteinn Einarsson *et al.* (2023) describe various methods of compiling the index. They also illustrate the results of factor analysis and of taking a simple average of the variables in the dataset.

Chart 1
Financial Conditions Indicator



nents are included in the index so that they explain at least 70% of the total variance of the dataset. As a result, the first three principal components are included. The weight of each depends on its explanatory power vis-à-vis the dataset as a whole. Taken together, the principal components explain nearly three-fourths of the total variance.

Interpreting the nature of the movements captured by each principal component is not simple and should be done with caution. However, the first principal component, which explains just over a third of the total variance, can be interpreted, with some simplification, as reflecting mainly the covariance of the dataset that is linked to the domestic interest rate level. The second principal component explains just under 30% of the variance and primarily captures movements in asset prices and the exchange rate index. To a large extent, it reflects market expectations at any given time, as it should largely capture the portion of the variance that is not caused by interest rates. The third principal component explains just under 10% of the variance in the dataset – mainly, changes in the interest rate differential with abroad. Therefore, it primarily reflects the risk premium applied to the Icelandic economy over and above others, with Germany as the benchmark. As is noted above, however, the matter is more complex than this interpretation suggests.

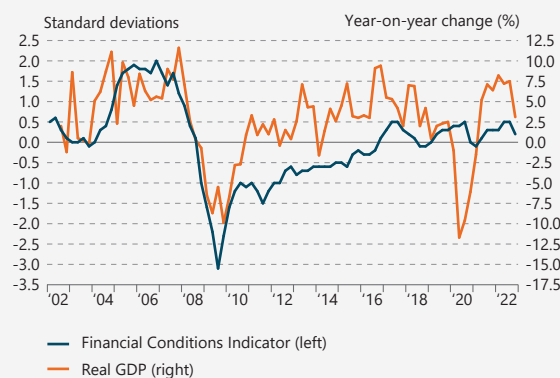
In Chart 1, the index is shown together with a breakdown by the five markets, so as to show where changes in financial conditions originate at any given time. The index shows expansionary financial conditions during the run-up to the 2008 financial crisis and highly growth-impeding conditions in its wake, as could be expected. In all key

respects, the index appears to be consistent with the available information on developments in financial conditions at the time in question.

From 2016 onwards, financial conditions have generally been expansionary. Rising asset prices, ready access to credit, and favourable interest rates in particular have explained the improvement in financial conditions, although the appreciation of the króna contributed for a while. Over the same period, however, the index has been volatile, and in February 2023 it was in its third steep decline since 2017.

It is noteworthy how little the index moved in connection with the onset of the COVID-19 pandemic early in 2020. But this is logical: the shock was not financial in nature, and the authorities took decisive mitigating action very quickly. On the other hand, the index fell rapidly in late

Chart 2
Correlation of financial conditions and GDP growth¹



1. Quarterly average of the Financial Conditions Indicator with a one-quarter lag.
Source: Statistics Iceland, Central Bank of Iceland.

autumn 2020, after the arrival of the second wave of the pandemic, when the economic outlook has highly ambiguous and Treasury debt accumulation uncertain. The index rose again thereafter, driven mainly by rising asset prices and low interest rates. In the months since the Central Bank significantly tightened the monetary stance and applied macroprudential tools to contain the accumulation of systemic risk, the index has trended sharply downwards, indicating that conditions could be tight or growth-impeding in coming months.

An analytical tool with potential

The main purpose of the financial conditions index is to create a comprehensive, traceable summary of financial conditions; i.e., it is designed to be a part of the descriptive statistics that form the basis for Central Bank policy formulation. As a result, the methodology behind it does not seek in particular to maximise its statistical links to other economic variables. Nevertheless, the index correlates with GDP growth, which indicates that it could be useful in assessing economic developments.

When the quarterly average of the index's monthly measurements is taken and shifted ahead in time by one quarter, it has a correlation coefficient of 0.61 with quarterly year-on-year GDP growth. This correlation is shown in Chart 2. The chart shows that the correlation is strong around the time of the 2008 financial crisis but that the deviation of GDP from the financial conditions index was largest by far during the pandemic, particularly in 2020.

This is normal, as the shock originated entirely outside the financial system, as is noted above, and stemmed from the pandemic itself and the public health measures imposed by the Government. The Government's pandemic-related economic measures were aimed at preventing financial conditions from deteriorating significantly at that time.

The fact that the financial conditions index acts as a leading indicator as well as describing financial conditions themselves gives rise to the hope that it will prove useful in analysing the links between financial factors and economic developments in a broader sense. Its informational value can be useful for forecasting, particularly to include very short-term economic forecasting. As such, it can support analysis of how monetary policy makes an impact on the economy by affecting financial conditions. Indices of this type have been used abroad in forecasting GDP growth, investment, inflation, and other macroeconomic variables.

For financial stability, an index like this one can be useful in assessing the macroprudential policy stance and the scope of cyclical systemic risk, and as an explanatory variable in the analysis of growth-at-risk.³

3. See, for example, Angelopoulou, E., Hiona Balfoussia, and Heather Gibson (2013). Building a Financial Conditions Index for the Euro Area and Selected Euro Area Countries. What Does It Tell Us About the Crisis? Working Paper Series No. 1541, May 2013. European Central Bank. See also Adrian, Tobias, Nina Boyarchenko, and Domenico Giannone (2016). Vulnerable growth. Staff Report, No. 794. Federal Reserve Bank of New York, and Alsterlind, Jan, Magnus Lindskog, and Tommy von Brömsen. An index for financial conditions in Sweden. Staff memo, February 2020. Sveriges Riksbank.

The impact of climate risk on the Icelandic banks' credit risk

The Central Bank of Iceland is currently analysing the impact of climate risk on both the financial system and financial stability. Although the Bank does not formulate policy on measures to combat climate change, analysis of this risk is important for the Governmental authorities that do so. Such analysis provides information on where risk is likeliest to lie in the domestic financial system. It should be borne in mind that the analysis in question entails a rough examination of the data available, but the quality of the data can be expected to improve in the coming term, with the introduction of more stringent regulatory requirements on information disclosure.

Indicators imply that the carbon footprint from the Icelandic banks' corporate loan portfolios has remained more or less unchanged in recent years, but the portfolios are among the most environment-friendly in Europe. Whereas Iceland's greenhouse gas (GHG) relative emissions due to fishing, agriculture, manufacturing, and transportation are above the EU average, emissions due to energy production are negligible in Iceland but considerable in the EU.

Central banks and international institutions have published a range of climate risk scenario analyses in recent years. The main focus has been on transition risk, which is the risk stemming from measures aimed at reducing behaviour that causes global heating. An example of this might be the impact on lending to business activities that are suddenly subject to government restrictions aimed at reducing emissions. It is easier to measure risk resulting from governmental policies than to measure the physical risk associated with the impact of climate change itself on economic activity and value creation.

The carbon footprint from the Icelandic banks' corporate loan portfolios

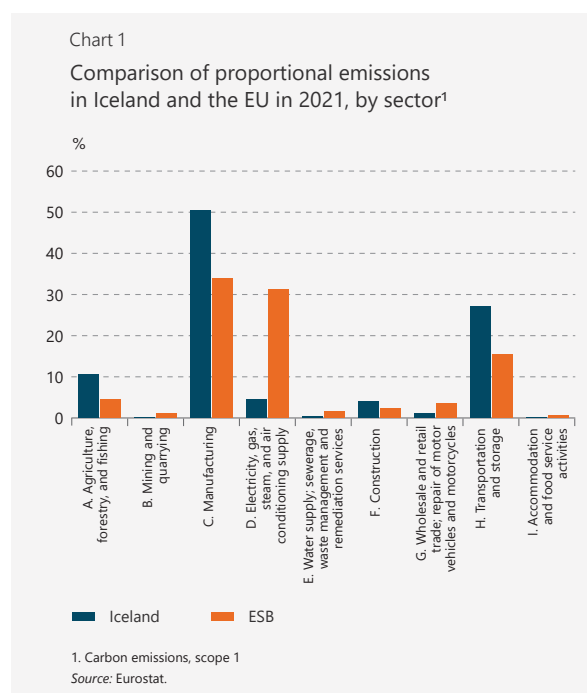
Data from the Central Bank's credit registry have been used to examine the sensitivity of the Icelandic banks' corporate loan portfolio to transition risk. The credit registry contains information on all of the banks' loans of more than 300 m.kr. Other information used includes data on emissions in Iceland and the EU, compiled by Eurostat, and data from Statistics Iceland on gross value added (or total output) by sector.

The analysis is based on three scenarios: an orderly transition, a disorderly transition, and a hothouse world resulting from unrestricted global heating. Although the

hothouse scenario could be classified more as physical risk than as transition risk, it provides a comparison against the banks' estimated loan portfolio in the event that minimal or no transition is undertaken.

The European Central Bank (ECB) and the European Systemic Risk Board (ESRB) have published three measures in their July 2022 scenario analysis report: loan-weighted emission intensity, transition-to-credit risk intensity (TCI), and expected loss.¹

Loan-weighted emission intensity is a measure of how much banks loan to sectors with a large carbon footprint.² Sectors' greenhouse gas emissions are divided by their total output, or gross value added. This yields a variable referred to as *emission intensity*, which is measured as the volume (in kg) of CO₂ emissions per euro³ of gross value added, where sectors that create less value per tonne of GHG emissions weigh heavier. Emission intensity is then weighted using the book value of the loan portfolio in each sector, giving the loan-weighted emission intensity.

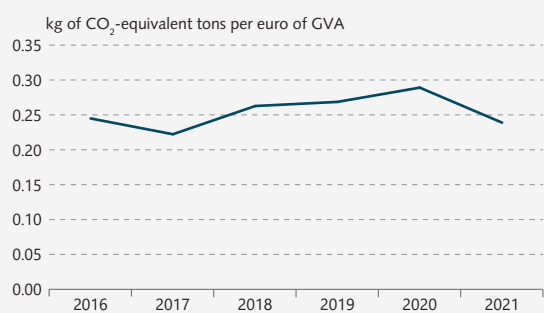


1. The macroprudential challenge of climate change, July 2022. ECB/ESRB Project Team on Climate Risk Monitoring.
2. Loan-weighted emission intensity is calculated using the formula $\sum E_s / GVA_s \times L_s / L$, where E_s represents emissions from the sector, GVA_s gross value added by the sector, L_s is the book value of loans to the sector, and L is the total book value of the loan portfolio.
3. The euro is used as the unit of measure so as to ensure comparability with EU member states.

Chart 1 gives a comparison of proportional emissions from key sectors in Iceland and the EU.⁴ The agriculture, fishing, manufacturing, and transportation categories weigh heavier in Iceland than in the EU, while utilities (electricity, gas, and heat) weigh heavier in the EU.

The emission intensity of the Icelandic banks' loan portfolio declined somewhat in 2021 but was even lower in 2017, as Chart 2 illustrates. The most recent value, 0.24, lies well below the EU average of around 0.45. Only seven countries are below the average. By this measure, the Icelandic banks' loan portfolios are among the greenest in Europe. Changes in the emission intensity of the loan portfolio are due to year-on-year changes in specific sectors' share in the portfolio and in the sectors' share in emissions. Between 2020 and 2021, for instance, the share of manufacturing in the banks' corporate lending fell from 15.7% to 14.7%, as compared with only 11.4% in 2017.

Chart 2
Loan weighted carbon intensity of Icelandic banks 2016-2021



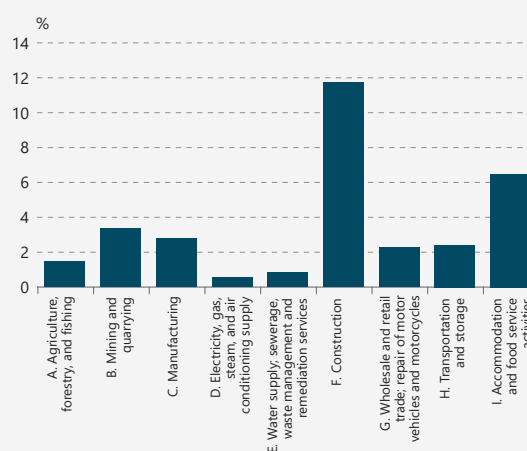
Sources: Eurostat, Statistics Iceland and Central Bank calculations.

Transition-to-credit risk intensity, or TCI, is measured by weighting the probability of default using the book value of loans to each sector and then weighting that result using the emission intensity of each sector.^{5, 6}

The probability of default is greatest for loans to companies in construction and hotel/restaurant operations. Weighting with the sector's emission intensity gives TCI. If the results are scaled so that the TCI of loans to the highest-intensity sectors (manufacturing sectors) is equal to 1, the intensity of the next sector (transportation and

4. The figures for sectoral emissions are based on direct emissions generated by companies within the sectors, less carbon sequestration carried out by the companies concerned.
5. In the ESRB and ECB's calculations, emission intensity is obtained by dividing by each company's turnover, but here it is calculated as is described above, by dividing by the sector's gross value added. On average, the difference should not be substantial.
6. In cases where the probability of default is not given, it is assumed for the sake of simplicity to be 0%. This underestimation should not skew the results, as the sectors are compared internally.

Chart 3
Weighted probability of default at year-end 2021, by sector¹



1. Banks own estimate of PDs in the credit registry.
Source: Central Bank of Iceland.

storage) is 0.46. The intensity of loans to the construction sector is 0.33, and for other sectors it is hardly quantifiable. Loans to these three sectors therefore entail the greatest transition risk for the Icelandic banking system. This variable is a measure of the banks' long-term transition risk associated with lending to these sectors.

The third measure, the expected loss in each sector, is obtained by multiplying the probability of default by loss given default (LGD), which is the banks' estimate of losses that would be incurred over the next twelve months in the event of borrower default. This variable and TCI differ in that expected loss is sensitive to the size of the loan portfolio in each sector. Weighting the expected loss in each sector using its emission intensity shows that expected loss lies mainly in two sectors: manufacturing, at 49% of the total, and transportation and storage, with 37%. There is also measurable expected loss in agriculture, forestry, and fishing, at 4.6% of the total, but this sector shows virtually no TCI.

The manufacturing sector weighs heavily in the ESRB and ECB results, albeit not to the degree seen in Iceland. Electricity production carries significant weight as well, while the weight of agriculture, forestry, and fishing in expected loss is negligible. In comparison with Iceland, the difference probably stems from the size of the sectors: the expected loss is greater in Iceland, as the sectors are proportionally larger.

Brown loans carry little weight

In climate risk scenario analysis, it is common to place loan portfolios into groups, or baskets, according to their carbon

footprint. Green loans are loans to companies that operate in sectors with a small carbon footprint, and brown loans are loans to companies operating in sectors with a large carbon footprint. Loans to companies lying between the two are labelled neutral.⁷

During an orderly transition, it is assumed that the banks' loan portfolio will not suffer any particular shocks. Brown companies have adequate time to adapt to a changed reality. The impact on the loan portfolio will therefore be limited to external factors, which are relatively minor. During a disorderly transition, brown companies will be affected suddenly and unexpectedly and will not be able to adapt in time. On the other hand, green companies will profit from having adapted promptly and from possible attrition among competitors.

In a hothouse scenario, green companies gain little from having adapted, while brown companies benefit from not having invested in such adaptation.

Emissions are examined according to a more detailed sectoral classification than is done above. The second stage in the ISAT (NACE) classification was examined to determine which sectors have the largest carbon footprint. Sectors whose weighted share in CO₂ emissions relative to GDP exceeded 5% were defined as brown, while those whose weighted share was between 1% and 5% were classified as neutral and the remainder were labelled green. Tables 1 and 2 show the share of brown and neutral loans. Fishing and aquaculture weigh heaviest by far in terms of brown loans, and manufacture of food products weigh heaviest among neutral loans.

Other corporate loans are classified as green. Table 3 shows the classification of the loans at year-end 2021. Green loans accounted for 75% of the loan portfolio and brown loans about 9%.

Because brown and neutral loans account for a relatively small share of the banks' corporate loan portfolio, it can be assumed that the transition risk associated with the portfolio is less than it would be otherwise. According to the methodology on which the ESRB and ECB's calculations are based, however, it can be assumed that a hothouse world scenario would have a substantial impact on the portfolio.⁸

7. The methodology is described further in The macroprudential challenge of climate change, July 2022. ECB/ESRB Project Team on Climate Risk Monitoring.

8. The calculations are based on the methodology in Ojea-Ferreiro, J., Reboredo, J.C., and Ugolini, A. The impact of climate transition risks on financial stability. A systemic risk approach. JRC Working Paper in Economics and Finance, 2022/1. Joint Research Centre.

Table 1 Brown corporate loans, year-end 2021

NACE Sector	Share of brown loans	Share of total corporate loans
A03 Fishing and aquaculture	80.0%	7.2%
H50 Water transport	10.2%	0.9%
C24 Manufacture of basic metals	4.4%	0.4%
Other brown sectors	5.4%	0.5%
Total		9.0%

Source: Central Bank of Iceland.

Table 2 Neutral corporate loans, year-end 2021

NACE Sector	Share of neutral loans	Share of total corporate loans
C10-C12 Manufacture of food products	64.9%	10.4%
F41 Construction of buildings, development of building projects	16.1%	2.6%
G45 Wholesale and retail trade; repair of motor vehicles and motorcycles	5.8%	0.9%
Other neutral sectors	13.2%	2.1%
Samtals		16.0%

Source: Central Bank of Iceland.

Table 3 Breakdown of commercial banks' corporate loans by type: green, neutral, and brown

B.kr.	Book value	Share, %
Green loans	1,357	75%
Neutral loans	289	16%
Brown loans	164	9%
Total	1,809	

Source: Central Bank of Iceland.

Tafla 4 Climate Transition Expected Return (CTER)

B.kr.	Book value	CTER	Loss
Hot house world	1,357	-0.0081	-11
Orderly transition	289	-0.0012	-0,3
Disorderly transition	164	-0.0081	-1,3

Sources: Ojea-Ferreiro, J., Reboredo, J.C. and Ugolini, A. The impact of climate transition risks on financial stability. A systemic risk approach. JRC Working Paper in Economics and Finance, 2022/1. Joint Research Centre.

Making additional assumptions enables the calculation of what is called the climate transition expected return (CTER). As the term implies, this is the banks' expected return under a given scenario. It is assumed here that green loans will be affected only by a hothouse world scenario, while neutral loans will be affected only by an orderly transition and brown loans will be affected only by a disorderly transition. It is also necessary to make an assumption concerning the relationship between, on the one hand, the impact on the banks' total returns, and on the other, the impact on the book value of their corporate

loan portfolio. It is possible, for instance, to assume that the impact on returns will be the same as the impact on book value. As Table 4 shows, based on these assumptions, the impact on book value could equal 11 b.kr. in a hothouse world scenario.

Transition risk is limited in Iceland

Transition risk varies greatly from one sector to another, but in general, it appears to be less in Iceland than elsewhere in Europe. As a result, it can perhaps be concluded that the Icelandic banks are relatively well positioned in terms of transition risk. However, this conclusion is subject to the caveat that the analysis is still in its earliest stages, and it would be unwise to draw overly sweeping conclusions from the findings thus far.

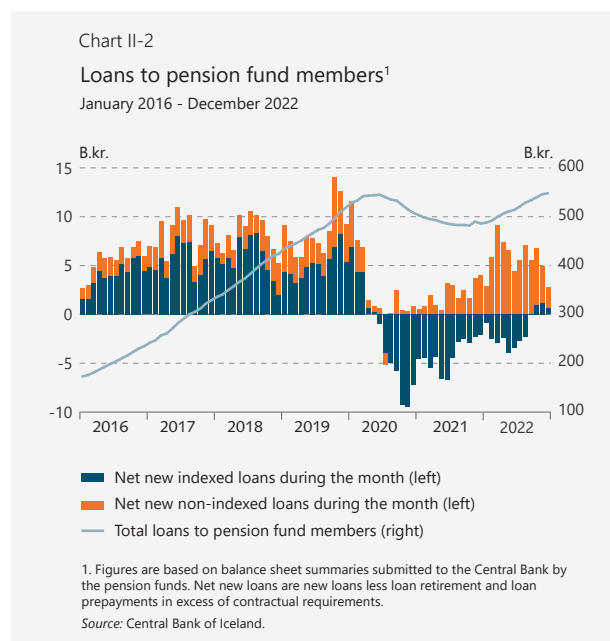
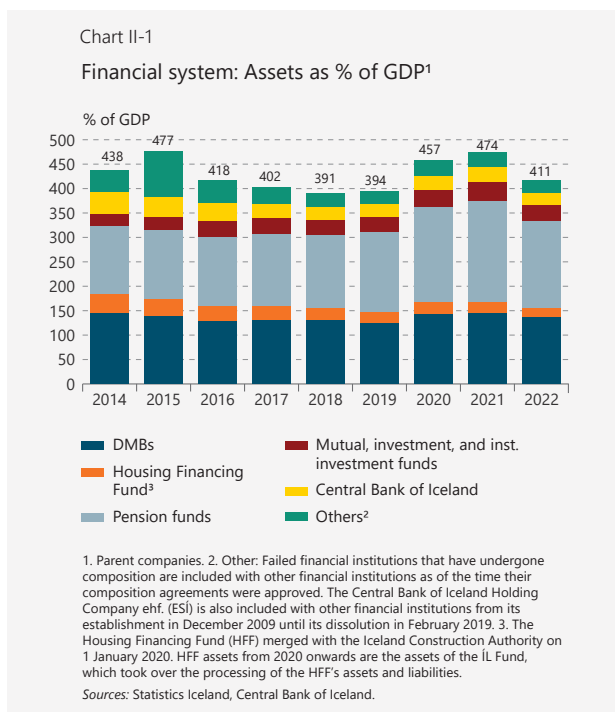
The financial system



Financial system assets totalled 411% of GDP at the end of 2022, down from 474% a year earlier. The decline is due for the most part to a roughly 16% increase in nominal GDP, whereas financial system assets grew by 1% in 2022. The ratio of assets to GDP rose steeply in 2020 and 2021, mainly because of the effects of the pandemic. The trend reversed in 2022, yet the end-2022 ratio was still higher than at year-end 2019.

than before the pandemic. Deposit institution assets increased as a share of total assets in 2022, while the share owned by other entities either remained flat or declined.

Pension fund assets totalled 6,639 b.kr. at the end of 2022, after declining by 108 b.kr. during the year. The reduction was due mainly to a contraction in the pension funds' foreign assets, which totalled just under 35% of total assets as of end-2022, a decline of a percentage point year-on-year. The króna depreciated by just over 2% in 2022, and the proportional decline in the funds' foreign assets was therefore greater at constant exchange rates. Nearly 97% of the pension funds' foreign assets are in equity securities and unit shares, and foreign equity markets fluctuated widely in 2022. Domestic equities and unit shares accounted



At the end of 2022, deposit institutions' assets accounted for about a third of total financial system assets. About 43% of total assets are owned by the pension funds. This represents a decline of 1 percentage point relative to the prior year but is higher

for 15.8% of total assets at the end of 2022, about 1½ percentage points less than at the previous year-end. Offsetting these declines, marketable domestic bonds and bills increased by 1% as a share of total assets, to 35%, and pension fund loans rose by another 1%, to just over 8.4%, by the year-end.

In 2022, the pension funds issued an average of just under 11.9 b.kr. per month in new loans to fund members, whereas retirement of pension fund loans averaged 7.8 b.kr. per month. This represents a reversal relative to 2021, when monthly new loans averaged 8.6 b.kr. and retirement averaged 10.7 b.kr. At the end of 2022, the stock of pension fund loans amounted to 548 b.kr., after increasing by 62 b.kr. during the year, whereas in 2021 it declined by 22 b.kr.

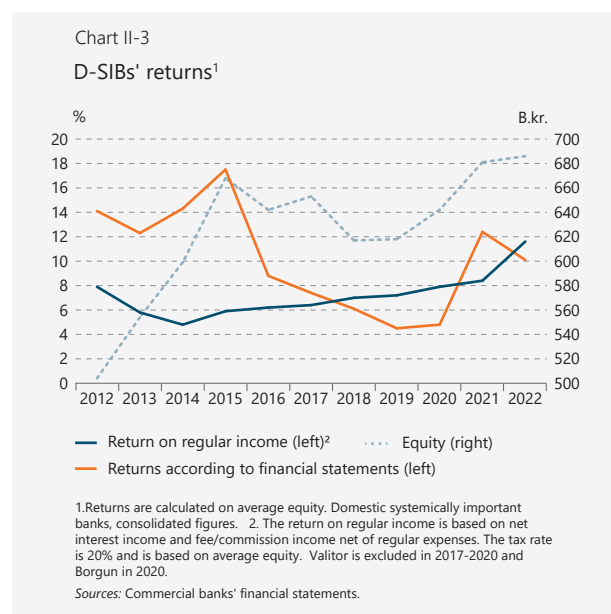
The supply of non-indexed pension fund loans on competitive terms was limited when mortgage rates were at their lowest. The supply of non-indexed loans with interest rates fixed for 3 or 5 years was particularly limited. When mortgage lending rates began rising in H2/2021 and 2022, the terms offered by the pension funds became more favourable in many cases than those offered by the banks, and the amount of pension fund loans began to rise thereafter. Of the 62 b.kr. increase in the pension fund loan stock in 2022, 61 b.kr. was due to non-indexed loans. Rising interest rates have bolstered the pension funds' competitive position once again.

The pension funds are the largest investors in the Icelandic financial market. Not only are they direct mortgage lenders, but they also fund the banks' mortgage lending by purchasing their bonds. Moreover, they finance businesses directly, through bond purchases, and indirectly, through investment funds. They are also the largest investors in the domestic equity market and are among the largest owners of two of Iceland's three systemically important banks. In addition, the pension funds' investment strategies assume that a large share of their asset portfolio will be invested abroad. Because of the funds' size, their strategies and conduct have an enormous impact on the market and the economy as a whole.

Profitability

The domestic systemically important banks' (D-SIB) operating results were strong in 2022, with profits totalling 67 b.kr., down from 81 b.kr. in 2021. Their return on equity totalled 10.1%, about 2.3 percentage points less than in the prior year. The D-SIBs' capital was virtually unchanged between years. In a departure

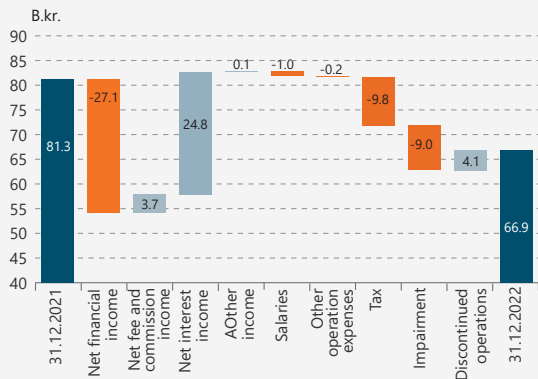
from the situation in 2021, the year-on-year contraction in profits and returns was due to a significant reversal in the D-SIBs' financial income, caused by headwinds in the financial markets during the year. On the other hand, the banks' core operations are at their strongest ever. All three D-SIBs' regular income increased, and streamlining and cost-cutting measures lowered their operating expenses in real terms. The return on equity from underlying operations, excluding one-off items, rose from 8.4% in 2021 to 11.6% in 2022, the banks' most favourable underlying returns since they were established in 2008.¹



The banks' interest rate spreads narrowed continuously from 2016 through end-2021. In 2022, however, the situation turned around concurrent with Central Bank interest rate hikes, as the interest rate spread on the D-SIBs' total assets widened by 0.44 percentage points, to 2.89%.² The banks' lending grew by nearly 12% in 2022, but larger balance sheets and higher interest rates led to a substantial increase in both interest income and interest expense. Net interest income rose from 106 b.kr. in 2021 to an all-time high of 133.5 b.kr. in 2022. Chart II-5 gives an approximation of changes in net interest income between 2021 and 2022. The chart assumes that loans are funded with deposit or bond issues. On average, 82% of the banks' assets took the form of loans and on the liability

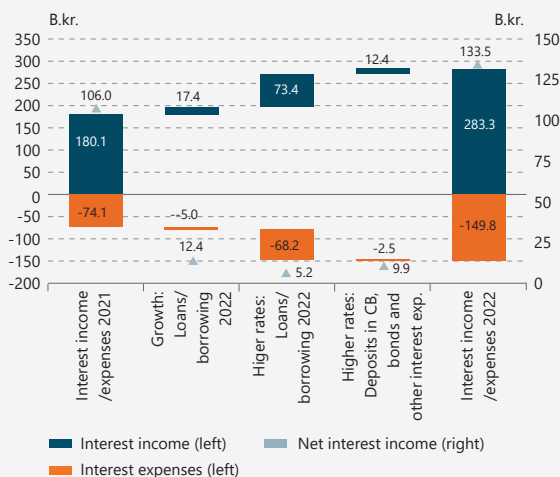
1. Underlying returns are defined here as returns on regular income, which are based on net interest income and net fees and commissions, less regular expenses apart from one-off cost items. The tax rate of 20% is based on the average balance of capital.
2. Bond interest income at fair value is partly estimated for the calculation of net interest income and interest rate spreads, as some of the banks recognise it as financial income rather than interest income.

Chart II-4
Change in D-SIBs' profit in 2022¹



1. Domestic systemically important banks, consolidated figures. The chart shows the difference between income and expenses for year 2022 compared to year 2021.
Sources: Commercial banks' financial statements.

Chart II-5
D-SIB: Changes in net interest income in year 2022¹



1. Domestic systemically important banks, consolidated figures. Borrowing consist of deposits and issued bonds of the banks in ISK and foreign currencies. Interest income of marketable securities at fair value are partly estimated.
Sources: Commercial banks' financial statements.

side, the same share was borrowing through deposits and issued bonds. Other key assets (apart from loans) are liquid assets such as bonds and deposits with the Central Bank. These assets are offset on the D-SIBs' balance sheet by capital (about 14%) and other liabilities (4%), such as public levies or debts due to trade settlement. Interest-bearing assets always somewhat exceed interest-bearing liabilities. The D-SIBs' net interest income grew by 27.5 b.kr. in 2022. About 12.4 b.kr. can be attributed to an increase in loans, another 9.9 b.kr. to higher interest income on liquid assets, and 5.2 b.kr. to a wider interest rate differential between borrowings and loans issued. Approximately two-thirds of the year-on-year increase in the interest rate spread stems from higher interest income on liquid assets, and the other

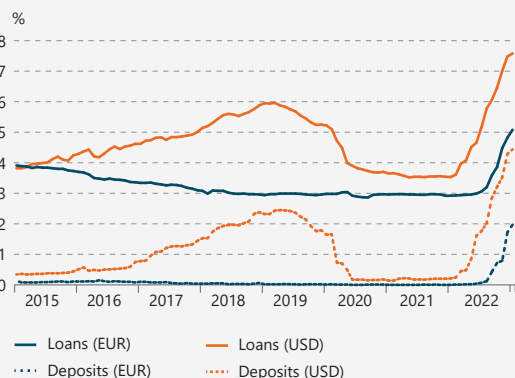
third is due to a wider spread between borrowings and loans. The Central Bank's key interest rate averaged 4.24% in 2022, as compared with 1.12% in 2021. It will clearly be much higher this year than last; therefore, the banks' interest rate spreads and net interest income will probably keep rising in 2023. It is also worth noting that at the end of 2022, the stock of non-indexed fixed-rate mortgage loans came to about 590 b.kr., and the weighted interest rate was 4.88%, as opposed to 7.65% for non-indexed variable-rate loans. For the first five months of 2022, fixed and variable rates on the non-indexed mortgage loan stock were virtually the same. It is clear, then, that variable rates rose steeply in H2. If all non-indexed fixed-rate loans had borne variable interest in December 2022, the banks' interest income would have increased by 1.4 b.kr. that month. The outstanding balance of non-indexed fixed-rate loans up for interest rate review in 2023 totals 75 b.kr., and loans totalling another 265 b.kr. are scheduled for review in 2024. The D-SIBs' interest income and interest differentials will probably increase with the reviews, as only part of the banks' funding comes from covered bonds or fixed-rate deposits.

Interest rates on deposits and loans in foreign currencies are rising sharp

Central bank interest rates among Iceland's main trading partners have risen steeply in a short period of time. The increases have passed through to interbank rates, as can be seen clearly in rates on the D-SIBs' foreign-denominated deposits and loans.

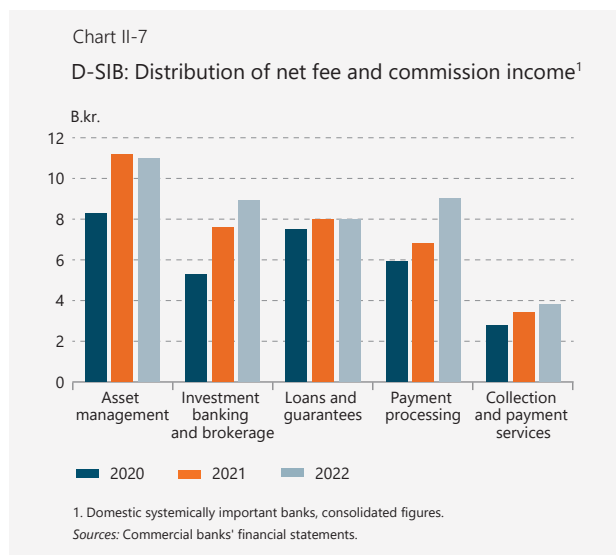
As of end-2022, the D-SIBs' foreign-denominated deposits and loans totalled 357 b.kr. and 670 b.kr.,

Chart II-6
D-SIB: Interest rates on deposits and loans to corporates in EUR and USD¹
January 2015 - January 2023



1. Total stock and weighted average interest rates. Domestic systemically important banks.
Source: Central Bank of Iceland.

respectively. About 38% of the deposits are in US dollars and 49% in euros, while 25% of the loans are in US dollars and 67% in euros. Some 90% of the D-SIBs' foreign-denominated loans and deposits are therefore in these two currencies. The US Federal Reserve Bank began raising its policy interest rate in March 2022, and by February 2023 it was up to 4.75%. The European Central Bank (ECB) began its monetary tightening phase in July 2022, and its key rate had risen to 3% by this February. As Chart II-6 shows, the rates offered by the D-SIBs to businesses for deposits and loans in dollars and euros have developed broadly in line with central bank rates in the respective currencies. US dollar interest rates started rising earlier, and the rate on dollar-denominated loans is now 7.5%, or 1½ percentage points below the rate on loans in krónur. The euro interest rates offered to the D-SIBs have not yet risen as much as the ECB key rate has, so the interest rate spread between dollar and euro is relatively wide.



Net income from fees and commissions totalled 41 b.kr. in 2022, rising 11% [year-on-year] despite difficult market conditions. Net fees and commissions have risen by 38% since 2020. They surged in 2021 because of favourable market conditions, which spurred increased asset management and corporate finance activity. Most fee and commission income stems from asset management, which generated income in the amount of 11 b.kr. in 2022, or 27% of total fees and commissions. A broadly similar share, 20%, came from payment intermediation, investment banking and securities trading, and loans and guarantees. Net income from fees and commissions is therefore distributed more or less equally across categories, which strengthens this income base. In 2022, the largest increase in fees and

commissions, 31%, was from payment intermediation, which aligns well with Icelanders' increased payment card turnover, particularly their card use overseas. The banks' annual accounts itemise fees and commissions by department. In 2022, about 31% came from personal banking, 30% from corporate banking, 33% from asset management, and the remainder from treasury and other departments.

The D-SIBs' regular income – i.e., net interest income and fees and commissions – increased by 31 b.kr. in 2022, to 174 b.kr., the largest total since the banks were established in 2008.

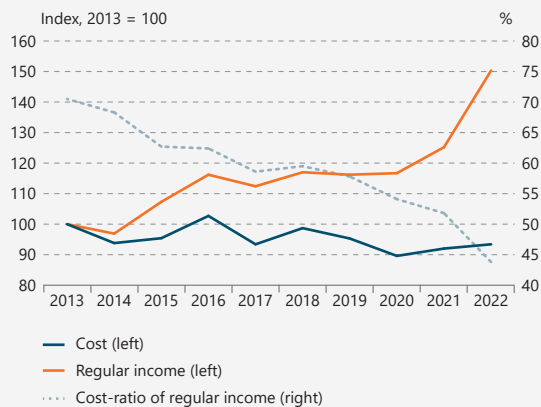
The D-SIBs' income from financial activities was negative by 12.7 b.kr. in 2022, in a marked turnaround relative to 2021, when it was positive by 14.4 b.kr. All of the D-SIBs recorded negative financial income last year, although the losses varied from bank to bank: Íslandsbanki's loss came to 1.3 b.kr., Arion Bank's was 3.5 b.kr., and Landsbankinn's 8.0 b.kr. Negative income from financial activities is due primarily to share price movements.

Other operating income for the year totalled 5.9 b.kr., including 2.6 b.kr. in income from insurance activities at Arion Bank. Other operating income declined by 9% year-on-year, owing mainly to reduced insurance income. Finally, returns on discontinued operations were positive by 6.7 b.kr., owing almost entirely to Arion Bank's Q2/2022 sale of its subsidiary Valitor for 14.6 b.kr.

Costs continue to fall

The D-SIBs' combined operating expenses totalled 74.8 b.kr. in 2022, an increase of 1.1 b.kr. between years. Costs declined by 7.3% in real terms, as real wage expense fell by 6.6% and other operating expenses by 8.3% (also in real terms). At year-end 2022, there were 2,333 full-time position equivalents at the D-SIBs, an increase of 31 during the year, after a continuous decline over the previous decade. Wage costs per man-year totalled 18.8 m.kr in 2022, an increase of 1% year-on-year, whereas costs declined by 8.6% in real terms. The Icelandic Financial Services Association (SFF) and the Confederation of Icelandic Bank and Finance Employees (SSF) agreed to lengthen the wage agreement between them for one year. The previous contract expired in November. Extending the contract will cost the financial institutions an estimated 5.6-5.8%. This represents a somewhat larger proportional pay rise than was provided for in the original agreements, and if staffing levels continue to increase, the banks' wage costs can be expected to rise somewhat this year. As Chart II-8 shows, however, the banks' regular income

Chart II-8
D-SIB: Regular income and cost-ratios¹



1. Domestic systemically important banks, consolidated figures. Regular income is net interest income and net fee and commission income.
Sources: Commercial banks' financial statements.

has been rising more than their costs. This trend is likely to continue, as this year's interest rates will be above the 2022 average. The D-SIBs' expense ratio remained flat year-on-year in 2022, at 45%. Their expense ratio relative to regular income – i.e., excluding net income from financial activities and other operating income – was 44% in 2022. It fell by 8 percentage points year-on-year, the largest single-year drop on record.

Corporate lending on the rise again

The D-SIBs' loans to households and businesses rose by 11% in 2022, to a total of 3,854 b.kr. at the year-end. The real increase was small, however, as inflation was high. Corporate lending grew slightly more than household lending, for the first time since 2018.

Household lending growth slowed markedly towards the end of the year, in accordance with the decline in both housing market turnover and the number of purchase contracts finalised, owing to the tighter monetary and macroprudential stance. Furthermore, mortgage refinancing has grown less common as interest rates have risen. Corporate lending grew at a steady pace over the course of 2022, and demand is still keen in spite of high interest rates, indicating how strongly the economy has bounced back.

The D-SIBs' loans to households and businesses equalled just over 79% of their total assets at the end of 2022, an increase of 3 percentage points between years. This ratio has been about 76% for all of the banks combined over the last five years, as compared with 63% in 2013. There is a limit on how high it can rise, however, as the banks must always hold a specified amount of high-quality liquid assets to offset potential capital outflows. The year-end ratio varied from bank

to bank, from just over 86% for Landsbankinn to 74% and 76%, respectively, for Arion Bank and Íslandsbanki. Landsbankinn recorded the largest increase during the year, at just over 6 percentage points, while Arion Bank's ratio rose by 2.5 percentage points and Íslandsbanki's was unchanged. In Landsbankinn's case, the increase was due mainly to lending growth, which measured 11% in 2022, while liquid assets declined somewhat, partly because of unfavourable conditions in funding markets. Funding conditions have improved substantially in 2023 to date; therefore, the loan-to-asset ratio has probably peaked.

Since the beginning of 2020, the D-SIBs' foreign-denominated loan stock has grown by 80 b.kr. and non-indexed króna-denominated loans to private sector borrowers have increased by 1,000 b.kr., whereas the indexed loan stock has contracted by 165 b.kr. over the same period. This change has strongly affected the D-SIBs' indexation imbalance; i.e., the difference between indexed assets and indexed liabilities. At the end of March 2022, the indexation mismatch was positive by 9 b.kr., whereas in 2019 it had been positive by 233 b.kr. The trend reversed in H2/2022, and by the end of the year the mismatch was positive by 51 b.kr. The banks have been able to manage their imbalances to some extent – for instance, by buying indexed assets such as Treasury bonds – but in addition, rising interest rates have fuelled demand for indexed loans, particularly among households. The D-SIBs' indexed household loan stock grew by 25 b.kr. in Q4/2022, for instance, while the non-indexed stock remained unchanged.

Forborne loans still declining

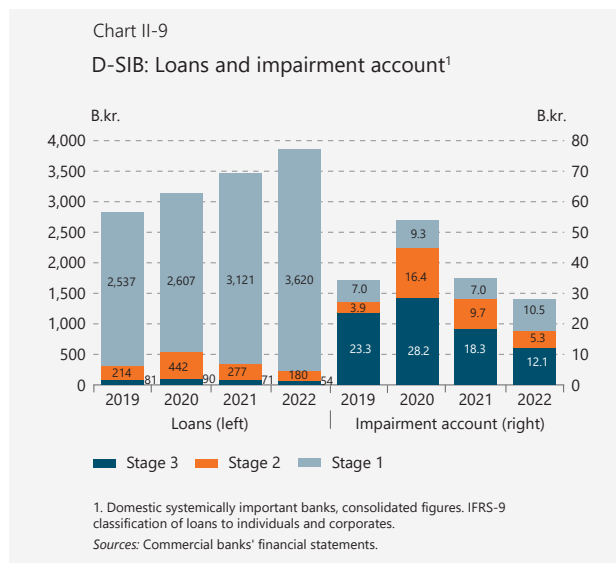
The economy is quite resilient, and tourism has recovered more strongly than previously expected. Borrowers who needed pandemic-related support measures have seen their situation improve markedly. For example, the banks have reversed unutilised impairment previously expensed as a precautionary measure due to the pandemic. Arrears on loans increased in the wake of the pandemic, topping out at the beginning of 2021, but are now down to half of that peak. At the end of 2022, 0.7% of household loans and 2.3% of corporate loans were non-performing. These ratios are at their lowest in quite some time.³

In most cases, loans to borrowers who took advantage of pandemic-related measures are classified as forborne and performing. At the end of 2022, 7.3%

3. This refers to non-performing loans as defined by the European Banking Authority (EBA).

of the D-SIBs' corporate loans (129 b.kr.) and 1.1% of loans to individuals (22 b.kr.) were forborne and performing. The share of forborne loans, like NPLs, has fallen to half its peak level. The banks' forborne loans are likely to continue falling in terms of both amount and percentage, as a large share of customers with such loans have already begun to make partial or full payment on them. In order for a loan to be reclassified as not forborne, one requirement is that regular payments of principal and/or interest must have been made for more than half of the time the loan has been classified as forborne. Loans may be classified as forborne for a maximum of 24 months; therefore, the impact of the pandemic on loan classification is likely to diminish over the course of the year. The improvement in borrowers' position can also be seen in the change in IFRS-9 classification. The amount of D-SIB loans in Stage 2 more than doubled between 2019 and 2020, and at the end of 2020 some 14.1% of loans were in Stage 2. A large share of the loans moved to Stage 2 were to tourism companies, and furthermore, frozen loans were usually classified as Stage 2.⁴ Because of the improvement in borrowers' situation, the amount of Stage 2 loans had fallen below the pre-pandemic level by the year-end, even though total D-SIB lending to households and businesses increased by over 1,020 b.kr. over the same period.

This is also true of Stage 3 loans, which can be viewed as non-performing: at the end of 2022, 1.4% of loans were in Stage 3, as compared with 2.9% at the



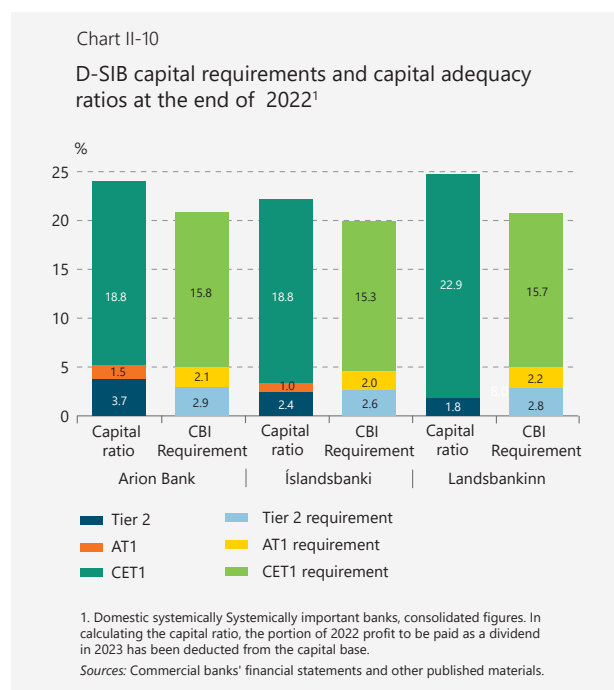
4. Loans are moved from Stage 1 to Stage 2 if credit risk has increased significantly relative to the initial position. Loans are moved to Stage 3 if they are in serious default and impairment can be expected. Impairment must be based on expected credit losses over the lifetime of the loan.

end of 2019. The D-SIBs' impairment account totalled 28 b.kr. (0.7%) at the end of 2022, as opposed to 34 b.kr. (1.2%) at the end of 2019.

In most cases, interest rates on loans to private sector borrowers have risen somewhat, concurrent with Central Bank rate hikes and higher inflation. All else being equal, loan quality should deteriorate when interest rates rise. During and after the pandemic, loan losses have been limited, and NPLs and impairment accounts are currently at a low. This is unlikely to remain unchanged at a higher interest rate level. As a result, the banks must assume that losses will increase in the coming term, as will the need for additional impairment to offset them.

Capital ratio declines

The D-SIBs' capital equalled 686 b.kr. at the end of 2022, after increasing by 5 b.kr. year-on-year, in spite of dividend payments and share buybacks totalling nearly 65 b.kr. during the year. Their combined capital ratio was 23.7% at the end of 2022, after falling by 1.2 percentage points between years.⁵ Profits and issuance of capital instruments led to a 2.8 percentage point rise in their capital ratio, while dividend payments, share buybacks, and an increase in risk-weighted assets led to a decrease of 4 percentage points.



5. According to the D-SIBs' annual accounts for 2022, planned dividends in the amount of 52 b.kr. have been deducted from their capital base, and this has been done both here and in comparison with the end-2021 position. If proposed dividend payments are added to the capital base, however, the capital ratio rises to 25.4%, or 1.4 percentage points lower in the prior year.

The minimum capital ratio required of the D-SIBs by the Central Bank ranges between 19.9% and 20.8%. At the end of 2022, their capital ratios were 2.3-4 percentage points above the required level, after adjusting for dividends to be paid on profits in 2022. The three banks' capital ratios including the management buffer were 1-2 percentage points above Central Bank requirements.⁶ It is possible to increase the D-SIBs' capital base by issuing additional Tier 1 equity instruments and Tier 2 subordinated bonds, as the scope for such issuance has not been fully utilised, particularly in the case of Landsbankinn. As a result, the banks have some latitude to steer their capital base, particularly because their underlying returns are strong.

The banks' leverage ratio declined by 1 percentage point in 2022, to 12.9% at the year-end. Individual leverage ratios ranged between 11.8% and 14.4% and fell by 0.5-1.5 percentage points during the year. The lower leverage ratio is attributable to a 6 percentage point increase in total exposures, to a year-end total of 5,043 b.kr., and a 1.5 percentage point decline in Tier 1 capital.⁷ Although the ratio fell in 2022, it is still well above the 3% required minimum.

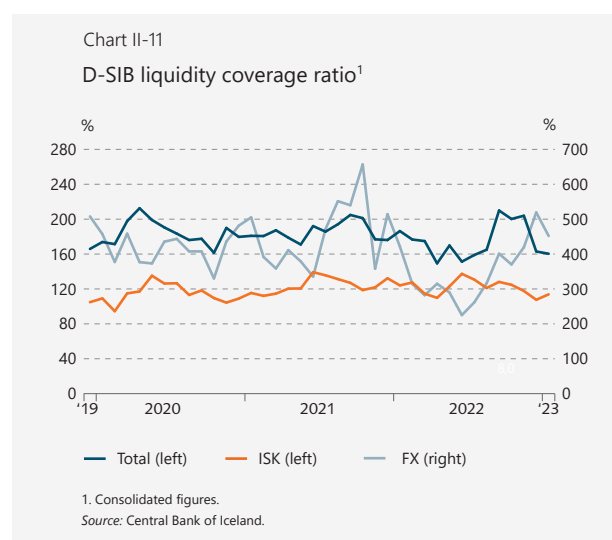
The banks' returns have been robust in the recent term, and their core operations have strengthened significantly. Assuming that interest rates keep rising, their core operations should continue to improve; however, near-term developments are uncertain, as is the impact that inflation and higher interest rates will have on the banks. The need for impairment will very probably increase, as credit risk has grown. The banks have stepped up their dividend payments and share buybacks markedly, but it is preferable to exercise caution in these areas during periods of economic uncertainty. It is vital to maintain financial system resilience and to ensure that financial institutions can both write off and restructure debt without jeopardising their own strength.

Liquidity and funding

The banks' liquidity position deteriorated in 2022

The domestic systemically important banks' (D-SIB) liquidity position has deteriorated in the past year but remains well above the Central Bank minimum. The decline in liquidity ratios is due mainly to lending growth, bond maturities, dividend payments, and

transfers of deposits. At the end of January 2023, the D-SIBs' combined liquidity ratio in all currencies was 160%, far above the 100% minimum required under Central Bank rules. The ratio varies from bank to bank, however. The liquidity ratio in foreign currencies was 452% whereas the ratio in Icelandic krónur was 114%. Among individual currencies, the ratios were in euros (312%) and US dollars (239%). Foreign currency liquidity ratios declined in early 2022 but started to rise again around mid-summer, concurrent with the banks' foreign-denominated bond issues. New Rules on Credit Institutions' Liquidity Ratios, no. 1520/2022, took effect on 1 January 2023. Among other provisions, the new Rules introduced an 80% minimum liquidity ratio in euros for credit institutions whose euro-denominated obligations equal or exceed 10% of total liabilities. The minimum liquidity ratio for all currencies combined is still 100%, and the 50% ratio for Icelandic krónur is also still in effect. The new Rules are discussed further in Box 4.



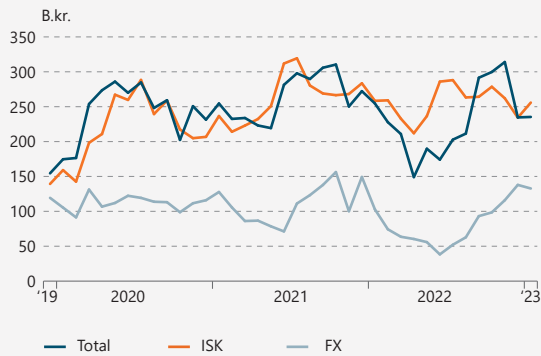
At the end of January 2023, the banks' disposable liquid assets were 236 b.kr. above the minimum required for all currencies combined under Central Bank rules. Liquid assets over and above requirements have fallen by 30 b.kr. in the past twelve months. As before, the banks' internal criteria determine the scope they have for disposition of liquid assets. Based on a 120% minimum liquidity ratio, for example, the banks' excess liquidity amounted to 158 b.kr. at the end of January. With reduced liquidity, they have less scope for new lending, dividend payments, and share buybacks.

The banks' liquid assets consist mainly of government bonds, government bills, and deposits with the Central Bank. At the end of January, the banks held 579 b.kr. in high-quality liquid assets in all cur-

6. The management buffer is an internal prudential buffer defined by the banks themselves.

7. The leverage ratio, computed in accordance with the Act on Financial Undertakings, no. 161/2002, is calculated as Tier 1 capital divided by exposures. By law, the minimum leverage ratio is 3%.

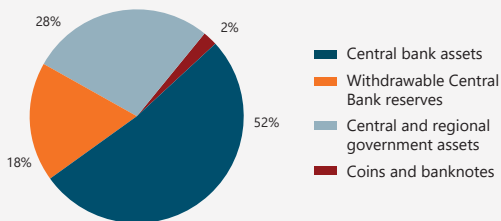
Chart II-12
D-SIB liquidity in excess of requirements¹



1. Parent companies
Source: Central Bank of Iceland.

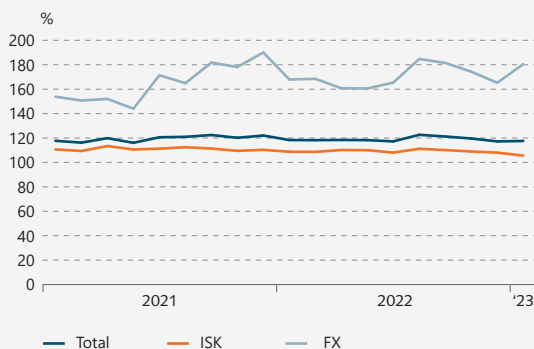
rencies combined; however, their liquid assets have contracted by 27 b.kr. since year-end 2021. Just over half of their liquid assets are in government bonds and bills. Their liquid assets in Icelandic krónur totalled 409 b.kr. as of end-January, after declining by 12 b.kr. since year-end 2021, while liquid assets in foreign currencies

Chart II-13
D-SIB: ISK HQLA¹
January 2023



1. Parent companies.
Source: Central Bank of Iceland.

Chart II-14
D-SIB Net stable funding ratio¹



1. Consolidated figures.
Source: Central Bank of Iceland.

contracted by 15 b.kr. The ratio of liquid assets to total assets is 16% and has held broadly unchanged in recent months.

Market funding in krónur has declined

As before, the majority of the banks' funding is in the form of deposits and marketable bonds. Deposits, which account for about half of their funding, increased by 237 b.kr., or 10%, in 2022. The largest increase, 90 b.kr., was in deposits owned by individuals, followed by large companies' deposits, which grew by 78 b.kr. The banks' domestic funding in Icelandic krónur is still mainly in the form of deposits, which explains the low funding costs in domestic currency.

Lending to both households and businesses increased in 2022, eroding the banks' liquidity at a time of tight funding conditions, particularly in foreign markets. On the whole, the banks still have enough liquidity to intermediate credit to households and businesses, but if lending growth continues, they must consider additional market funding. The recent increase in lending has been sustained by deposit-based funding. If the composition of the deposit portfolio changes – for instance, if individuals move their savings to other investments – it could adversely affect the banks' liquidity. It is therefore important to keep close track of developments in banking system deposits. The banks' excess liquidity shrank somewhat around mid-year, but the situation reversed with increased foreign issuance during the autumn.

The D-SIBs' funding ratio for all currencies combined was 118% at the end of January and therefore well above the minimum required under Central Bank rules. At that time, the funding ratio in foreign currencies was 180%, whereas the ratio in Icelandic krónur was 106%. It rose during the autumn with the banks' bond issues but then fell again as the year-end approached.

The banks' króna-denominated bond issues have been limited, apart from covered bonds. In 2022 they issued 49 b.kr. in króna-denominated covered bonds. The stock of outstanding covered bonds denominated in krónur contracted by 5 b.kr. in 2022. All of the banks had large maturities during the year. Demand for the bonds has been limited and, as before, buyers are few. At the same time, the banks' net new lending to households totalled 98 b.kr.⁸ Íslandsbanki and Landsbankinn have covered bond maturities totalling 88 b.kr. sched-

⁸ Net new loans are defined as new loans less debt retirement and prepayments in excess of contractual requirements.

uled for 2023. Based on a comparison of last year’s covered bond issuance and this year’s maturities, it will be challenging for the banks to maintain the outstanding covered bond stock.

Arion Bank and Íslandsbanki issued króna-denominated subordinated bonds in 2022, with a 10-year maturity and a five-year call provision. In addition, Arion Bank issued a green bond in Icelandic krónur. If the banks do not succeed in boosting their króna-denominated funding, their liquidity could be under threat in the future.

Foreign funding uncertain

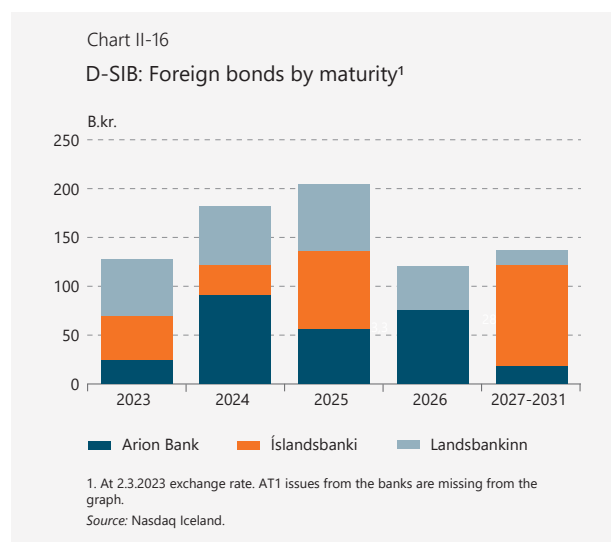
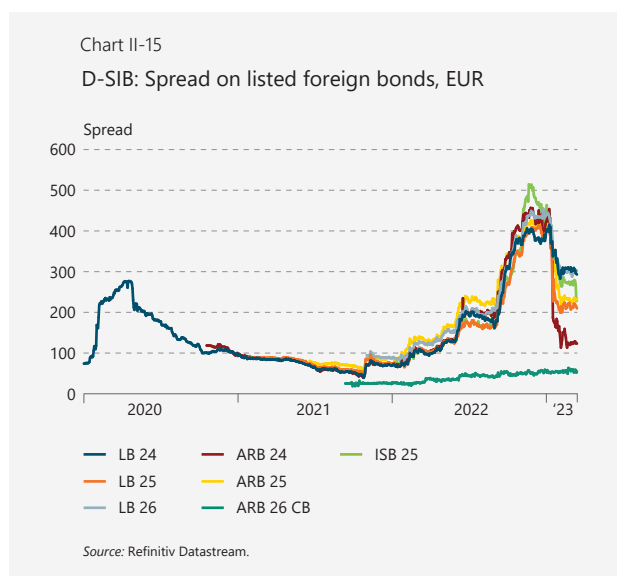
Credit spreads on the domestic banks’ foreign bond issues rose markedly in 2022. They began to rise when Russia invaded Ukraine and continued to climb as uncertainty escalated in Europe. By December, secondary market spreads were higher than they were at the time of the banks’ first foreign issues after the 2008 financial crisis, and far above the peak at the onset of the pandemic.

The Icelandic banks are not the only issuers affected by higher credit spreads in foreign markets. Funding conditions tightened over all in Europe but then began to improve again after mid-October 2022, while secondary market spreads on the Icelandic banks’ issues started to fall somewhat later. The difference between Icelandic and European banks’ spreads can be explained in part by the size of the bond issues, as Icelandic bank bonds are very small in European context and therefore relatively illiquid. Other reasons include the [Icelandic] banks’ credit ratings and the small size of the investor group. Furthermore, turnover with the banks’ foreign-denominated bonds has been limited

and price formation therefore weak. For instance, when the banks made efforts at the beginning of 2023 to boost secondary market turnover, it came to light that few investors were willing to sell at the prices on offer. It was not until the price of the bonds had risen and yields had fallen that trading increased.

The banks scaled back their foreign bond issuance as uncertainty mounted in foreign credit markets in 2022. As the year advanced and foreign bond maturities approached, however, the need for refinancing grew greater. In September, the banks issued two large eurobonds. Íslandsbanki sold a covered bond in the amount of 300 million euros, and Arion Bank issued a green bond, also for 300 million euros. The credit spread on Arion Bank’s bond was somewhat larger than on previous issues from the Icelandic banks. The two banks used the proceeds from the issues to refinance 2023 maturities and strengthen their foreign liquidity. At the beginning of March, Landsbankinn issued its first euro-denominated covered bond in the amount of 300 million euros.

Íslandsbanki was considering another eurobond issue in November but abandoned the idea due to difficult market conditions. Shortly thereafter, it issued bonds in Swedish kronor and Norwegian kroner for just under 30 b.kr combined. The credit spread on the two-year issue was 425 basis points above the three-month interbank rate, and the spread on three-year bond was 475 points above it. The terms were among the more unfavourable obtained by Icelandic banks since the 2008 financial crisis, reflecting how disadvantageous market conditions were at the time of the issue. A short time later, Íslandsbanki called in its eurobond maturing in January 2024. The banks have issued three foreign-denominated bond thus far in 2023 in the



amount of 48.7 b.kr., whereas their 2022 issues totalled nearly 213 b.kr.

New legislation amending the Act on Covered Bonds, no. 11/2008, so as to implement two European regulatory instruments on the same topic entered into force on 1 March 2023. The main amendments include a requirement that the cover pool contain liquid assets sufficient to cover maximum outflows for a 180-day period, a set of conditions for the postponement of maturities, and more detailed requirements concerning issuers' information disclosures to investors. Also provided for is an authorisation to market bonds satisfying the conditions in the Act as *European Covered Bonds* or *European Covered Bonds (Premium)*, which will have a positive impact on covered bonds issued by Icelandic banks. In all, the D-SIBs have issued covered eurobonds for 1,100 million euros and have issued bonds for their own use in the amount of 550 million euros.

Their outstanding foreign-denominated maturities for the remainder of 2023 total about 130 b.kr. If the call provisions on the bonds are exercised at the earliest opportunity, this amount will increase by 29 b.kr. All three banks also have large eurobond maturities next year, as well as smaller maturities in Nordic currencies, for a total of roughly 182 b.kr.

The banks' foreign refinancing risk has increased, and their foreign liquidity position did deteriorate in the first half of 2022. For example, the ratio of high-quality foreign-denominated assets to short-term foreign-denominated liabilities fell significantly in H1/2022 but then began to rise marginally in H2. This differs from the situation at the onset of the pandemic, when their liquidity position was better, even though foreign markets had closed temporarily.

Even though the banks' foreign liquidity is generally ample, they will not be able to pay all of this year's foreign maturities without refinancing. As a result, their refinancing risk is still considerable. Because of new minimum requirements for own funds and eligible liabilities (MREL), the banks must issue bonds that satisfy specified conditions pursuant to Article 17, Paragraph 2 of the Act on Resolution of Credit Institutions and Investment Firms, no. 70/2020. Bonds maturing within one year do not satisfy these conditions, and the minimum requirement therefore puts pressure on the banks to refinance earlier.

The banks must maintain strong liquidity

Stress tests of the banks' liquidity and funding are carried out on a regular basis. At the end of 2022, not all of the banks had enough high-quality liquid assets to

cover withdrawals of the largest deposits held by large firms, financial institutions, pension funds, and non-residents. Furthermore, all of the banks' liquidity ratios would fall below the threshold provided for in the Central Bank's liquidity rules, as such a situation would generate substantial outflows.

As the banks' liquidity position deteriorates, the need for increased market funding in 2023 grows even greater. Because of last year's difficult foreign market conditions, the banks issued a limited amount of foreign-denominated securities other than euro-denominated covered bonds.

Further ahead, the banks must step up their market funding in krónur and foreign currencies and should give consideration to term deposits so as to shore up their liquidity position.

New Central Bank rules on credit institutions' liquidity ratios

New Rules on Credit Institutions' Liquidity Ratios, no. 1520/2022, took effect on 1 January 2023, superseding the previous Rules on the same topic. The new Rules introduce an 80% minimum liquidity ratio in euros for credit institutions whose euro-denominated liabilities equal 10% or more of their total liabilities. Concurrent with the introduction of the new requirements for liquidity ratios in euros, the 100% liquidity ratio requirement for all foreign currencies combined has been deleted. Credit institutions must still maintain a minimum liquidity ratio of 100% in all currencies combined, as well as a minimum 50% ratio in Icelandic krónur.

Regulation (EU) 2015/61 contains an authorisation to set liquidity requirements for individual currencies that reach a specified threshold; i.e., currencies for which liabilities equal or exceed 5% of the total liabilities of the credit institution concerned. The aim of setting separate liquidity requirements for specified foreign currencies is to mitigate credit institutions' liquidity risk by ensuring that they always have enough liquid assets in the specified currencies to satisfy their obligations in those currencies under stressed

conditions over a specified period of time. It is reasonable to require that credit institutions generally have liquidity to offset liabilities if total liabilities in a given currency exceed a certain percentage of their total liabilities. It was considered sufficient to set the threshold for liabilities in such currencies at 10% of the credit institution's total liabilities. For Icelandic credit institutions, it is primarily the euro that reaches this threshold.

In setting a suitable liquidity ratio for euros, consideration was given to the importance of giving credit institutions the flexibility to determine the composition of their liquid assets in accordance with the market conditions prevailing at the time in question. Markets that use euros are accessible and active, and in general, it should be possible to acquire high-quality liquid assets denominated in euros at relatively short notice.

Credit institutions must continue to satisfy the requirements on consistency in currency composition for all currencies exceeding the 5% threshold; cf. Article 8, Paragraph 6 of the aforementioned Regulation (EU) 2015/61.

Independent domestic retail payment solution

One of the Central Bank of Iceland's principal roles is to promote a safe and effective financial system, including domestic and cross-border payment intermediation. Because businesses and individuals in Iceland rely heavily on electronic retail payment intermediation, ensuring that it is secure, efficient, and economical is a matter of substantial public interest.

Over 90% of domestic retail payment intermediation is carried out with payment cards (Visa and MasterCard) or with smart device apps based on connections with payment cards. About 8% of payments are made in cash, and a scant 2% use other methods.¹ Payment cards are therefore a key element in electronic payment intermediation in Iceland. Today some 99% of all payment card transactions, including authorisations and netting, are routed through foreign infrastructure owned by Visa and MasterCard. This tends to compromise the resilience of retail payment intermediation in Iceland; for instance, from the standpoint of ensuring continued functioning in the event of a disruption in service. Such disruptions can occur because of interrupted internet connections, power outages, cyberattacks, or geopolitical or business disputes that could have severe repercussions, as examples show. For this reason, it is considered vital to supplement the current solutions by implementing an independent domestic payment solution in Iceland using domestic infrastructure, thereby boosting the resilience of Icelandic retail payment intermediation.

A December 2022 report from the National Security Council stresses the importance of implementing a domestic payment solution as soon as possible, so that payments and settlement can take place entirely through the use of infrastructure that is under domestic control, independent of international telecommunications, and unsusceptible to intervention by foreign entities. The first steps towards such an independent domestic solution have been taken, including the operational reorganisation of Icelandic financial market infrastructure and the adoption of new deposit systems, which is a prerequisite for a successful solution. The Central Bank has published on its website a discussion document on an independent domestic retail payment solution. The report is based on the findings of a task force that worked on behalf of the Bank, mapping out the Icelandic payment intermediation market, analysing potential risks in retail payment intermediation, etc., and

1. These include account-based transactions such as *buy now, pay later*, or BNPL.

evaluating possible ways to implement an independent domestic retail payment solution.²

The Central Bank has concluded that two options are most feasible for the implementation: a debit card solution – for instance, a co-badged solution – which ensures that authorisations for domestic debit card transactions are independent of foreign infrastructure, or an account-to-account (A2A) solution that routes retail payments between bank accounts. It is possible to build an A2A solution using the Icelandic banking system's core infrastructure, thereby opening up the possibility for banks and other payment service providers to offer an even wider range of domestic payment options for goods and services purchases in Iceland. In any event, the fundamental requirement is that the independent retail payment solution must be accessible to all who fulfil the relevant conditions and must not hinder active competition.

The Forum for the Future is further developing the ideas recommended in the above-mentioned report.³ If a consensus cannot be reached among all stakeholders concerning an A2A solution, the Central Bank is planning to adopt rules, in consultation with the relevant Governmental authorities, that will either provide for domestic debit card transactions to be authorised, netted out, and settled entirely in Iceland, or stipulate that deposit institutions must participate in an A2A-based payment solution developed by the Central Bank.

In the recent term, the Bank has not limited itself to considering matters pertaining to the development of an independent domestic payment solution. It has also worked in a number of other areas pertaining to increased security in Icelandic payment intermediation. In this context, the Bank has been preparing a contingency plan for the distribution and receipt of banknotes. Furthermore, the Payment Council⁴ has appointed a special task force entrusted with conducting a preliminary examination of the resilience of trade and services in the event of an interruption in retail payment intermediation service.

2. The report (Central Bank *Special Publication* no. 16) can be found here (in Icelandic): https://www.sedlabanki.is/library/Skraarsafn/Serrit/Serit_nr_16_ohad_greidslulausn.pdf

3. More information on the Forum for the Future can be found here: <https://www.greidsluveitan.is/hlutverk/framtidarvettvangur/>.

4. More information on the Payment Council can be found here: <https://www.sedlabanki.is/utgefing-efni/kalkofninn/grein/2022/02/25/Greidslurad-vettvangur-fyrir-greidslumidlun-og-fjarmalainnvidi/>.

TIBER-IS

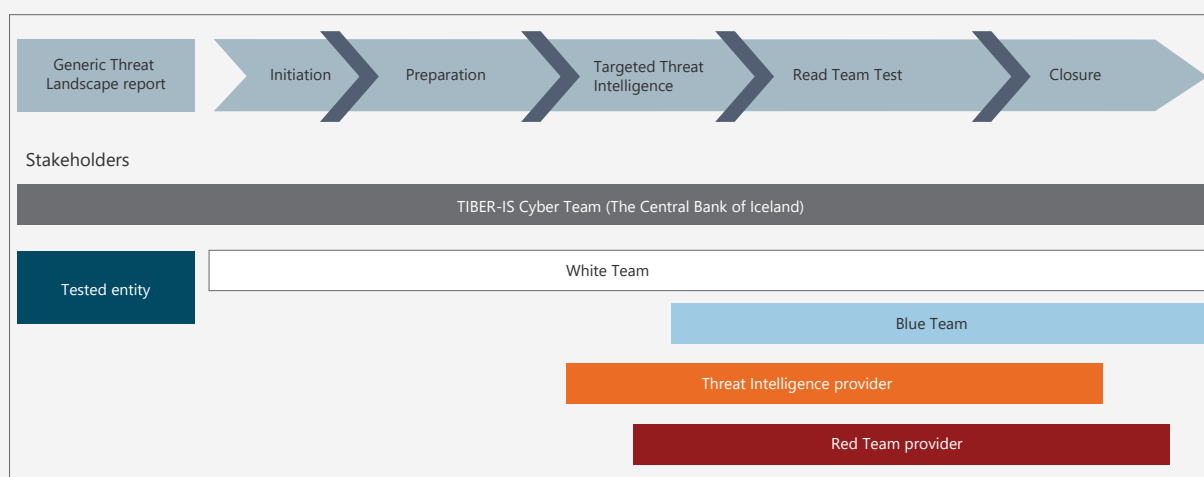
In 2018, the European Central Bank (ECB) introduced the Framework for Threat Intelligence-based Ethical Red Teaming, or TIBER-EU,¹ for the purpose of testing resilience against cyberattacks. The framework was developed jointly by the ECB and several EU member states' central banks, based on comparable mechanisms previously developed by the Bank of England (CBEST)² and De Nederlandsche Bank NV in the Netherlands (TIBER-NL).³ TIBER-EU was created with the financial market in mind, but it can also be used for cyber-resilience testing by companies operating in other markets. The objectives are as follows:

- To bolster financial institutions' resilience against cyberattacks.
- To standardise and harmonise the execution of tailor-made cyberattack testing, but with the flexibility to take account of differing conditions from one country to another.
- To provide guidance to authorities on how to set up and maintain a cyber-resilience testing framework.
- To support cyberattack testing for companies with cross-border operations.

- To foster cross-border recognition of testing and reduce duplication of effort in supervision of financial institutions.
- To provide guidance on cross-border communications and collaboration, as well as on sharing results and analysis.

The ECB guidelines on implementation of TIBER-EU⁴ state that if a country decides to use the framework, it shall do so formally and shall so notify the ECB. The guidelines also state that such decisions may be taken from a financial stability perspective. The Central Bank of Iceland has decided to implement the framework and has notified the ECB accordingly.⁵ The Bank has already begun to implement Iceland's version of the framework, which is called TIBER-IS. The intention is to test Icelandic financial institutions' resilience against cyberattacks in a formal, attestable way. TIBER-IS tests based on the TIBER-EU framework give Icelandic financial institutions the opportunity to demonstrate their resilience against cyberattacks in a manner that is accepted throughout the European Economic Area (EEA),

Chart 1
TIBER-IS Test Process



1. Further information on TIBER-EU can be found here: <https://www.ecb.europa.eu/paym/cyber-resilience/tiber-eu/html/index.en.html>.

2. Further information on CBEST can be found here: <https://www.bankofengland.co.uk/financial-stability/operational-resilience-of-the-financial-sector/cbest-threat-intelligence-led-assessments-implementation-guide>.

3. Further information on TIBER-NL can be found here: <https://www.dnb.nl/en/sector-information/cash-and-payment-systems/tiber-nl/>.

4. The guidelines can be found here: https://www.ecb.europa.eu/pub/pdf/other/ecb.tiber_eu_framework.en.pdf.

5. A number of central banks in the EEA, including the Nordic central banks, currently use TIBER-EU.

provided that the test results are positive. It is planned to begin testing this autumn.

TIBER-IS will be based on having a designated *red team provider* carry out simulated bespoke attacks on critical functions in financial institutions' production environment. Attacks are based on known attack scenarios; i.e., those considered likeliest to be used in an actual cyberattack. Assistance in designing such attack scenarios is obtained from so-called *threat intelligence providers*, companies that specialise in gathering information on cyberattack methods most common in the respective area.

Cyberattacks are then launched without prior notice – i.e., without the knowledge of the company's cybersecurity team, called the *blue team*, but with the knowledge of the company's *white team*, which manages the testing in consultation with the Central Bank's TIBER-IS cyber team. The Central Bank's cyber team provides information on TIBER-IS, furnishes the relevant guidance documents and templates, assists with and monitors the testing process, and ensures that the tests satisfy the requirements laid down in the TIBER-EU framework.

Appendix

Tables

Table 1 Financial system assets¹

Assets, b.kr	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021,%
Central Bank of Iceland	755	840	844	964	874	-9
Deposit-taking corporations excl, the Central Bank	3,681	3,775	4,212	4,700	5,100	9
Commercial banks	3,656	3,748	4,183	4,669	5,066	9
Savings banks and other deposit-taking corporations	26	26	28	31	34	10
Money market funds	147	144	145	128	138	8
Non-MMF investment funds ²	668	766	846	1,125	1,071	-5
Other financial intermediaries ^{3,4}	397	290	257	221	230	4
Treasury	941	936	1,071	1,064	1,073	1
Housing Financing Fund	731	718	703	669	646	-3
Financial auxiliaries	25	25	53	59	54	-8
Insurance corporations	232	259	290	320	317	-1
Pension funds	4,245	4,975	5,727	6,747	6,639	-2
Total assets	11,091	12,010	13,445	15,328	15,496	1

1. Including the old banks' holding companies from 31 December 2015 onwards.

2. Effective 31 December 2016, specialised investment companies are included with equity, investment, and institutional investment funds.

3. Effective 31 December 2015, after finalisation of composition agreements, the old banks' holding companies are classified as other financial corporations.

4. Beginning on 27 February 2019, Byr, ESI, the Framtíðin credit fund, and Sparisjóðabankinn (SPB) are classified among other financial institutions. Data are as follows: for Byr, from January 2016 onwards; for ESI, from December 2009 onwards; for Framtíðin, from May 2017 onwards; and for SPB, from February 2016 onwards.

Source: Central Bank of Iceland.

Table 2 DMB assets

Assets, m.kr.	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021, %
Cash and deposits with Central Bank	293,870	329,923	213,003	281,653	279,738	-1
Deposits in domestic deposit-taking corporations	658	633	1,736	3,627	3,179	-12
Deposits in foreign deposit-taking corporations	107,039	63,887	85,059	80,358	118,948	48
Domestic credit	2,708,062	2,784,748	3,070,639	3,409,643	3,814,383	12
Foreign credit	153,272	137,546	168,636	150,557	179,297	19
Domestic marketable bonds and bills	95,842	104,980	306,068	277,500	270,610	-2
Foreign marketable bonds and bills	137,139	145,433	146,996	183,058	169,294	-8
Domestic equities and unit shares	101,026	121,132	123,347	191,208	140,951	-26
Foreign equities and unit shares	3,077	2,622	2,262	4,593	3,798	-17
Other domestic assets	68,435	67,047	74,048	108,794	107,481	-1
Other foreign assets	13,068	16,693	19,845	9,229	13,221	43
Total	3,681,488	3,774,645	4,211,637	4,700,220	5,100,899	9

Source: Central Bank of Iceland.

Table 3 Other credit institutions' assets¹

Assets, m.kr.	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021, %
Cash and deposits with Central Bank	29,493	21,067	0	0	0	0
Deposits in domestic deposit-taking corporations	20,511	8,639	16,822	9,734	9,446	-3
Deposits in foreign deposit-taking corporations	36,088	28,597	24,927	15,945	3,705	-77
Domestic credit	137,595	154,903	178,680	162,245	173,304	7
Foreign credit	57,731	17,413	17,847	15,559	15,692	1
Domestic marketable bonds and bills	258	1,430	5,037	9,818	14,671	49
Foreign marketable bonds and bills	266	0	350	268	335	25
Domestic equities and unit shares	92,915	29,765	521	1,145	2,229	95
Foreign equities and unit shares	3,602	6,681	1,451	76	47	-37
Other domestic assets	12,068	18,126	8,849	3,599	4,065	13
Other foreign assets	6,544	3,445	2,650	2,771	5,524	99
Total	397,071	290,065	257,136	221,159	229,018	4

1. Beginning on 27 February 2019, Byr, ESI, the Framtíðin credit fund, and Sparisjóðabankinn (SPB) are classified among other financial institutions. Data are as follows: for Byr, from January 2016 onwards; for ESI, from December 2009 onwards; for Framtíðin, from May 2017 onwards, and for SPB, from February 2016 onwards.

Source: Central Bank of Iceland.

Table 4 Pension fund assets

Assets, m.kr.	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021, %
Deposits in domestic deposit-taking corporations	142,872	151,522	164,821	170,092	164,527	-3
Deposits in foreign deposit-taking corporations	13,776	24,174	34,230	22,717	13,418	-41
Domestic credit	428,474	522,485	511,516	491,083	553,604	13
Foreign credit	309	378	495	423	629	48
Domestic marketable bonds and bills	1,909,858	1,970,450	2,105,645	2,305,830	2,332,764	1
Foreign marketable bonds and bills	3,980	8,516	8,568	7,578	17,298	128
Domestic equities and unit shares	647,835	805,115	987,843	1,336,313	1,243,911	-7
Foreign equities and unit shares	1,071,412	1,465,596	1,887,539	2,384,949	2,285,194	-4
Domestic insurance and pension assets	21,003	22,118	20,989	21,651	21,621	0
Foreign insurance and pension assets	69	48	50	30	62	105
Other domestic assets	5,083	4,149	5,690	5,987	4,666	-22
Other foreign assets	0	0	46	334	548	64
Total	4,244,671	4,974,551	5,727,434	6,746,988	6,638,241	-2

Source: Central Bank of Iceland.

Table 5 Insurance company assets

Assets, m.kr.	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021, %
Cash and deposits with Central Bank	1,563	440	2,574	3,097	4,175	35
Deposits in domestic deposit-taking corporations	6,589	10,166	6,985	6,441	8,797	37
Deposits in foreign deposit-taking corporations	75	48	28	0	0	0
Domestic credit	3,523	2,490	1,819	1,454	3,733	157
Foreign credit	0	0	0	0	0	0
Domestic marketable bonds and bills	98,628	112,194	137,759	151,058	146,843	-3
Foreign marketable bonds and bills	16,801	23,770	24,601	25,815	26,297	2
Domestic equities and unit shares	61,159	65,790	74,850	72,283	68,090	-6
Foreign equities and unit shares	8,821	10,200	12,168	14,590	13,652	-6
Domestic insurance and pension assets	22,228	24,772	25,786	27,550	29,393	7
Foreign insurance and pension assets	6,310	6,997	6,311	6,614	5,461	-17
Other domestic assets	5,197	7,183	7,721	10,411	10,076	-3
Other foreign assets	1,542	750	319	200	134	-33
Total	232,436	264,800	300,922	319,512	316,652	-1

Source: Central Bank of Iceland.

Table 6 D-SIB: Income and expenses¹

Income and expenses, m.kr.	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022	Change from 31.12.2021, %
Arion Bank hf.						
Operating income	46,171	47,998	50,764	58,225	57,198	-2
Net interest income	29,319	30,317	31,158	32,063	40,277	26
Net fee and commission income	10,350	9,950	11,642	14,673	16,065	9
Other operating income	6,502	7,731	7,964	11,489	856	-93
Operating expenses	26,278	26,863	24,441	25,875	26,911	4
Change in loan values	3,525	382	5,044	-3,169	-144	-95
Taxes	7,432	6,698	4,532	8,298	11,558	39
Net after-tax gain from discontinued operations	-1,159	-12,955	-4,278	1,394	6,543	369
Profit	7,777	1,100	12,469	28,615	25,416	-11
Íslandsbanki hf.						
Operating income	44,987	45,165	43,153	50,172	57,236	14
Net interest income	31,937	32,822	33,371	34,043	43,126	27
Net fee and commission income	12,227	10,899	10,525	12,849	14,053	9
Other operating income	823	1,444	-743	3,280	57	-98
Operating expenses	28,823	25,424	23,425	23,884	24,083	1
Change in loan values	-1,584	3,480	8,816	-3,018	-1,576	-48
Taxes	8,015	7,437	4,060	6,802	10,343	52
Net after-tax gain from discontinued operations	912	-370	-97	1,221	149	-88
Profit	10,645	8,454	6,755	23,725	24,535	3
Landsbankinn hf.						
Operating income	52,558	56,344	50,273	55,293	50,780	-8
Net interest income	40,814	39,670	38,074	38,953	46,464	19
Net fee and commission income	8,157	8,219	7,638	9,483	10,623	12
Other operating income	3,587	8,455	4,561	6,857	-6,307	-192
Operating expenses	27,797	28,196	25,646	23,864	23,763	0
Change in loan values	-1,352	4,827	12,020	-7,037	-2,473	-65
Taxes	6,853	5,086	2,086	9,547	12,493	31
Net after-tax gain from discontinued operations	0	0	0	0	0	0
Profit	19,260	18,235	10,521	28,919	16,997	-41
D-SIB						
Operating income	143,716	149,507	144,190	163,690	165,214	1
Net interest income	102,070	102,809	102,603	105,059	129,867	24
Net fee and commission income	30,734	29,068	29,805	37,005	40,741	10
Other operating income	10,912	17,630	11,782	21,626	-5,394	-125
Operating expenses	82,898	80,483	73,512	73,623	74,757	2
Change in loan values	589	8,689	25,880	-13,224	-4,193	-68
Taxes	22,300	19,221	10,678	24,647	34,394	40
Net after-tax gain from discontinued operations	-247	-13,325	-4,375	2,615	6,692	156
Profit	37,682	27,789	29,745	81,259	66,948	-18

1. Figures are based on methodology used by SNL Financial. Figures on operating income and expense could differ from those published in the banks' annual accounts.

Source: SNL Financial.

Table 7 D-SIB: Key ratios

%	31.12.2018	31.12.2019	31.12.2020	31.12.2021	31.12.2022
Return on equity	6.1	4.5	4.8	12.4	10.1
Return on assets	1.1	0.7	0.7	1.9	1.5
Expenses as a share of net interest and commission income	60.0	57.8	54.1	51.8	43.8
Expenses as a share of total assets	2.3	2.1	1.8	1.7	1.6
Net interest and commission income as a share of total income	92.4	88.2	91.8	86.8	103.3
Net interest income as a share of total assets	2.9	2.7	2.6	2.4	2.8
Capital ratio	23.2	24.2	24.9	25.4	23.7
Foreign exchange as a share of the capital base	0.3	2.1	0.3	-0.7	0.7
Liquidity coverage ratio (LCR), total	166	165.9	179.7	176.1	163.0
Liquidity coverage ratio (LCR), FX	509.6	508	481.3	514.27	519.0
Net stable funding ratio (NSFR), total	117.9	117	118.7	121	117.0
Net stable funding ratio (NSFR), FX	159.8	141.2	147	164.9	165.0

Source: Central Bank of Iceland.

Table 8 Commercial banks' foreign bond issues, last 12 months (13 March 2022 - 13 March 2023)

Issuer	Date	Currency	Amount (b.kr.)	Maturity (years)	Premium on interbank rate ¹ %
Arion Bank	Mar. 22	EUR ²	28.0	4.5	0.37
	Aug. 22	NOK	7.8	3.0	
	Aug. 22	SEK	3.1	3.0	3.71
	Sep. 22	EUR	42.0	2.0	2.65
	Mar. 22	SEK	4.0	3.0	3.00
	Mar. 23	NOK	2.7	2.0	2.55
Total			87.6		
Islandsbanki	Sep. 22	EUR ²	42.0	5.0	0.70
	Nov. 22	SEK	10.3	2.0	4.25
	Nov. 22	NOK	18.6	2.0	4.75
Total			70.9		
	Aug. 22	NOK	7.4	2.0	4.26
	Aug. 22	NOK	5.0	3.0	
	Mar. 23	EUR ²	42.0	5.0	0.9
Total			54.4		

1. Interest premium on three-month interbank rate in the relevant currency unless otherwise specified.

2. Covered bond.

Source: Nasdaq Iceland.

Table 9 Capital buffers

Capital buffer	FME decision/ announcement ¹	Value %	Effective date
Systemic risk buffer, O-SII banks	8.4.2020	3	8.4.2020
Systemic risk buffer, other DMBs	8.4.2020	3	8.4.2020
Other Systemically Important Institutions buffer	8.4.2020	2	8.4.2020
Countercyclical capital buffer	29.9.2021	2	29.9.2022
Capital conservation buffer		2.5	1.1.2017

1. Effective 1 January 2020, the Central Bank of Iceland sets rules on capital buffers, subject to prior approval from the Financial Stability Committee (FSC).

Sources: Financial Supervisory Authority, Ministry of Finance and Economic Affairs.

Table 10 Indicators pertaining to the international investment position

	Unit	Frequency	2018	2019	2020	2021	2021
Net IIP	% of GDP	Q	9.3	20.0	34.4	39.4	24.2
External debt ¹	% of GDP	Q	82.1	78.0	85.1	84.9	79.2
Net external debt ²	% of GDP	Q	22.4	21.4	22.4	27.8	29.2
Short-term debt based on remaining maturity ³	% of GDP	Q	17.3	13.9	11.3	15.3	13.0
Treasury FX debt as a share of total debt	%	M	14.9	21.1	20.1	23.9	20.0
Commercial banks' foreign-denominated bonds	% of GDP	Q	20.9	19.3	22.1	22.4	23.6
Current account balance ⁴	% of GDP	Q	4.3	6.5	0.9	-2.4	-1.5
International reserves	% of GDP	M	25.9	27.2	28.0	28.4	22.2
International reserves financed in krónur	% of GDP	M	20.8	20.2	18.5	15.1	13.1
International reserves/IMF RAM	%	Q	139.5	153.4	151.9	144.9	123.9
Terms of trade ⁵	Value	Q	91.1	93.8	91.3	98.5	94.1
Nominal exchange rate ⁶	Value	M	173.8	179.7	200.5	195.6	199.8
Real exchange rate ⁷	Value	M	90.3	91.3	84.8	86.6	85.1
Treasury's highest credit rating	Rating	-	A2/A	A2/A	A2/A	A2/A	A2/A

1. External liabilities with a known payment profile; i.e., excluding equity securities, unit shares, derivatives, and FDI in corporate equity.

2. External debt, net of comparable assets.

3. Short-term liabilities based on original maturity, plus foreign long-term loans and marketable bonds maturing within 12 months, and non-residents' holding in CBI2016 certificates of deposit, Treasury bonds, and Housing Financing Fund bonds maturing within 12 months.

4. The quarterly value is based on the last four quarters.

5. Index. Q1/2000 = 100.

6. Trade-weighted exchange rate index – narrow trade basket (1%).

7. Index. March 2005 = 100. In terms of relative consumer prices.

Sources: Statistics Iceland, Central Bank of Iceland.

Definitions

Account information service

A direct-line service that provides consolidated information on one or more payment accounts as a user of payment services either from another payment service provider or from more than one payment service provider; cf. Article 3 of Act no. 114/2021.

Acquirer

A provider of payment services that offers acquiring; cf. Act no. 114/2021.

Acquiring

One type of payment service described in the Payment Services Act, no. 114/2021; cf. Article 3, Item 22(e) of Act no. 114/2021.

Balance on goods

The difference between the value of exported and imported goods.

Balance on income

The difference between revenues and expenses due to primary income and secondary income.

Balance on services

The difference between the value of exported and imported services.

BCBS

Basel Committee on Banking Supervision.

Bill

A debt instrument with a short maturity, generally less than one year.

BIS

Bank for International Settlements.

Blockchain technology

Technology that has emerged in recent years and is based on the idea that encrypted information is stored in a secure, traceable manner in a distributed system instead of a centralised database. Blockchain technology has been used, among other things, to develop cryptocurrencies such as Bitcoin. The blockchain does not include information on owners, such as their names or identification numbers, and despite its traceability properties, there are certain restrictions on access.

Bond

A written instrument acknowledging the issuer's unilateral and unconditional obligation to remit a specified monetary payment.

Book value of a loan

The nominal value or outstanding balance of a loan once haircuts or loan loss provisions have been deducted.

Calculated return on equity

The profit for a given period as a percentage of average equity over the same period.

Capital base

The sum of Tier 1 and Tier 2 capital after adjusting for deductions; cf. Articles 84-85 of Act no. 161/2002.

Capital buffer

Additional capital required by the Central Bank upon approval from the Financial Stability Committee. Capital buffers currently in effect are: capital conservation buffer, countercyclical capital buffer, capital buffer for systemically important institutions, and systemic risk buffer.

Capital ratio

The ratio of the capital base to risk-weighted assets (risk base)

Cash

Physical currency; i.e., banknotes and coin issued by a central bank.

Central bank money

A claim against a central bank, either in the form of cash (banknotes and coin) or as a deposit held in an account with a central bank.

Central securities depository

A licensed and supervised entity as described in Act no. 7/2020. Central securities depositories own and operate securities registration and settlement systems.

Claim value of a loan

The nominal value or outstanding balance of a loan before deducting discounts or loan loss provisions.

Commercial bank

A financial institution that has been granted an operating licence pursuant to Article 4, Paragraph 1, (1) of the Act on Financial Undertakings, no. 161/2002.

Commercial bank money

A claim against a commercial bank/savings bank in the form of a deposit held in an account with the institution concerned.

CPMI

Committee on Payments and Market Infrastructures, located at the Bank for International Settlements (BIS).

Credit institution (credit undertaking)

A company whose business is to receive deposits or other repayable funds from the public and to grant credit on its own account.

Cross-default nonperforming loans

Based on the cross-default method, all of a given customer's loans are considered to be in default if one loan is 90 days past due, frozen, or deemed unlikely to be repaid.

Cryptocurrencies

Electronic or digital currencies have not been defined in a harmonised manner, but the term virtual currency(-ies) has been used in Icelandic law.

CSDR

Regulation (EU) no. 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories.

Current account balance

The sum of the goods, services, and income account balances.

Deposit institutions

Commercial banks and savings banks licenced to accept deposits.

Digital cash

A digital claim against a central bank (i.e., central bank digital currency, CBDC), which, if issued, can function as a standard currency.

Digital wallet provider

An individual or legal entity that offers custodial services relating to the storage of virtual currency owners' payment information, using software, systems, or other types of media

to manage, store, or transfer virtual currency; cf. Article 3 of Act no. 140/2018.

Disposable income

Income net of taxes.

Distributed ledger technology (DLT)

Technology that administers digital accounting or distributed ledgers.

Domestic systemically important banks (D-SIB)

Banks that, due to their size or the nature of their activities, could have a significant impact on the stability of the financial system and the general economy, in the opinion of the Financial Stability Council. Currently, D-SIBs in Iceland are Arion Bank hf., Íslandsbanki hf., and Landsbankinn hf. In addition, the Housing Financing Fund (HFF) is considered a systemically important supervised entity.

Economic outlook index

Corporate expectations concerning economic developments and prospects, based on the Gallup survey carried out among executives from Iceland's 400 largest firms.

Electronic króna/krónur

Digital cash that could potentially be issued by the Central Bank of Iceland, would be in digital form, and would be stored in a specific medium (such as cards or apps) or in an account with the Central Bank.

Electronic money (e-money)

Monetary value in the form of a claim against the issuer, which is stored in an electronic medium, issued in exchange for funds for the purpose of remitting payment, and approved as such by parties other than the issuer; cf. Act no. 17/2013.

Encumbrance ratio

The proportion of a bank's assets that are hypothecated for funding.

European supervisory bodies

European Banking Authority (EBA), European Insurance and Occupational Pensions Authority (EIOPA), European Securities and Markets Authority (ESMA), and European Systemic Risk Board (ESRB); cf. EU Regulations no. 1093/2010, 1094/2010 and 1095/2010, incorporated into Icelandic law with Act no. 24/2017; cf. Articles 2 and 3 of the Act.

Equity

Assets net of liabilities.

Expense ratio

The ratio of operating expense net of the largest irregular items to operating income, excluding loan valuation changes and discontinued operations.

Facility-level default

Based on the facility method, a given customer's loan is considered to be in default if it is past due by 90 days or more.

Financial market infrastructure

A multilateral system among participating institutions, including the operator of the system, used for the purposes of clearing, settling, or recording payments, securities, derivatives, and/or other financial transactions; cf. the PFMI Core Principles.

Financial system

Deposit institutions; miscellaneous credit institutions (including the Housing Financing Fund, HFF); pension funds; insurance companies; mutual, investment, and institutional investment funds; and State credit funds.

Financial technology (fintech)

Any type of innovation in financial services that is based on technology and can give rise to new business models, software, processes, or products in the area of payment services, and could affect the financial market, financial services, and the way in which financial services are provided.

Foreign exchange balance

The Central Bank of Iceland sets rules on credit institutions' foreign exchange balance. According to the rules, neither the overall foreign exchange balance nor the open position in individual currencies may be positive or negative by more than 15% of the capital base.

Foreign exchange imbalance

Difference between assets and liabilities in foreign currencies.

Foreign exchange reserves

Foreign assets managed by monetary authorities and considered accessible for direct or indirect funding of an external balance of payments deficit.

FSB

Financial Stability Board.

Funding rules

The Central Bank of Iceland sets rules on foreign currency funding ratio. The rules are based on the net stable funding ratio (NSFR) developed by the BCBS. The rules are designed

to limit the extent to which banks can rely on unstable, short-term foreign funding to finance long-term loans granted in foreign currency. The ratio is subject to a minimum of 100%.

Holding company

A company whose sole objective is to acquire stakes in other companies, administer them, and pay dividends from them without participating directly or indirectly in their operations, albeit with reservations concerning their rights as shareholders.

Indexation imbalance

Difference between indexed assets and indexed liabilities.

Interbank market

A market in which deposit institutions lend money to one another for a period ranging from one day to one year.

Interbank payment intermediation

Payments routed between participants (financial institutions) in interbank systems that are generally operated by central banks. PFMI

Interest burden

Interest payments as a percentage of disposable income.

Interest premium

A premium on a base interest rate such as the interbank rate.

Internal payment system/In-house payment intermediation

Payments between customers of a single payment service provider (financial institution).

International investment Position (IIP)

The value of residents' foreign assets and their debt to non-residents. The difference between assets and liabilities is the net international investment position (NIIP), also referred to as the net external position.

Key Central Bank of Iceland interest rate (policy rate)

The interest rate that is used by the Central Bank in its transactions with credit institutions) and is the most important determinant of developments in short-term market interest rates. The interest rate that has the strongest effect on short-term market rates and is therefore considered the Central Bank's key rate may change from time to time.

Legal tender

Banknotes and coin issued by the Central Bank and accepted for all payments at full nominal value; cf. Acts no. 92/2019 and 22/1968.

Liquidity coverage

The ratio of high-quality liquid assets to potential net outflows over a 30-day period under ratio (LCR) stressed conditions; cf. the Rules on Liquidity Coverage Requirements for Credit Institutions no. 266/2017.

Liquidity rules ratio (LCR)

The Central Bank's liquidity rules are based on the liquidity coverage requirements developed by the Basel Committee on Banking Supervision (BCBS) and are largely harmonised with European Union liquidity rules. Credit institutions must always have sufficient high-quality assets to cover potential liquidity needs over the coming 30 days under stressed conditions. The LCR may not fall below 100% for all currencies combined or for all foreign currencies combined.

Loan-to-value (LTV) ratio

A debt as a percentage of the value of the underlying asset (for instance, mortgage debt as a percentage of the value of the underlying real estate).

Net stable funding (NSFR)

The ratio of available stable funding to required stable funding; cf. the Rules on Funding ratio Ratios in Foreign Currencies, no. 1032/2014.

Payment card turnover balance

The difference between foreign nationals' payment card use in Iceland and Icelandic nationals' payment card use abroad.

Payment initiation

Activation of payment instructions at the request of a user of payment services, as regards a payment account held with another payment services provider; cf. Article 3 of Act no. 114/2021.

Real exchange rate

Relative developments in prices or unit labour costs in the home country, on the one hand, and in trading partner countries, on the other, from a specified base year and measured in the same currency. The real exchange rate is generally expressed as an index.

Real wage index

An index showing changes in wages in excess of the price level. It is the ratio of the wage index to the consumer price index (CPI).

Risk-weighted assets

Assets adjusted using risk weights; cf. Article 84(e) of Act no. 161/2002.

Risk-weighted assets (risk base)

The sum of the weighted risks of financial institutions (e.g., credit risk, market risk, operational risk, etc.), cf. Article 84(e) of Act no. 161/2002.

Shadow bank

Definition based on the methodology of the Financial Stability Board (FSB). Shadow banking is defined as credit intermediation involving entities and activities outside the regular banking system. Shadow banks include money market funds, bond funds, equity funds, investment funds, specialized investment companies, securities companies, brokers, specialized funds and other credit institutions. Government operated credit institutions, pension funds, insurance companies and financial auxiliaries are excluded. A detailed discussion on the methodology can be found in the Committee on Shadow Banking's March 2015 report to the Ministry of Finance and Economic Affairs.

Stablecoin

A type of virtual currency whose value is pegged to the price of other assets or fiat currencies so as to prevent the price volatility that otherwise characterises virtual currency or cryptocurrency. Examples of types of stablecoin are Ether (pegged to the US dollar) and Diem (previously Libra), which Facebook is planning to launch.

Systemically important infrastructure

Infrastructure that, according to a decision by the Financial Stability Committee, is of such a nature that its operation could affect financial stability.

Terms of trade

The price of goods and services imports as a percentage of the price of goods and services exports.

The IMF's reserve adequacy metric (RAM)

The reserve was developed by the International Monetary Fund (IMF) as a criterion for desirable size of foreign exchange reserves, which can be determined with respect to a number of factors that affect a country's balance of payments and could provide indications of potential capital outflows. The RAM consists of four elements: i. Export revenues: Reflect the risk of contraction in foreign currency accumulation ii. Money holdings: Reflect potential capital flight in connection with liquid assets iii. Foreign short-term liabilities: Reflect the economy's refinancing risk iv. Other foreign debt: Reflects outflows of portfolio assets The RAM is the sum of 30% of current foreign short-term liabilities, 15% of other foreign debt (20% at constant exchange rates), 5% of money holdings

(10% at constant exchange rates), and 5% of export revenues (10% at constant exchange rates).

The Principles for Financial Market Infrastructures, issued by CPMI/BIS and IOSCO.

PSD and PSD2

The EU Payment Services Directives.

Trade-weighted exchange

The index measuring the average exchange rate in terms of average imports and exports, rate index (TWI) based on the narrow trade basket.

Virtual currency

Any type of digital money that is neither electronic money in the sense of the Act on Issuance and Treatment of Electronic Money nor a fiat currency; cf. Article 3 of Act no. 140/2018. Virtual currency is an electronic representation of monetary value, issued by a party that is neither a central bank nor a supervised entity in the sense of the law, whose unit value is determined by the issuing party. The best-known virtual currency system is Bitcoin.

VIX implied volatility index

The expected volatility of the S&P 500 index according to the pricing of options related to it. It gives an indication of investors' risk appetite or aversion.

Yield

The annualised return that an investor requires on funds invested.

Yield curve

A curve that plots the interest rates, at a set point in time, of bonds with equal credit quality but differing maturity dates.

