

# Financial Stability Report

2016:1



3 November 2016

The legend in Chart 2:3 contained incorrect information. The error has been corrected in this version.

## The Riksbank's Financial Stability Report

The Riksbank's Financial Stability Report is published twice a year. In the report, the Executive Board of the Riksbank gives an overall assessment of the vulnerabilities and risks that can threaten the stability of the financial system and evaluates the system's resilience to them. In some cases the Executive Board recommends specific measures to counteract risks and increase resilience. These recommendations may be based on the current economic situation, but they may also relate to more structural circumstances. The recommendations can be aimed at banks as well as at other market participants, or at legislators and other authorities.

The Executive Board of the Riksbank discussed the report on two occasions – on 18 and 30 May 2016. The report takes into account developments up to and including 20 May 2016. The report can be downloaded in PDF format from the Riksbank's website, [www.riksbank.com](http://www.riksbank.com), where more information about the Riksbank can also be found.

## The Riksbank and financial stability

- The Riksbank defines financial stability as the financial system being able to maintain its three basic functions – the mediation of payments, the conversion of savings into funding and risk management – as well as being resilient to shocks that threaten these functions.
- The financial system plays an important role in the economy. It is necessary to have a stable and smoothly running financial system for the economy to function and grow. A serious crisis in the financial system risks leading to extensive economic and social costs.
- The Riksbank has a mandate from the Riksdag (the Swedish parliament) to promote a safe and efficient payment system. In practice, this task means that the Riksbank is responsible for promoting financial stability.
- The Riksbank is also the authority with the capacity to grant liquidity assistance to individual institutions if problems arise that threaten financial stability. To be able to do this effectively, the Riksbank needs to have a high level of preparedness in the form of an efficient crisis organisation.
- The Riksbank shares responsibility for promoting financial stability with Finansinspektionen (the Swedish Financial Supervisory Authority), the Ministry of Finance and the Swedish National Debt Office. The Ministry of Finance is responsible for the regulation of financial enterprises and Finansinspektionen has responsibility for microprudential and macroprudential policy. The Swedish National Debt Office is, in turn, a support and resolution authority. The interaction between the authorities is important both in the preventive work, for example in the Financial Stability Council, and in the event of crisis management. The same also applies internationally as financial enterprises increasingly operate across national borders.
- The Riksbank analyses the financial system's stability on a continuous basis for the early detection of risks and vulnerabilities that could lead to socioeconomic costs. The Riksbank publishes the results of its analysis in various publications. By doing this, the Riksbank not only brings attention to and warns against things that may pose a threat to the financial system but also contributes to the debate on this subject.

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## SUMMARY

### Major movements on the financial markets

Following an uncertain start to the year, characterised by large falls in equity prices and rising risk premiums for high-risk assets, the financial markets have recovered during the spring. The unease was linked to factors such as poorer global growth prospects, greater focus on the large amount of bad loans at a number of European banks and the effects of large falls in the oil price. As a result of the developments, central banks, with the help of low policy rates and unconventional monetary policy measures, have continued to support economic growth.

The risk of weaker global economic development remains, which can create financial imbalances. For example, Chinese economic growth may be weaker than expected, European banks' balance sheets may weaken further or the conditions for EU collaboration and economic growth deteriorate if the United Kingdom votes in favour of leaving the EU.

### Low interest rates pose risks

Low interest rates have contributed to the economic recovery. At the same time, a long period of low interest rates can provide participants with the incentive to take ever-greater risks. Excessive risk-taking can make the financial system more vulnerable as it can lead to assets being overvalued and risks being incorrectly priced. Such a situation increases the likelihood of large price falls on the asset markets.

### High valuations especially of housing

Housing prices have continued to increase rapidly. According to the Riksbank's analysis, the valuation of the Swedish housing market is high from a historical perspective. The probability of a fall in prices is therefore also heightened. This, in combination with increasingly high indebtedness in the household sector and the fact that an ever-greater proportion of loans are at variable interest rates, has made both households and banks more vulnerable.

### Low interest rates make banks and insurance companies more vulnerable

Prolonged low interest rates can put pressure on banks' profitability and cause them to increase their risk-taking. The major Swedish banks have still continued to report good results and their profitability is high. However, the low interest rates have led to the already large exposures of Swedish banks to the Swedish housing market increasing

further, making them even more vulnerable to shocks in the housing sector.

Low interest rates can also make it more difficult for life insurance companies to fulfil their commitments to policyholders as they get a lower return on their investments. In order to compensate for the low yield, life insurance companies can invest in riskier assets. This would increase their vulnerability. There are, however, no clear signs of increased risk-taking among Swedish life insurance companies.

### The financial system is vulnerable to shocks

Risks linked to the low interest rate level and developments on the housing market can lead to shocks that can have an adverse effect on the Swedish banking system. The consequences for the Swedish economy in the event of a serious shock may be severe as the banking system is exposed to these risks and is characterised by a number of vulnerabilities. The Swedish banking system is large, concentrated and closely interlinked. Furthermore, the major Swedish banks have a high proportion of wholesale funding, a large part of which is in foreign currency.

### Further measures are needed

The major Swedish banks have improved their resilience in recent years. Furthermore, Finansinspektionen (FI) has implemented certain measures to reduce risks and increase resilience in the financial system. In addition, new regulations have been implemented at global level that entail further capital requirements for the banks in the future. Measures have also been taken to protect taxpayers from the costs associated with banking crises.

According to the Riksbank, however, further measures are needed to reduce the risks of high and still increasing housing prices and increased household indebtedness. Measures are also needed to strengthen and guarantee greater resilience among Swedish banks. This is particularly important in the current situation, which is characterised by low and negative interest rates that can lead to excessive risk-taking. If no further measures are taken, the socio-economic imbalances are expected to increase, which can ultimately be very costly to the Swedish economy.

### Measures are needed to reduce the risks of housing prices and household indebtedness

A combination of measures in different policy areas is required to reduce the risks linked to household indebtedness. Measures are needed to address the underlying causes of the increasing indebtedness, for instance

targeting the housing market to attain a better balance between supply and demand. Taxation reforms that reduce households' willingness and ability to take on debt are also needed.

A debt-to-income limit, that is, a cap on how much the debt can be in relation to disposable income, is an effective macroprudential policy measure to limit the risks of household indebtedness.

It is also of great importance that the framework for macroprudential policy in Sweden be reviewed. Experience of the process that led to the amortisation requirement indicates flaws in the framework regarding target-setting, processes for the allocation of tools and the legal basis for conducting macroprudential policy. The review of the framework can be made in connection with the announced review of the Sveriges Riksbank Act. As this will take time, it is important that FI is now given the decision-making powers needed to adopt measures that can reduce the risks linked to household indebtedness.

#### **Measures are also needed to guarantee greater resilience among banks**

In light of the vulnerabilities present in the banking system, it is important for banks to have good resilience. It is therefore essential that FI ensures the major banks have sufficient capital by introducing a leverage ratio requirement as a complement to the risk-weighted capital requirements. This is because there are shortcomings in the risk-weighted capital requirements which can lead to the banks holding too little capital. Furthermore, there may also be reason to consider a further tightening of the risk-weighted capital requirement. In addition, it is important that there are regulations in place that ensure banks manage all their liquidity risks.

#### **Market liquidity on the Swedish bond market**

An article in the report examines how market liquidity on the Swedish bond market has developed since the financial crisis. Market liquidity is of significance for how well the bond market functions. A deterioration in market liquidity can lead to poorer efficiency in the market and to problems arising for different market participants. In a negative scenario this could ultimately pose risks to financial stability. This is particularly true if, in the event of a sales pressure, market liquidity drops sharply for bonds that normally have a high level of market liquidity, and for such a long period that investors are no longer able to hold off selling their bonds until market liquidity improves again. Different quantitative measures of market liquidity provide divergent pictures of the development and it is thus difficult to draw unequivocal conclusions about how market liquidity has changed after the financial crisis. The Riksbank's assessment is, however, that the development does not seem to

have led to a significant deterioration in the functioning of the market or to greater risks to financial stability.

#### **Cyber threats in the financial system**

The financial system is increasingly dependent on IT systems and as these are also becoming more and more interlinked, vulnerability and the potential effects of cyber attacks are increasing. A major cyber attack could threaten financial stability. As a result, cyber security, its significance for financial stability and the challenges posed are being increasingly highlighted by authorities, banks and financial market infrastructures (FMIs) alike. The surveys performed by the Riksbank among banks and FMIs show that although they have taken measures to protect themselves, awareness within the organisations must be improved. Another area where there is room for improvement concerns cooperation and information exchange among authorities, banks, FMIs and external suppliers of IT services.

## CHAPTER 1 — Assessment of current situation

Following an uncertain start to the year, characterised by large falls in equity prices and rising risk premiums for high-risk assets, many financial markets have recovered during the spring. The unease was linked to factors such as weaker global growth prospects, greater focus on the large amount of bad loans at a number of European banks and the fall in the oil price. More expansionary monetary policy around the world subsequently contributed to the recovery. In Sweden, the housing market is still deemed to be highly valued and both indebtedness and housing prices are rising from levels that are already high. The major Swedish banks continue to show good levels of profitability despite the low interest rates.

### Uncertainty on the financial markets remains

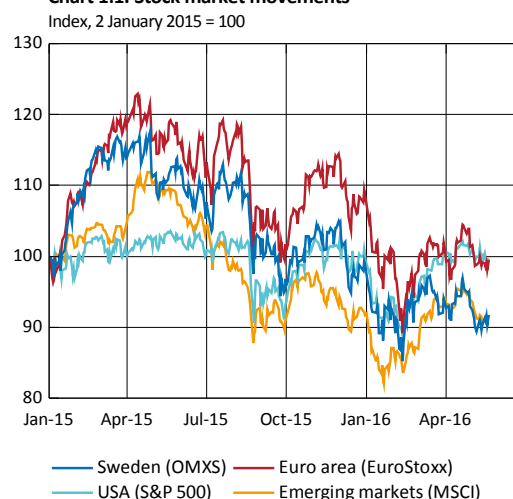
Since November, when the last stability report was published, developments on the financial markets have been characterised by major price movements. During the first two months of the year, global equity markets fell (see chart 1:1), volatility increased and the risk premiums for riskier assets rose. Since then, however, equity markets have recovered, risk premiums have fallen and volatility has decreased (see chart 1:2).<sup>1</sup> The large price falls at the beginning of the year were due in part to uncertainty surrounding growth prospects in China and other emerging market economies and to the fall in the oil price which had a negative effect on oil-producing countries and companies. The development was also reinforced by unease about structural problems in the European banking sector, which contributed to large price falls in most bank equities. Hardest hit were banks in Greece, Italy and Portugal although one large German bank was also affected. The unease is primarily due to the large amount of bad loans that banks in several European countries have on their balance sheets (see chart 1:4). Many banks have also been burdened by weak profitability for a long time, due to causes including weak economic growth and very low or negative interest rate levels. In turn, this weak profitability is impacting the banks' possibilities of building up capital buffers.

### Monetary policy is expansionary around the world

The low level of interest rates is primarily driven by structural factors that have increased global saving relative to investment and that have thereby pushed down the trend for global real interest rates (see chart 1:3 and fact box on page 5). The low interest rates are also due to the very expansionary monetary policy that many central banks have conducted for several years. By means of low policy rates and other unconventional monetary policy measures, central banks have supported economic development. Over the spring, the

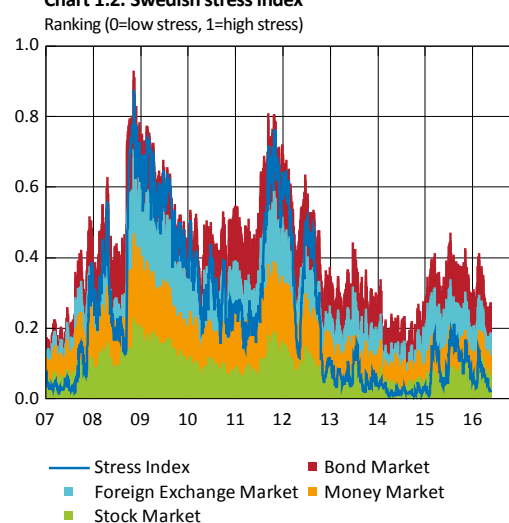
<sup>1</sup> See the Appendix for additional charts on developments on the financial markets and the situation in the major Swedish banks and among the banks' borrowers ([www.riksbank.com](http://www.riksbank.com)).

**Chart 1:1. Stock market movements**



Sources: Macrobond and Thomson Reuters

**Chart 1:2. Swedish stress index**



Note. The Swedish stress index has been produced by the Riksbank using a method similar to that used by the ECB for the European stress index. See Johansson, T. and Bonthron, F. (2013), Further development of the index for financial stress in Sweden, *Economic Review 2013:1*. Sveriges Riksbank.

Sources: Bloomberg and the Riksbank



Riksbank and the European Central Bank have cut their policy rates and extended their bond purchases.

The expansionary monetary policy increases the prerequisites for central governments, households and companies to obtain funding at a lower cost and to strengthen their balance sheets, which in turn contributes to the economic recovery. However, a long period of low interest rates also conveys a risk of inflated balance sheets, overvalued assets and insufficiently priced risks. The Riksbank still assesses the valuations of several asset classes to be high in a historical perspective (see Chapter 2).

### Housing prices and indebtedness still rising

In Sweden, the valuations on the housing market are still high. Housing prices are rising rapidly, albeit at a slightly slower rate than previously (see chart 1:5). At the same time, household indebtedness has continued to increase from an already high level. In recent years, households' debts have increased faster than their incomes on an aggregate level. The debt-to-income ratio amounted to 179 per cent in December 2015 and is expected to continue to rise.<sup>2</sup> Several Swedish banks have, however, adapted to the forthcoming amortisation requirement to a certain extent and amortisations are increasing for new mortgage holders with high loan-to-value ratios.<sup>3</sup>

The conditions for Swedish bank lending remain favourable. Lending rates to Swedish households and companies are very low. This is due to banks' borrowing costs being low. The corporate sector continues to increase its borrowing, but at a slower pace than the household sector. Some larger corporations are also issuing corporate bonds, but to a lesser extent than previous years.

### Weaker growth in the Nordic countries

The unfavourable developments abroad have contributed to weaker growth in the Nordic countries, where Swedish banks have large exposures. So far, however, this development has not led to higher loan losses for Swedish banks. In addition, the fall in the price of oil has had a negative impact on the Norwegian oil sector. Swedish banks' direct exposure to this sector is relatively limited. However, the loan losses could increase over the long run if companies linked to the oil sector encounter difficulties in paying their bank loans.

### Continued good profitability in the Swedish banking sector

The major Swedish banks have continued to report good profits. Despite low interest rates, profitability is high and significantly higher than in many other European banks (see chart 1:6). This is due in part to the major Swedish banks having relatively low costs. In addition, credit losses continue to be very low. The major banks' revenue has also increased

### Why have real interest rates fallen?

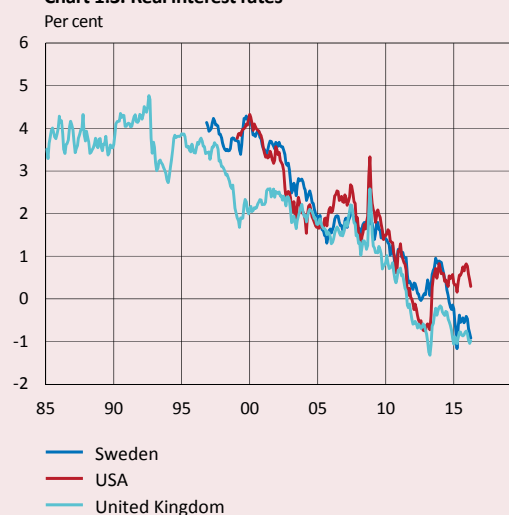
Real interest rates have shown a falling trend in many countries over the last 20–25 years (see chart 1:3). There are several causes behind this development.

Over an extended period, a number of structural factors have contributed towards increased saving and thereby the decline of real interest rates. For example, the Asian crisis of 1997 contributed towards increased saving in emerging market economies (for example China). An additional factor is demographic change in the form of an older population with a greater propensity to save. To this can be added increased income gaps, which are contributing towards a greater proportion of incomes going to the richest part of the population, which has a relatively high propensity to save.

The decline in real interest rates in recent years has also been largely due to cyclical factors in the wake of the global financial crisis. The increased uncertainty following the crisis has led to a combination of increased precautionary saving among households and worsened conditions for investment, both of which are contributing towards lower real interest rates. In addition, the crisis and the slow recovery led to many central bank policy rates being substantially cut and now lying close to or even below zero. This reflected a need to strongly push the real interest rate down below the 'neutral' real interest rate, which was already low to start with, in order to stimulate demand and increase inflation.

All in all, it can thus be said to be a combination of a structurally high level of saving over a longer period and a weak level of economic activity in the wake of the financial crisis – with subsequent expansionary monetary policy – that lies behind the current low real interest rates.

**Chart 1:3. Real interest rates**



Note. 10-year yield on real government bonds in Sweden, the United Kingdom and the United States.

Sources: Bank of England, Federal Reserve, Thomson Reuters and the Riksbank

<sup>2</sup> *Monetary Policy Report*, April 2016. Sveriges Riksbank.

<sup>3</sup> *The Swedish Mortgage Market*, April 2016. Finansinspektionen.

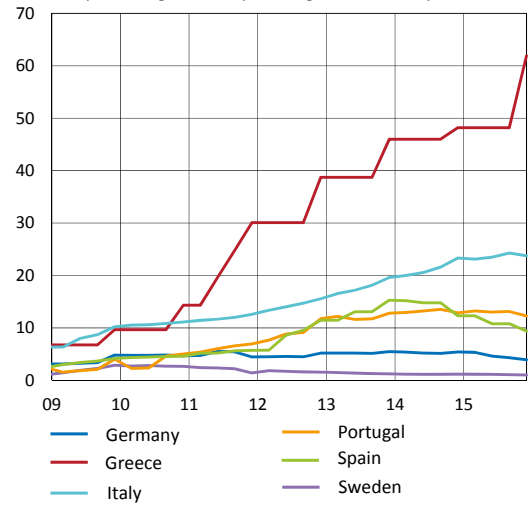
as a result of relatively high growth in lending, especially regarding mortgages, and higher lending margins. Revenue from other business areas, such as fund management and advisory services, has also increased.<sup>4</sup> The increasingly high lending volumes for housing purchases have, however, meant that the Swedish banks' already high exposures to the Swedish housing market have increased (see Chapter 2).

**Divided opinions among market participants regarding the functioning of the Swedish financial markets**

Among the market participants who responded to the Riksbank's risk survey during the spring, there was disagreement on how the Swedish financial markets are functioning.<sup>5</sup> One-third of the participants felt that the financial markets function well, one-third that they function poorly and one-third that they neither function well nor poorly. Among the participants, there was also disagreement on the overall level of risk in the Swedish financial system. About as many participants felt that the risk level was high, average or low. In contrast, the participants agree more on how the Swedish financial markets are functioning now compared to six months ago. Overall about 40 percent of the participants felt that the markets are functioning less well than six months ago and they said that it is mainly due to a deterioration of market liquidity (for a general review of market liquidity, see the article Market liquidity on the Swedish bond market and its implications for financial stability). The participants were primarily concerned over risks linked to the global low level of interest rates could cause investors to seek out more risky investments, or that risks are not being priced in full. Household indebtedness is also highlighted as a source of unease.

<sup>4</sup> See also Effects of negative interest rates on Swedish banks, Article in *Monetary Policy Report*, April 2016. Sveriges Riksbank.  
<sup>5</sup> *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank.

**Chart 1.4. Non-performing loans in European banks**  
 Non-performing loans as a percentage of total loans, per cent



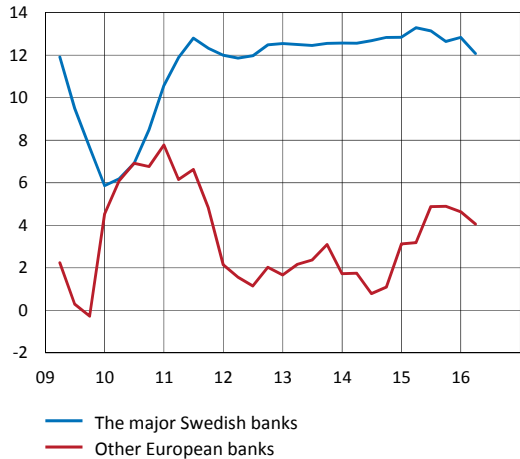
Note. Based on a sample of banks in each country.  
 Source: SNL Financial

**Chart 1.5. Housing prices, debt and income**  
 Annual percentage change



Sources: Statistics Sweden, Valueguard and the Riksbank

**Chart 1.6. Return on equity**  
 Rolling four quarters, per cent



Note. Unweighted average. The red line represents a sample of European banks, see footnote 109 in *Financial Stability Report 2014:1*.  
 Sources: SNL Financial and the Riksbank

## CHAPTER 2 – Vulnerabilities and risks in the financial system

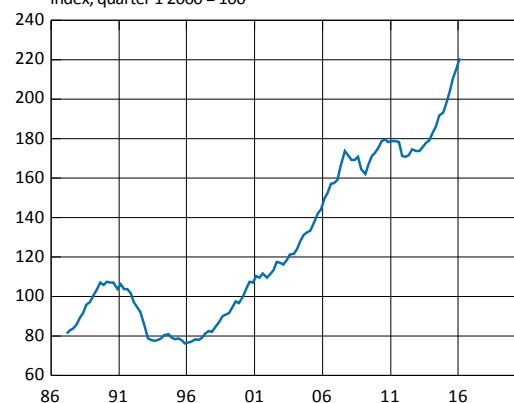
The structure of the Swedish banking system makes it vulnerable to shocks. As previously, the potential causes of such shocks are the high valuations on asset markets, especially the Swedish housing market, and Swedish households' high level of indebtedness. There are also risks associated with international developments. If a shock arises in the household sector, for example due to a global shock leading to a drop in housing prices, this may lead to a fall in consumption. Such a development could not only have major negative consequences for macroeconomic stability, but could also affect financial stability. Historically, sharp falls in asset prices combined with extensive private indebtedness have contributed to deep and long-term recessions.

### Vulnerabilities and risks associated with international developments

Since 2008, economic growth in many countries has been weak and inflation low. The problems started on the financial markets where what began as a crisis on the American mortgage market became a global financial crisis. The uncertainty and distrust surrounding certain participants' creditworthiness meant that financial market participants were unwilling to trade with and lend to one another. The crisis led to a global fall in asset prices and the financial markets functioned poorly. Moreover, risk premiums rose sharply— it became both more expensive and more difficult to obtain credit. A crisis in public finances then ensued in the euro area which was laden with large budget deficits, high sovereign debts, banks with financial problems and widespread unemployment. Problems in several large emerging market economies followed, where indebtedness had increased in the non-financial corporate sector.

During the entire period, there has been unease and uncertainty about global growth prospects and the vulnerabilities that can be built up on the financial markets. During the last six months, global growth prospects have been revised down further from what was already a poor starting-point and volatility on the financial markets has periodically increased. The risk of continued weak global economic growth remains a potential threat to financial stability both in Sweden and globally. Such a risk may, for example, consist of a worse-than-expected development in the Chinese economy and further weakening of European banks' balance sheets, which can lead to a credit crunch. There is also a risk of weakening confidence in the European Union as a result of the referendum in the United Kingdom, of this low confidence having greater negative effects on the global economy and of even lower growth in our neighbouring Nordic countries.

**Chart 2:1. Real property price index in Sweden**  
Index, quarter 1 2000 = 100



Note. Deflated with CPIF. Refers to price development of single-family houses.

Sources: Statistics Sweden and the Riksbank

## Vulnerabilities and risks associated with low interest rates

Weak economic developments and unease on the financial markets has led to central banks in many countries pursuing increasingly expansionary monetary policy in recent years. This has contributed to the economic recovery and helped to mitigate the risks of low inflation. At the same time, a low level of interest rates has given participants the incentive to take increasingly greater risks. If risk-taking becomes excessive, it can also lead to greater vulnerability in the financial system and ultimately disrupt financial stability. This is connected to assets being overvalued and risks being incorrectly priced. Such a situation increases the likelihood of large falls on the asset markets. Risk in the financial system may also increase if this leads to financial institutions experience an impaired financial situation or if they increase the risks in their operations.

### High asset valuations increase the probability of price falls

Housing prices have increased sharply in recent years. Prices have indeed risen slightly more slowly recently, but the rate of increase is still high. The annual growth rate was 12 per cent in April. Furthermore, in April the majority of the households asked in a survey believed that housing prices would continue to rise over the coming year.<sup>7</sup>

The trend of rapidly increasing housing prices has been ongoing since the mid-1990s (see chart 2:1). Prices have increased rapidly in most regions of Sweden, not just in the major cities. There are several different explanations for this price development. Prices have also been pushed up by housing supply not increasing to the same extent as demand (see chart 2:2 and fact box on this page). Moreover, prices have increased due to many households having rising incomes and benefitting from tax changes. Finally, the low interest rates have made it increasingly cheaper to borrow money to buy a home.

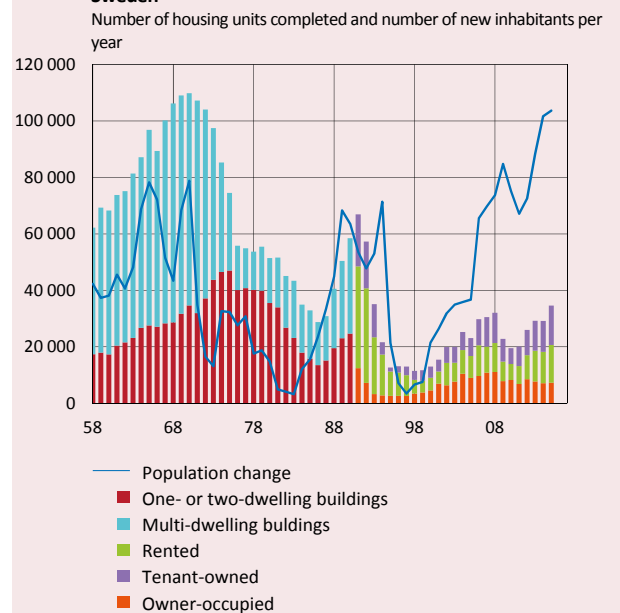
To ensure price developments on the housing market are sustainable in the long term, the price in relation to disposable income per capita should not demonstrate a long-term rising trend. In Sweden's case however, this ratio has shown an upward trend over the last twenty years. This is particularly true of tenant-owned apartments (see chart 2:3). Other indicators and model results also point to a highly valued housing market in Sweden.<sup>8</sup>

### Housing shortage has contributed to increase in housing prices

Higher housing prices are in part due to the supply of housing not increasing to the same extent as the demand. According to the Swedish National Board of Housing, Building and Planning, 240 of the country's 290 local authorities now say they have a housing shortage, particularly of rented homes. This is 30 per cent more than stated in the Swedish National Board of Housing's previous report from 2015. The shortage of housing has several causes. One is that taxes and the rent-setting system are leading to existing housing not being efficiently utilised. Another reason is that housing construction in Sweden has been low in recent decades, both from a historical perspective and in relation to the requirements created by the rapidly rising population and urbanisation.

Housing construction has certainly increased in recent years, but the present rate is still not deemed to be sufficient to meet the future population increase in Sweden. The demand for housing is high and the population is expected to grow rapidly over the next few years. This could put more pressure on housing prices and increase indebtedness in the household sector.<sup>6</sup>

**Chart 2.2. Housing construction and population changes in Sweden**



Note. Prior to 1991, it is not possible to distinguish between different forms of occupancy in one- or two- and multi-dwelling buildings.

Source: Statistics Sweden

<sup>6</sup> See also Emanuelsson, R. (2015). Supply of housing in Sweden *Economic Review 2015:2*. Sveriges Riksbank.

<sup>7</sup> Of the 1,000 households surveyed, 76 per cent believed housing prices would rise in the year ahead. See *SEB's house price indicator*, May 2016. SEB.

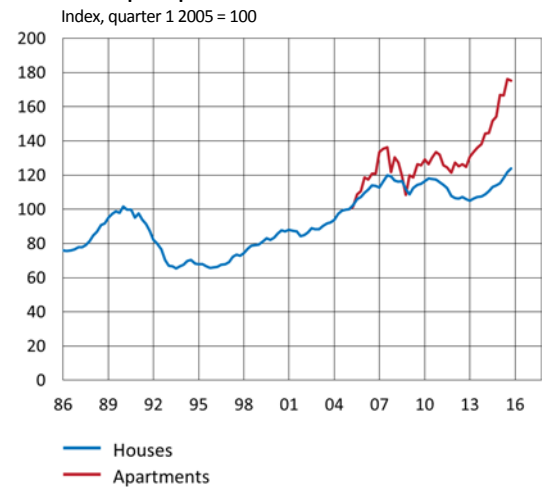
<sup>8</sup> For further details, see Giordani, P. Grodecka, A. Kwan, S. Morales, P. Ölcer, D. and Spector, E. (2015) Asset valuation and financial stability, *Economic Commentary* no. 15, 2015. Sveriges Riksbank.

The Riksbank's business survey suggests that the low level of interest rates has led more participants to look towards the commercial property market in order to invest in property.<sup>9</sup> This has contributed to rising property prices. Transaction volumes on the commercial property market are currently on the same levels as before the financial crisis and there are few vacancies in attractive areas. Swedish banks lend significant amounts to property companies, and about 40 per cent of their lending to non-financial corporations has property as collateral. This means that banks are directly affected by developments on the commercial property market and among property companies, both with regard to earnings and potential credit losses. Even if the economic conditions are currently favourable, with low funding costs and high demand, and hence good profitability for property companies, the continuing rise in housing prices leads to the accumulation of risks to financial stability. This is because a price fall becomes more likely in a situation where conditions deteriorate. In the event of a sharp price fall on the property market, the value of properties used as collateral also drops, causing some companies to have difficulty funding their operations. This can ultimately lead to credit losses for banks (see the section A combination of different events can have a negative effect on financial stability). Several participants in the Riksbank's risk survey during the spring were worried about the high valuations on the commercial property market.<sup>10</sup>

Also, equity prices have risen rapidly in recent years both in Sweden and internationally (see chart 2:4). After the last stability report in November, equity prices were slightly subdued but they have risen again during the spring. The Riksbank's analysis suggests that the valuation of the Swedish equity market continue to be high in a historical perspective.<sup>11</sup> For example, the value of the equity market in relation to GDP is around the same level as before the 2008 crisis and at the level reached in 1999 when the IT bubble was at its peak (see chart 2:5).

As in the Riksbank's previous financial stability report, the overall assessment is that housing in particular is highly valued from a historical perspective. A high valuation does not necessarily mean that asset prices will fall in the future. On the other hand, it does imply that the likelihood of a price fall is increased, which in turn implies a heightened risk to financial stability.

**Chart 2:3. Swedish housing prices in relation to disposable income per capita**



Sources: SCB and Valueguard

**Chart 2:4. Developments on the equity market**



Sources: Bloomberg and the Riksbank

**Chart 2:5. Stock market value in relation to GDP, Sweden**



Note. Market capitalization refers to the total market value of the assets included in the index of all shares listed on the Stockholm Stock Exchange (SAX index). Annual data of market capitalization until 2002 and then quarterly data. Data refers to the end of each period.

Sources: World Bank, Statistics Sweden, Bloomberg and the Riksbank

<sup>9</sup> *The Riksbank's Business Survey*, February 2016. Sveriges Riksbank.

<sup>10</sup> *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank.

<sup>11</sup> For further details, see Giordani, P. Grodecka, A. Kwan, S. Morales, P. Ölcer, D. and Spector, E. (2015) *Asset valuation and financial stability*, *Economic Commentary* no. 15, 2015. Sveriges Riksbank.

### The functioning of the markets has not been affected by the development in market liquidity

In a situation in which risk-taking is high, a changed view of risks in the economy or on the financial markets may lead to many investors rapidly wishing to reallocate their asset portfolios and reduce their risk-taking, by selling certain financial assets and buying others instead. This may lead to a situation with falling prices and greater volatility on the financial markets. In such a situation, market liquidity can deteriorate, which in turn contributes to further price falls and volatility. This could ultimately cause problems for the functioning of the financial markets and pose risks to financial stability. This is particularly true if, in the event of a sales pressure, market liquidity unexpectedly drops sharply for bonds that normally have a high level of market liquidity, and for such a long period that investors are no longer able to hold off selling their bonds until market liquidity improves again.

In recent years, a number of international authorities and institutions as well as market participants have expressed concern about the deterioration in market liquidity, especially on the global bond markets.<sup>15</sup> A review of different indicators for the Swedish bond market provides a mixed picture of the development and it is therefore difficult to draw any unequivocal conclusions about how market liquidity has changed after the financial crisis. It is the Riksbank's assessment, however, that the development has not led to a deterioration in the functioning of the market or to greater risks to financial stability (see the article Market liquidity on the Swedish bond market and its importance for financial stability). The Swedish bond markets are functioning well, outstanding bond volumes have increased since the financial crisis and there are no signs of any substantial sales pressure on bonds. The conditions on the financial markets can change rapidly, however, and it is therefore important to keep track of how they are functioning.

### Low interest rates make banks and insurance companies more vulnerable

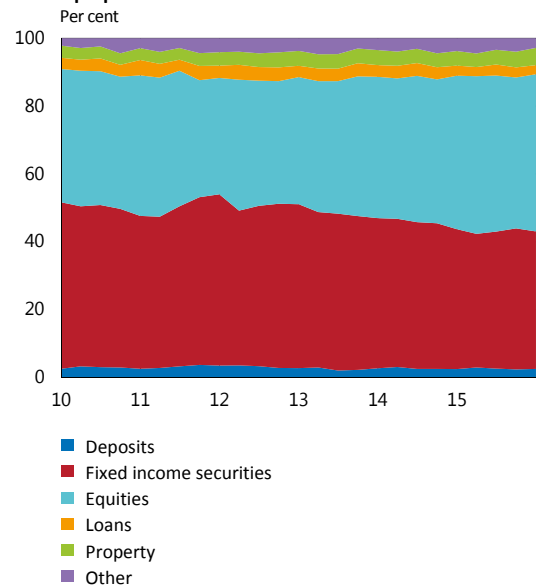
If interest rates remain low for a longer period, banks and insurance companies may want to compensate for low returns and profitability by taking greater risks.<sup>16</sup> Banks could, for example, start lending money to riskier borrowers. They may also choose to introduce negative deposit rates to reduce their funding costs. But at the same time this would pose a risk of customers moving their savings or withdrawing

### How are Swedish life insurance companies affected by low interest rates?<sup>12</sup>

Since the global financial crisis, interest rates have been historically low both in Sweden and internationally. This poses challenges for Swedish life insurance companies as they have long-term financial commitments in the form of guaranteed return on pension savers' capital. In order to meet these commitments, they invest in financial assets, mostly equities and bonds. When the bonds mature, the companies must invest in new ones. If the prevailing interest rate is lower than the guaranteed return, there is a risk that companies will not be able to meet their future commitments. The greater the difference in maturity between the companies' assets and their obligations to policyholders, the greater this risk becomes. The 2014 European stress test for insurance companies showed that the difference in maturity is relatively substantial for Swedish insurance companies.<sup>13</sup> This means that Swedish companies can encounter greater problems than many other insurance companies in the EU when interest rates are low.

At the same time as interest rates have been low, the equity market has seen a positive development (see chart 2:4). Swedish life insurance companies assets consist of a relatively large proportion of equities compared to other insurance companies in the EU. The high return on the companies' equity holdings has largely cancelled out the low yield on bonds. Swedish life insurance companies are therefore deemed to be in a relatively healthy financial situation despite the low interest rates.<sup>14</sup> There is some uncertainty, however, about how the companies would cope with a stress situation, especially in the event of a sharp fall in equity prices. A new European stress test that includes this kind of situation is underway and the results will be presented in the autumn. The IMF is also currently conducting a stress test of Swedish insurance companies within the framework of their review of the Swedish financial system during 2016.

Chart 2:6. Swedish life insurance companies' various assets as a proportion of total assets



Note. Interest-bearing assets include both bonds and certificates. Equities also include mutual funds, but not those that belong to fund insurance policies. Properties refers to buildings and land as well as equities in wholly-owned property companies. Other refers to repos, derivatives and accrued interest income.

Source: Statistics Sweden

<sup>12</sup> For a more detailed discussion, see Swedish financial institutions and low interest rates, Article in *Financial Stability Report 2015:2*. Sveriges Riksbank.

<sup>13</sup> *EIOPA Insurance stress test 2014*, November 2014. EIOPA.

<sup>14</sup> See also *Supervision of insurance undertakings*, 2016. Finansinspektionen.

<sup>15</sup> See, for example, *Global Financial Stability Report*, April 2015. International Monetary Fund (IMF). *Financial Stability Report*, December 2014. Bank of England. *Global financial markets liquidity study*, August 2015. PwC.

<sup>16</sup> See also *How do low and negative interest rates affect banks' profitability?* Article in *Monetary Policy Report*, February 2016. Sveriges Riksbank.

their money instead. If this were to happen rapidly, it could entail risks to financial stability. For example, individual banks could then be exposed to liquidity stress, which could damage confidence in the Swedish banking system. To lower deposit rates into negative territory can therefore pose risks. At present, however, banks have only chosen to introduce negative interest rates on a limited amount of their deposits.

The major Swedish banks have continued to report low credit losses and good profits (see Chapter 1). The low interest rates have also increased the demand for loans, including mortgages. This has increased Swedish banks' exposures to the housing market even further, and made them even more vulnerable to shocks in the sector.

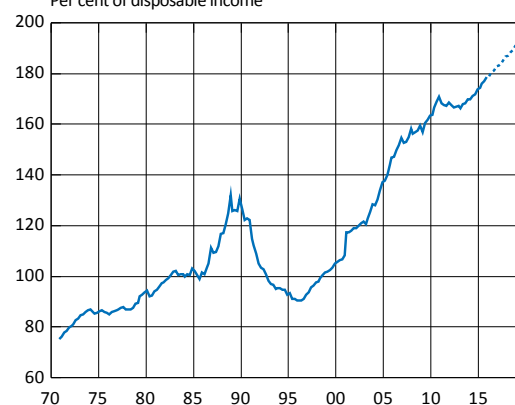
Low interest rates could also make it more difficult for life insurance companies to fulfil their commitments to policyholders as they get a lower return on their investment (see fact box on page 10). To compensate for the low yield on bonds as a result of the low interest rates, life insurance companies may increase their risk-taking and invest more in high-risk assets, such as equities, in the hope of increased returns. Increasing their risk-taking makes the companies more vulnerable. However, there are no clear signs of increased risk-taking among Swedish life insurance companies (see chart 2:6).

## Vulnerabilities and risks linked to high housing prices and high indebtedness

As described above, housing prices have been rising rapidly for a long time. The increase has gone hand in hand with ever-higher indebtedness in the household sector. In Sweden, the total debt-to-income ratio, that is, debts in relation to disposable incomes, is currently at about 179 per cent, which is a high level from both a historical and an international perspective (see chart 2:7). If we just consider the households that have mortgages, the average debt-to-income ratio amounts to 317 per cent (see chart 2:8). The proportion of households with a debt-to-income ratio of between 300 and 700 per cent has increased over the last five years and in particular among high-income households. Almost 30 per cent of the households with mortgages now have a debt-to-income ratio in excess of 400 per cent and just over 10 per cent have a debt-to-income ratio in excess of 600 per cent (see chart 2:9).

According to Finansinspektionen (FI), the proportion of households with new mortgages who amortise has increased since 2011.<sup>17</sup> The amortisation requirement comes into force on 1 June this year (see fact box on page 12). It will be important to monitor how the requirement affects borrowers' amortisations and indebtedness. However, the

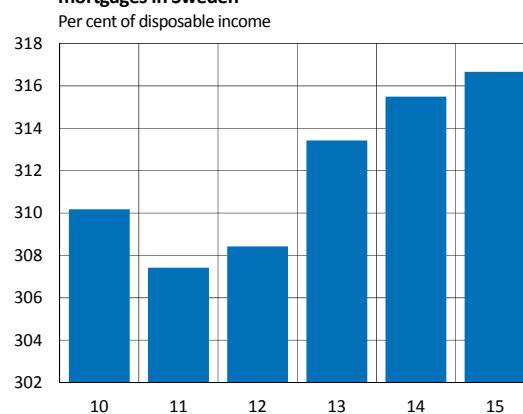
**Chart 2:7. Households' debt-to-income ratios in Sweden**  
Per cent of disposable income



Note. The broken line represents the Riksbank's forecast.

Sources: Statistics Sweden and the Riksbank

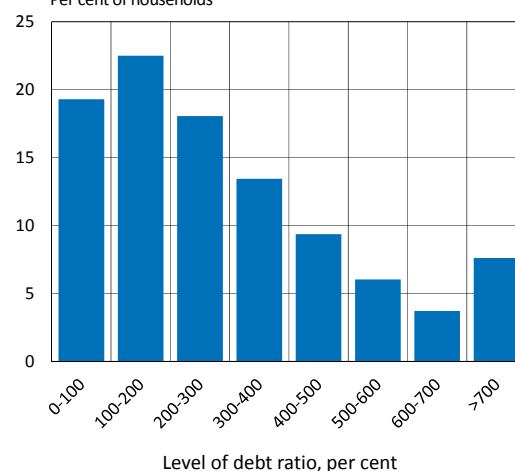
**Chart 2:8. Average debt-to-income ratio for households with mortgages in Sweden**  
Per cent of disposable income



Note. Mean value for indebted households in July each year

Source: The Riksbank

**Chart 2:9. Breakdown of debts for Swedish households with mortgages in 2015**  
Per cent of households



Source: The Riksbank

<sup>17</sup> *The Swedish Mortgage Market*, April 2016. Finansinspektionen.

Riksbank’s analysis shows that the requirement alone will probably not be sufficient to dampen the rising indebtedness among Swedish households and reduce the risks in the household sector.<sup>18</sup>

To make an overall assessment of the financial risks in the household sector, it is important to analyse measures other than indebtedness. One important variable is how much households pay for their loans on a day-to-day basis. Although household loans are now historically high in relation to incomes, their interest expenses in relation to income are the lowest in about 40 years (see chart 2:10). This is due to interest rates currently being at historically low levels. It is therefore important for households to be aware that interest expenditure will eventually rise and to plan for this. This is something that minimum levels in the banks’ discretionary income calculations can help to do (see Chapter 3).<sup>20</sup> Households have also become more sensitive to interest rate changes due to the fact that it has become more common to choose mortgages with short interest-rate fixation periods (see chart 2:11).

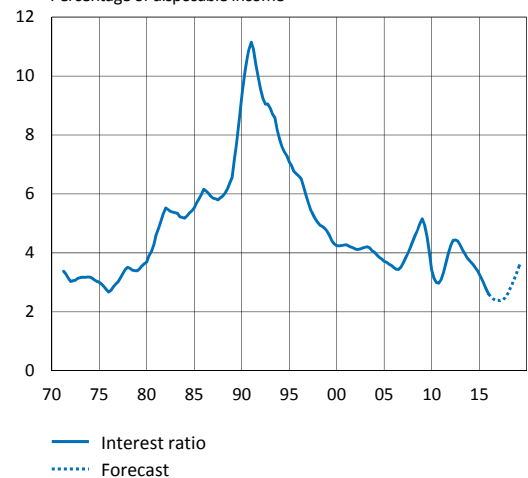
Other important variables to analyse include household assets. In principle, the risks of high household indebtedness should decrease if households have large assets in relation to their debts. In the past year, households’ total assets have also increased, particularly since real assets have increased in value. But most of these assets are illiquid. In addition, the value of both real and financial assets can be very volatile and can fall in periods of financial turbulence, while debts remain unchanged.

According to the participants who responded to the Riksbank’s risk survey in the spring of 2016, the risks linked to Swedish households’ high indebtedness could have major negative consequences for the Swedish financial system were they to be realised. The participants felt that, if household indebtedness continues to rise at its present rate, it may lead to problems when interest rates start to rise again.<sup>21</sup>

**What does the amortisation requirement mean?**

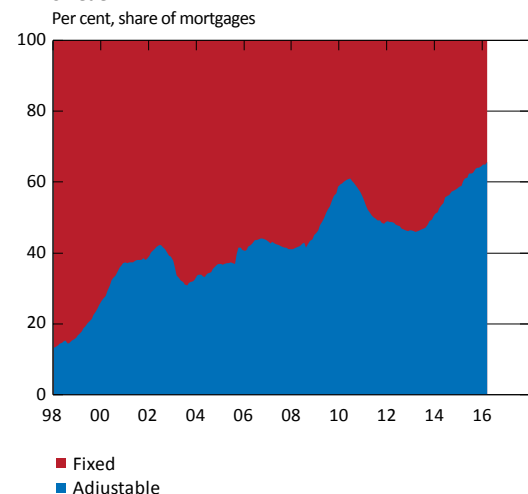
The amortisation requirement that comes into force on 1 June makes it mandatory to amortise new mortgages. According to the new requirement, at least two per cent of the original amount per year must be amortised for new mortgages, down to 70 per cent of the value of the home. When the mortgage corresponds to between 50 and 70 per cent of the value, the amortisation requirement will be at least one per cent a year.<sup>19</sup>

**Chart 2:10. Household interest expenditure in Sweden**  
Percentage of disposable income



Note. Interest expenditure is after tax.  
Sources: Statistics Sweden and the Riksbank

**Chart 2:11. Rate fixation periods for the mortgage stock in Sweden**  
Per cent, share of mortgages



Note. Share of mortgage loans in each category are calculated on the loan value. Variable interest rate refers to rate fixation periods of up to three months. Fixed rate refers to rate fixation periods of three months or more.  
Source: Statistics Sweden

<sup>18</sup> See *Financial Stability Report 2015:1*, and *Financial Stability Report 2015:2*. Sveriges Riksbank.

<sup>19</sup> Owners of newly built houses does not need to amortise during the five first years.

<sup>20</sup> Banks are obliged to carry out credit checks to ensure that borrowers can fulfil their undertakings. As part of these checks, banks do so-called discretionary income calculations.

<sup>21</sup> *Market participants’ views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank.



## Vulnerabilities and risks in the banking system

As described above, certain asset markets are highly valued, especially the Swedish housing market, and households are heavily indebted. These risks can lead to shocks occurring in the Swedish banking system. The seriousness of the impact of such shocks can depend, for example, on how exposed the banking system is to these risks and how resilient it is.

### Structural vulnerabilities in the banking system

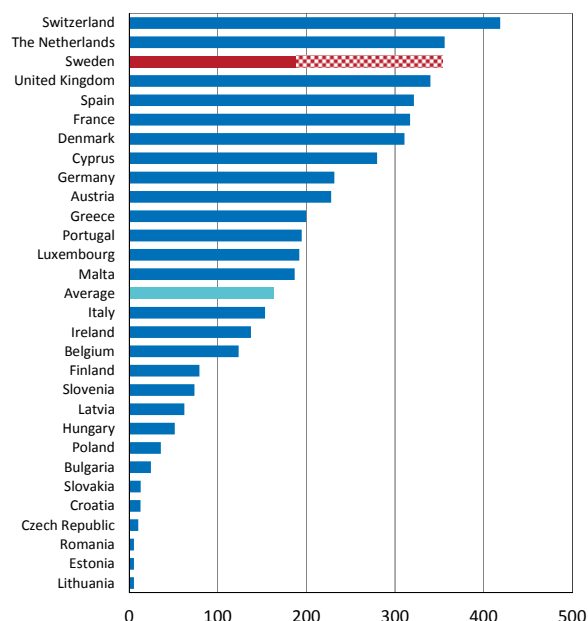
In recent decades, virtually all housing funding has been moved into the banking system as a result of mortgage institutions and banks being closely interlinked within large corporate groups.<sup>22</sup> In addition, many Swedish banks have established major operations abroad. As a result, Sweden now has a very large banking system, which can be illustrated by the size of banks' assets in relation to Sweden's GDP (see chart 2:12). Nordea's plans to transform its corporate structure could potentially entail a major change to the Swedish banking system in the period ahead (see fact box on page 14).

In addition, the banking system is highly concentrated around the four major banks (Nordea, Handelsbanken, SEB and Swedbank), which are tightly interlinked. This interconnection is partly due to the banks having significant holdings of each other's securities. This cross-ownership amounts, at present, to a value corresponding to around 30 per cent of the total equity of the major banks. In addition, Swedish banks are closely interlinked with other participants in the Swedish financial system, due in part to Swedish insurance companies and mutual funds holding a large share of their covered bonds.

As the banks have so large volumes of mortgages on their balance sheets (see chart 2:13), there is also a strong connection between the banking system and the Swedish housing market. Between 1993 and 2015, mortgages as a percentage of bank lending increased from 27 to 51 per cent. The increased exposure to housing in combination with greater vulnerability in the household sector and highly valued homes poses risks to the banking system.

Banks fund mortgages to a high degree with wholesale funding, and especially with covered bonds, the collateral for which is made up of mortgages. This means that banks are dependent on a high level of trust in both the Swedish banking system and in the Swedish housing and mortgage market among investors. Since covered bonds fund mortgages with significantly longer maturity, there is also a risk of the bank not being able to renew the mortgage funding when the bonds mature.

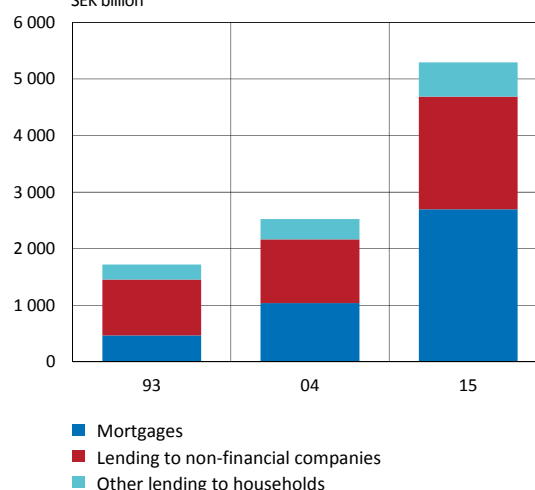
Chart 2:12. The banks' assets in relation to GDP  
December 2014, per cent



Note. Banking assets include all of the assets of the national banking groups, that is both foreign and domestic assets. The banks' insurance operations are, however, excluded. The shadowed part of the red bar shows the four major banks' assets in foreign subsidiaries and branches in relation to Sweden's GDP.

Sources: The ECB, Eurostat, the Swiss Bankers Association, the Swiss Statistics, bank reports and the Riksbank

Chart 2:13. Distribution of Swedish banks' lending  
SEK billion



Note. The chart shows the monetary financial institutions (MFIs) lending. Banks' foreign subsidiaries are not included. 1993 refers to mortgage for the Swedish mortgage lending.

Sources: Statistics Sweden and the Riksbank

<sup>22</sup> See also From A to Z: the Swedish mortgage market and its role in the financial system. *Riksbank Studies*, April 2014. Sveriges Riksbank.

Since the banking system is concentrated and interconnected, it is likely that the entire system could be adversely affected if there were problems in one of the major Swedish banks, in a foreign bank that has close ties with a major Swedish bank, or on the markets to which the Swedish major banks are exposed.

**Important for major banks to have a sufficiently high level of resilience**

Following the financial crisis, comprehensive reform work was initiated to strengthen the resilience of the financial system. This included the new minimum requirements for capital and liquidity under the framework of the Basel III Accord (see further in Chapter 3). The major Swedish banks have also improved their resilience within several areas in recent years. The major banks have built up liquidity buffers in foreign currency and strengthened their Common Equity Tier 1 (CET 1) capital ratios, which has resulted in them now having both liquidity coverage ratios (LCRs) and CET 1 capital ratios that exceed the Basel Committee and FI requirements (see chart 2:14).

Given the Swedish banking system’s concentration and size, the Riksbank considers the requirements in several cases to be insufficient. A central aspect in this context is the importance of banks holding a sufficient amount of capital. Admittedly, the risk-weighted capital requirement for the major Swedish banks is already higher than the international minimum requirements. But there are several problems associated with the risk-weighted capital requirement (see the article Need of a leverage ratio requirement for the major Swedish banks). For a long time, therefore, the Riksbank has drawn attention to the importance of complementing the risk-weighted capital requirement with a minimum requirement for an adequately high leverage ratio. According to the Riksbank, a leverage ratio requirement should be set at 4 per cent immediately, rising to 5 per cent from 2018 (see Chapter 3).

**Liquidity risks in the banking system**

Liquidity requirements for the major Swedish banks have included Liquidity Coverage Requirements (LCRs) in euros and US dollars for some time. Since these requirements were introduced, the major banks have built up large liquidity buffers in these currencies, and therefore have high LCR levels in euros and US dollars. In recent years, however, the major Swedish banks have had relatively small liquidity buffers in Swedish kronor. However, their LCRs in Swedish kronor have improved recently. During certain periods, on the other hand, some banks still have low or very low LCRs in Swedish kronor (see chart A3:6). The lowest levels observed during the past

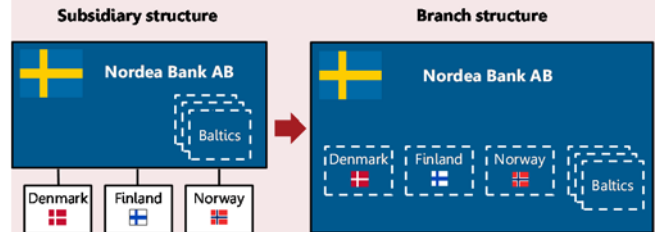
<sup>23</sup> See also *Consultation response to Nordea’s applications for permission to implement merger plans*, April 2016. Sveriges Riksbank.

**What are the consequences of Nordea’s plans to change its corporate structure?**

The plan involves most of the company’s Nordic subsidiaries merging with the Swedish parent company (see figure 2:1). Nordea then intends to conduct the same operations as before in these countries, but through branches instead of through subsidiaries.

At present, about three-quarters of Nordea’s total assets are in foreign operations. The planned restructuring would significantly increase Nordea’s operations in the Swedish parent company. The transformation into a branch structure would also tie Nordea’s operations more closely to Sweden than at present, with main responsibility for supervision and resolution of both the Swedish and foreign operations falling on Swedish authorities. The Swedish banking system would be even larger relative to the Swedish economy, which may lead to much greater consequences for Swedish taxpayers in the event of a crisis. The transformation into a branch structure would involve a major structural change not only in the Swedish banking system but also in the rest of the Nordic region.<sup>23</sup>

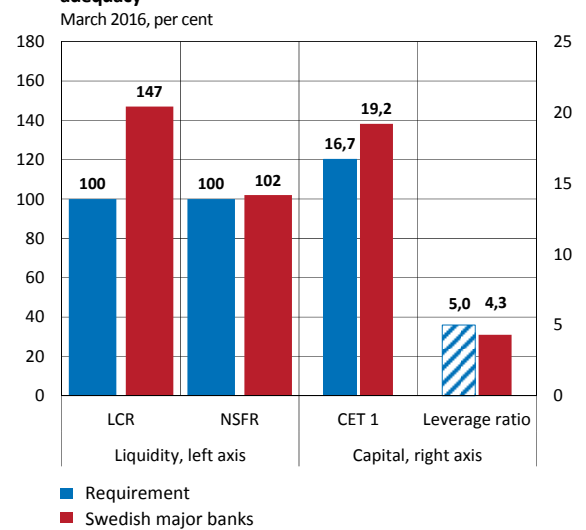
**Figure 2:1 Nordea’s plans to change their legal structure.**



Note: The above is a simplification of Nordea’s legal structure. Some subsidiaries not shown in the figure will continue to operate as subsidiaries. At the end of 2015, the figure for Sweden was around 350 per cent.

Source: The Riksbank

**Chart 2:14. The four Basel III measures for liquidity and capital adequacy**



Note. Minimum leverage ratio has not yet been set. The chart shows the level recommended by the Riksbank from 2018. CET 1 is an abbreviation of Core Equity Tier 1 ratio, minimum level has been calculated as a weighted average of the major banks’ total capital requirements. The major banks’ capital ratios are given as weighted averages.

Sources: Bank reports, BIS and the Riksbank

twelve months indicate that the liquidity buffers in Swedish kronor would not even be sufficient to cope with one week of stressed liquidity outflows in accordance with the LCR.<sup>24</sup> To be able to meet large outflows in Swedish kronor, the banks have instead relied on being able to use other assets such as covered bonds (that are not fully taken into account in the LCR) or being able to change foreign currency to Swedish kronor on the currency swap market (see the article Need for a liquidity coverage requirement in Swedish kronor). It is not certain that the buffers in foreign currency can be converted into Swedish kronor on the market. During a stress period, with rising costs for exchanging currencies on the swap markets, these circumstances risk reducing the banks' resilience to liquidity stress, compared with if they had had Swedish kronor in the first place. This weakness therefore poses a risk to financial stability.<sup>25</sup> It is important for the banks to insure themselves against risks in their operations, including liquidity risks. Central government, via the Riksbank, should only intervene as a liquidity supplier if there is adequate collateral.

The major banks are also deemed to still be exposed to excessive structural liquidity risks. The structural liquidity measure Net Stable Funding Ratio (NSFR) aims to measure these risks by putting a bank's illiquid assets in relation to its stable funding (see fact box on this page). The banks' NSFRs have certainly improved in recent years and now amount to around 100 per cent on average. One reason for this increase is, however, that Basel's final definition of NSFR compared to the original proposal is relatively favourable for Swedish banks. Measured using the Riksbank's structural liquidity measure, the major Swedish banks' structural liquidity risks are relatively substantial compared to many other European banks.<sup>26</sup>

Furthermore, the imbalances between the maturities of the major banks' assets and liabilities are still large for longer maturities. This is not captured by the NSFR or the Riksbank's measure. For example, the average maturity of Swedish covered bonds is only about three years, which is significantly shorter than the maturity of the mortgages they fund. Furthermore, only around 10 per cent of the Swedish banks' outstanding issued securities have a maturity in excess of 5 years, which is low from a European perspective.

### The structural liquidity measure Net Stable Funding Ratio (NSFR)

The structural liquidity measure Net Stable Funding Ratio (NSFR) highlights differences in maturities between a bank's assets and its funding. In somewhat simplified terms, it measures the relation between the portion of the bank's funding expected to be available in one year's time (available stable funding) and the assets expected to require funding over the same time horizon (required stable funding). The NSFR is expressed as the ratio between available stable funding and required stable funding.

<sup>24</sup> This is a simplification, which assumes that cash outflows are evenly divided over the 30-day scenario.

<sup>25</sup> See also Hilander, I. (2014), The major banks' short-term borrowing in foreign currencies and their use of the short-term currency swap market. *Economic Review 2014:1*. Sveriges Riksbank.

<sup>26</sup> The Riksbank's structural liquidity measure is similar to the Basel Committee's NSFR but is, in several cases, based on stricter assumptions than the final wording of the NSFR.

## A combination of different events may have a negative effect on financial stability

As described above, there is a risk of a new unexpected event, or a combination of events, occurring that could have a negative effect on financial stability in Sweden. The vulnerabilities in the banking and household sectors can also amplify the effects of a shock. Below we describe how financial stability can be affected in a scenario where growth abroad slows, stress arises on the financial markets and housing prices in Sweden fall.

Weaker global growth could impair Swedish companies' ability to pay for their loans due to their profits decreasing. Credit losses can then occur among Swedish banks, affecting their profitability. If, in such a situation, stress arises on the financial markets, for example as a result of increased uncertainty about the proportion of bad loans in European banks, both banks and non-financial corporations can find it difficult to obtain funding on the market and it may become more expensive. This can have a further negative effect on profitability of both banks and companies.

Higher funding costs can affect the banks' scope for granting credit, and the interest rates households and companies pay for their loans. As many households are highly indebted and also have loans at variable interest rates, such a development could increase expenditure for many households. Were the economic situation to simultaneously worsen with slower income growth and rising unemployment, households' debt-servicing ability could deteriorate even more. If a situation arises in which households cannot service their mortgages, the banks that have lent money to them may be impacted by credit losses. Such credit losses have been small historically speaking, but they cannot be ruled out, especially since households are now more vulnerable due to the high indebtedness. If, at the same time, housing prices fall, it could lead to even greater problems.

In such a situation, it is most likely, however, that banks and financial stability would be affected indirectly, as a result of lower consumption. That would reduce profitability in the corporate sector and could lead to more bankruptcies and hence greater credit losses incurred by banks on their corporate lending.

Swedish banks obtain most of their funding via covered bonds, with mortgages as the underlying collateral. This means that a fall in housing prices may affect the confidence in Swedish banks and further impair their ability to find funding. In a very negative scenario, this might mean the banks are unable to fund their lending and therefore try to reduce it.

In addition, the major Swedish banks would also be affected by developments in other countries where they have operations. About 35 per cent of the major Swedish banks' total lending to households and companies goes to Finland,

Denmark and Norway (see chart 2:15). A scenario with lower growth abroad and greater stress on the financial markets would probably also affect developments in these countries and thereby impact Swedish banks.

There are several ways in which shocks in our vicinity or further afield could, either individually or in combination, affect financial stability in Sweden. Given the vulnerabilities in the Swedish banking system, the consequences could be severe. It is therefore extremely important to reduce the existing risks, and to build up resilience in the financial system.

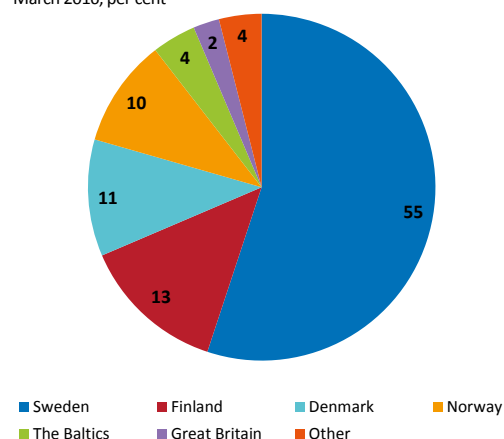
## Vulnerability and risks in the financial infrastructure

The financial infrastructure in Sweden functions well, but there are a number of operational risks that need to be dealt with. One is linked to the ongoing replacement of Euroclear Sweden's system for securities settlement, which began last year.<sup>27</sup> Such a replacement is associated with risks since Euroclear Sweden's settlement system constitutes an important component of the Swedish financial infrastructure and is interlinked with several other Swedish infrastructure systems. It is important that there is an awareness of the elevated operational risks in the Swedish financial infrastructure until the system replacement has been completed.<sup>28</sup>

### Cyber attacks on the increase

Another operational risk that banks and financial market infrastructures (FMIs) must be able to handle is cyber attack (see the article Cyber threats in the financial system). The financial system is increasingly dependent on IT systems and as these are also becoming more and more interlinked, vulnerability and the potential effects of cyber attacks are increasing. A major cyber attack could threaten financial stability. Cyber attacks have become increasingly common and more advanced in recent years. As a result, cyber security, its significance for financial stability and the challenges posed are being increasingly highlighted by authorities, banks and FMIs alike.

Chart 2:15. The major Swedish banks' lending by geography  
March 2016, per cent



Note. The major Swedish banking groups total lending amounted to 7 798 billion SEK in the first quarter of 2016.

Sources: Bank reports and the Riksbank

<sup>27</sup> Euroclear Sweden clears and settles transactions mainly in Swedish shares and debt securities. In its role as a central securities depository (CSD), Euroclear Sweden keeps a register of securities and their owners, provides securities accounts and administers corporate actions.

<sup>28</sup> See also *Financial Infrastructure Report 2016*, April 2016. Sveriges Riksbank.

## ARTICLE – Market liquidity on the Swedish bond market and its importance for financial stability

In recent years, a number of international authorities and institutions as well as market participants have expressed concern about the deterioration in market liquidity, especially on the global bond markets.<sup>29</sup> A possible explanation for this, frequently highlighted by market participants, is new financial regulations introduced since the financial crisis. They are reported to have reduced the presence of market makers, who use their balance sheets to provide the market with market liquidity. A deterioration of market liquidity can threaten financial stability, particularly if it is severe, unexpected and prolonged. This article therefore looks at how market liquidity on the Swedish bond market has evolved since the financial crisis and whether it has affected the risks to financial stability. Different quantitative measures of market liquidity provide divergent pictures of the development and it is therefore difficult to draw any unequivocal conclusions about how market liquidity has changed after the financial crisis. The development does not seem to have led to a significant deterioration in the functioning of the market or to greater risks for financial stability.

### What is market liquidity?

Market liquidity reflects how quickly and at what cost it is possible to convert a financial asset into liquid funds on the so-called secondary market. The bond market consists of a primary market and a secondary market. On the primary market, various agents issues bonds in return for funding. If the buyer of the bonds wants to sell them on before they mature, this can be done on the secondary market. The bond can then change ownership several times on the secondary market before it reaches maturity. When it is possible to quickly sell significant volumes on the secondary market at a low transaction cost and without the transaction significantly affecting the market price of the instrument, market liquidity is said to be good. The concept of market liquidity thus contains several different dimensions.<sup>30</sup>

### Market liquidity has significance for the possibility to obtain funding via bonds

The bond market makes it possible to convert savings into investment and thus becomes a funding alternative for the public sector, banks and non-financial corporations who issue bonds on the primary market. On a primary market where it is easy to issue, one says that *funding*

*liquidity* is good.<sup>31</sup> To ensure the conversion from savings to investment occurs as smoothly as possible, that is, for funding liquidity to be good, it is useful if there is a liquid secondary market. This is because it encourages funding liquidity if the investors buying bonds on the primary market can sell them on if necessary via the secondary market. There is thus a link between liquidity on the two markets. If, for example, a company wishes to fund a lengthy project by issuing a long-term bond and lenders do not wish to grant a similarly long-term loan, lenders may still wish to invest in the bond if they know that they can sell it on via the secondary market. It is thus usually important to both issuers and investors that the secondary market is liquid.

### Market makers' significance for market liquidity

Bonds are usually traded in the form of OTC (Over The Counter) trading.<sup>32</sup> Trade is facilitated by the existence of market makers, normally banks, who, with the help of their balance sheets, are ready to act as intermediaries in the event of large differences in supply and demand. They assist investors with market liquidity when necessary by holding a stock of bonds, what is known as a trading book, from which they can either sell bonds or to which they can add bonds they have bought.

<sup>29</sup> See, for example, *Global Financial Stability Report*, April 2015. IMF. *Financial Stability Report*, December 2014. Bank of England and *Global Financial Markets Liquidity Study*, August 2015. PwC.

<sup>30</sup> For further information on these dimensions, see Bonthron, F. Johansson, T. and Mannent, J., Market liquidity on the Swedish bond market and its importance for financial stability, *Economic Commentary* no. 3, 2016. Sveriges Riksbank.

<sup>31</sup> One also talks about *central bank liquidity*. The Riksbank can create such liquidity via its different types of facilities or by buying financial assets on the market. When the Riksbank raises the balance of one of its counterparties' accounts at the Riksbank, in exchange for collateral or as payment for asset purchases, the amount of liquidity increases in the form of central bank money in the banking system.

<sup>32</sup> OTC trading is conducted outside regulated trading platforms.

### Market liquidity varies...

Market liquidity varies from one type of bond to another and also over time. Sometimes, there are periods when market liquidity temporarily declines. This does not usually lead to any major problems. Nor does there have to be a liquid secondary market for every type of bond. There are bonds that can be issued on the primary market despite the lack of a well-functioning secondary market. This works as long as there are long-term investors who do not need to quickly sell the bonds.

### ...and the variations affect the risk premium

If the markets function efficiently then, all else being equal, the most liquid bonds will have a lower risk premium and the bonds with low market liquidity will have a higher risk premium. This means that those who issue bonds with poorer market liquidity will have to pay more to borrow than those who issue more liquid ones. The purchaser of a bond with poorer market liquidity is therefore compensated for the risk of it being more difficult to sell on the secondary market than more liquid bonds.

### Financial stability risks when market liquidity declines

A bond's market liquidity is of significance for how well the bond market functions. A deterioration in market liquidity can lead to poorer efficiency in the market and to different types of problem arising for different market participants. This could ultimately in a negative scenario pose risks to financial stability. This is particularly true if, in the event of a sales pressure, market liquidity drops sharply for bonds that normally have a high level of market liquidity, and for such a long period that investors are no longer able to hold off selling their bonds until market liquidity improves again.<sup>33</sup>

However, it is often not the deterioration in market liquidity in itself that triggers a negative chain of events that may later have negative consequences for financial stability. It is rather the case that the deterioration may reinforce the events in a stressed situation. There are several different factors that could trigger a stressed situation, for example it could be as a result of a fall in Swedish housing prices. Such a situation can lead to investors becoming uncertain about what the covered bonds, which have mortgages as underlying collateral, are actually worth. If they perceive that they lack information on the real value of the bonds, it may lead to them not wishing to own them any longer. This could lead to a strong sales pressure arising and cause market liquidity to deteriorate. Moreover, if the market makers do not wish

to, or cannot, smooth out the differences in supply and demand with the aid of their balance sheets in this situation, then market liquidity may deteriorate further.

In a worst case scenario, trade on the secondary market may more or less cease as a result of this development. Depending on how much compensation the investors want when the liquidity risk increases in this way, the cost to the issuers may be so high that they do not find it financially attractive to issue new bonds.

In an economy where many participants are dependent on wholesale funding, this can increase risks to financial stability. The major Swedish banks, who all have a large share of wholesale-based funding, could be hit hard by poorer market liquidity if it means that they experience difficulty issuing new bonds. The same applies to Swedish non-financial corporations that partly fund themselves by issuing bonds. If market liquidity declines so much that this funding possibility is no longer an option, the corporations need to find funding somewhere else, for example via a bank loan. If it is not possible to secure a bank loan, it may initially cause liquidity problems for the corporations. In addition, it may ultimately lead to profitability problems and in the worst case to bankruptcy. In cases where the banks are exposed to companies that issue bonds, it may also lead to negative consequences for the Swedish banking system, for example in the form of greater credit losses.

For the investors, the reduced market liquidity may mean that the value of the bonds they have invested in declines. This can affect different investors in different ways. For instance, life insurance companies may experience a deterioration in their financial position (solvency).<sup>34</sup> If solvency deteriorates so that it approaches the statutory minimum level, these companies may be forced to sell off their riskier assets. As life insurance companies are major investors on the Swedish bond market, it may have spill-over effects on many other financial assets. For the banks, poorer market liquidity may mean that the value of their assets falls, which is negative for their capital adequacy. This can in turn have a negative effect on confidence in the banks.

Mutual funds are not generally affected in the same way as banks and insurance companies. A decline in the value of the funds' holdings usually does not affect the funds themselves but instead those saving in them. On the other hand, if fund investors start to sell their holdings, the funds may need to sell parts of their holdings on the secondary market to meet the withdrawals. This may lead to further price falls, value reductions and sales. Problems on part of the bond market can also spread to

<sup>33</sup> See, for instance, Cecchetti, S. and Schoenholtz, K. (2015), Bond market liquidity: should we be worried, *Money Banking and Financial Markets*.

<sup>34</sup> See Swedish financial institutions and low interest rates, article in *Financial Stability Report 2015:2*. Sveriges Riksbank.

other parts of the market, depending on which assets the funds choose to sell off in such a situation.

Finally, investors who have used bonds as collateral to borrow money for additional bond purchases may be forced to sell these if their value falls below the amount for which they constitute collateral. This may lead to a negative spiral with further price falls.

All in all, a severe, unexpected and persistent deterioration in market liquidity can thus entail risks for financial stability.

### Market liquidity on the bond market in Sweden

It is not so easy to acquire a picture of how market liquidity is developing. There is, for example, no single measure that captures all the dimensions of market liquidity.<sup>35</sup> Neither is there always data available to measure all the dimensions.

Below is a review of some different measures that provide indications of how market liquidity has changed in Sweden after the financial crisis in 2008. The review is limited to bonds issued in Swedish kronor by Swedish participants.<sup>36</sup>

#### *The price-impact measure does not indicate any change in market liquidity in recent years*

The first measure sets movements in bond prices in relation to turnover.<sup>37</sup> When the measure rises as a result of the price moving far in relation to turnover, it may be a sign that market liquidity is deteriorating. One limit with this measure of price impact is that the price changes are not solely due to changes in market liquidity, but also to other factors such as credit risk. It is thus possible that the measure may wrongly indicate, for instance, a better or poorer market liquidity than is actually the case because some factor other than market liquidity has influenced price movements.

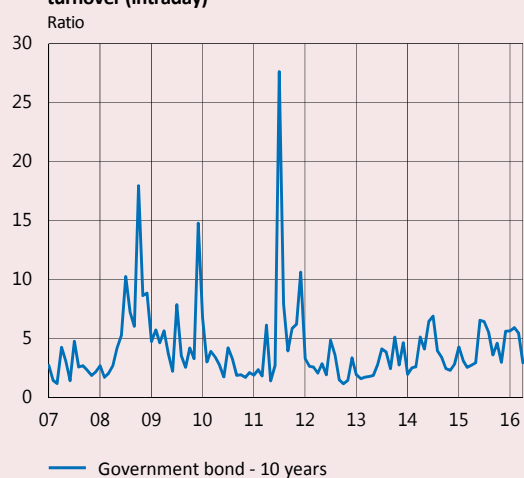
Another limitation of this measure is that it only provides a picture of developments during a particular maturity, in this case for 10-year government bonds and 5-year covered bonds.

Chart A2:1 shows that the measure rose in 2008. This indicates that market liquidity for Swedish government bonds deteriorated, partly in connection with the outbreak of the financial crisis and also in connection with the sovereign debt crisis in 2011. In this context, however, it is important to bear in mind that the fall in turnover and

thus in market liquidity during the financial crisis was not due to many investors wanting to sell government bonds. On the contrary, demand increased when investors sought safer investment alternatives. Market liquidity for covered bonds also rose in connection with the sovereign debt crisis in 2011 (see chart A2:2).<sup>38</sup>

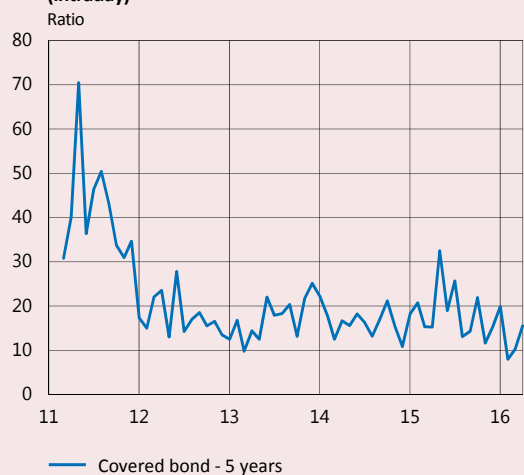
However, no noteworthy or prolonged change in the measure can be seen thereafter, either for government bonds or covered bonds. At present this measure is therefore not indicating that market liquidity has deteriorated. FI uses a similar measure in a study of market liquidity on the Swedish bond market

**Chart A2:1. Price change in government bonds per billion turnover (intraday)**



Sources: Bloomberg and Nasdaq

**Chart A2:2. Price change in covered bonds per billion turnover (intraday)**



Sources: Bloomberg and Nasdaq

<sup>35</sup> For a more detailed description and further measures, see *Discussion paper on Defining Liquid Assets in the LCR under the draft CRR*, 2013. European Banking Authority.

<sup>36</sup> Market liquidity for bonds issued in foreign currency by Swedish participants can also have significance for financial stability in Sweden, as such bonds constitute an important source of funding for many of them. These bonds are not included in the analysis due to a lack of data.

<sup>37</sup> A bond's price moves in the opposite direction to the interest rate. It is, however, not the direction that is of significance for the measure, only the size of the change.

<sup>38</sup> Due to lack of data, it is not possible to calculate this measure for corporate bonds on the Swedish market.



and obtains a similar picture.<sup>39</sup> However, this picture is not confirmed by market participants. Their assessment is that the amount that can be traded without it affecting the price has decreased, with regard to both government bonds and covered bonds, in recent years.<sup>40</sup>

#### *The turnover measure gives a different perspective*

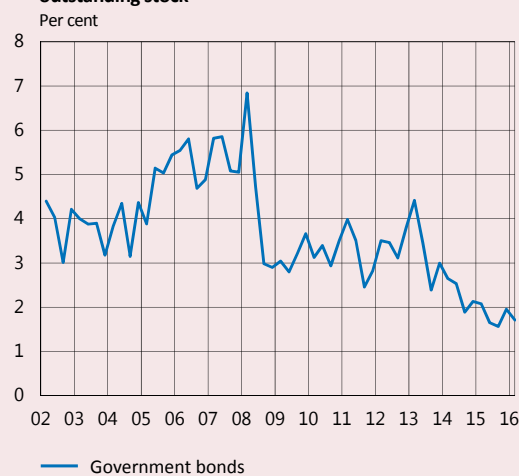
A measure that sets turnover in relation to outstanding volume gives a different perspective (see chart A2:3). Here a fall in the measure indicates that market liquidity is deteriorating, that is, it can be considered poorer as few bonds are sold in relation to the total volume of outstanding bonds. Also this measure indicates that market liquidity for government bonds deteriorated when the financial crisis broke out. Since then the measure has continued to fall. However, the deterioration in connection with the financial crisis was, as pointed out above, the result of a sharp increase in demand when investors sought safer investment alternatives. It was not driven by sales pressure.

Turnover has also fallen for covered bonds according to this measure, first sharply in connection with the financial crisis and then gradually (see chart A2:4). In connection with the sharp decline during the financial crisis, there was considerable sales pressure and market liquidity plummeted.

However, here one should take into account the fact that the good market liquidity prior to the crisis was not necessarily a good reference point. When the crisis occurred, market liquidity disappeared when it was most needed. Good market liquidity in a more stable situation is therefore no guarantee that it will not fall sharply in a stress situation. The gradual deterioration that has occurred afterwards is primarily a result of an increase in the outstanding stock.

It is difficult to draw any conclusions with regard to corporate bonds, as the data series are short. What can be noted is that market liquidity is much lower than for government bonds and covered bonds according to this measure.

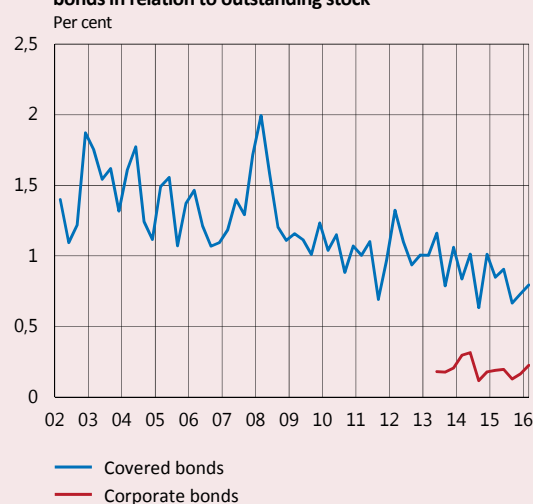
**Chart A2:3. Government bonds' daily turnover in relation to outstanding stock**



Note. Refers to quarterly averages of turnover.

Sources: The Riksbank, the Swedish National Debt Office and Statistics Sweden

**Chart A2:4. Daily turnover for covered bonds and corporate bonds in relation to outstanding stock**



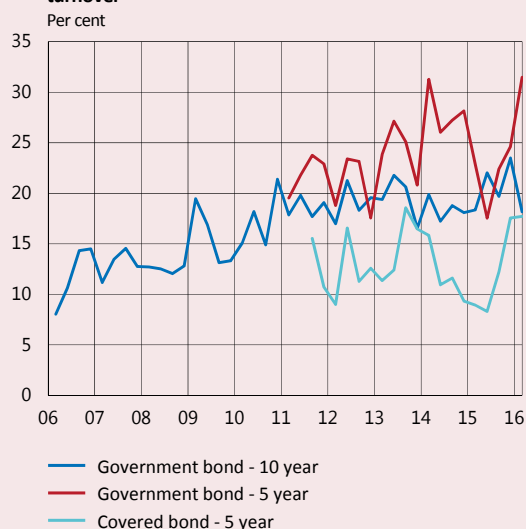
Note. Refers to quarterly averages of turnover. There is no outstanding stock for one of the banks whose bonds are included in the turnover statistics. This should not affect the development of the measure to any great degree, however.

Sources: The Riksbank, the Swedish National Debt Office and Statistics Sweden

<sup>39</sup> See *Likviditeten i marknaden för säkerställda obligationer* [Liquidity in the covered bond market], *FI-Analysis* No 3, December 2015. Finansinspektionen.

<sup>40</sup> *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, autumn 2015. Sveriges Riksbank. *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank.

**Chart A2:5. Special benchmark bonds as a percentage of total turnover**



Note. Refers to quarterly averages of the turnover for government bonds and covered bonds respectively.

Sources: Nasdaq and the Riksbank.

### *Market liquidity has been concentrated to the most liquid maturity segments*

The turnover measure describes developments for all outstanding bonds issued by the respective category of issuer. Participants in the Swedish bond market state, however, that market liquidity following the financial crisis was concentrated to the most liquid maturity segments in each category.<sup>41</sup> This is confirmed if one looks at trade in government bonds with a so-called benchmark status with five- and ten-year maturities, which account for an increasing large share of the total turnover in government bonds (see chart A2:5).<sup>42</sup> No clear shift is discernible for 5-year covered bonds, but on the other hand data is only available from 2011 for these bonds.

### *Difficult to draw unequivocal conclusions about the development of market liquidity*

As indicated by the review above, different measures paint somewhat different pictures and there are differences between different segments issued by the same issuer categories. Market liquidity appears to have fallen according to the turnover measure, and appears to be unchanged according to the price-impact measure. All in all, it is therefore difficult to draw any clear conclusions as to how liquidity in the Swedish bond market has changed since the financial crisis. The market participants'

assessment is, however, that market liquidity has deteriorated.

### **What has affected the development of market liquidity?**

Market liquidity can be affected by many different factors, both short-term and more structural ones. Short-term factors include the development of interest rates in general. Low interest rates make it cheaper for market makers to fund the trading books they use to assist the market with market liquidity. The search for yield due to the low interest rates may also have contributed positively to market liquidity for covered bonds and corporate bonds in relation to government bonds by increasing the demand for them and thus their turnover. This means that there is a risk that market liquidity instead deteriorates when the interest rates rise.<sup>43</sup> There are also participants who point out that the central banks' purchases of bonds, including the Riksbank's purchases of government bonds, have had a negative effect on their market liquidity. This is because the volumes bought by the Riksbank are no longer being sold on the market. This leads to a reduction in turnover and a shortage of government bonds.<sup>44, 45</sup>

Something that may have had a more lasting negative effect on market liquidity is that the banks that have been active in bond trading have chosen to reduce their participation in bond trading and instead redirect their business models towards safer and less volatile sources of income. It is also possible that investors are to a greater extent than before keeping the bonds they have invested in for longer and that this has contributed to reducing turnover. New financial regulations, such as requirements for the banks regarding leverage ratios and liquidity buffers, are a further factor that may have more lasting significance for developments, according to both Swedish and international market participants.<sup>46</sup> They point out that the banks are now less interested in using their balance sheets to act as intermediaries in the case of large differences in supply and demand on the market as their capital costs have increased. This in turn has had a negative impact on market liquidity.

However, the basic idea behind these regulations is to create more robust banks, which should increase resilience to large falls in market liquidity. The result will be a more robust financial system where the consequences of

<sup>43</sup> *Fixed income market liquidity*, January 2016. Committee on the Global Financial System.

<sup>44</sup> *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank. *Fixed income market liquidity*, January 2016. Committee on the Global Financial System.

<sup>45</sup> The Riksbank announced for the first in February 2015 that it would start buying government bonds.

<sup>46</sup> *Market participants' views on risks and the functioning of the Swedish fixed-income and foreign exchange markets*, spring 2016. Sveriges Riksbank. *Market-making and proprietary trading: industry trends, drivers and policy implications*, November 2014. Committee on the Global Financial System.

<sup>41</sup> The information is based on interviews with a number of market participants.

<sup>42</sup> The corporate bond market has been excluded here as there are no corporate bonds with benchmark status.

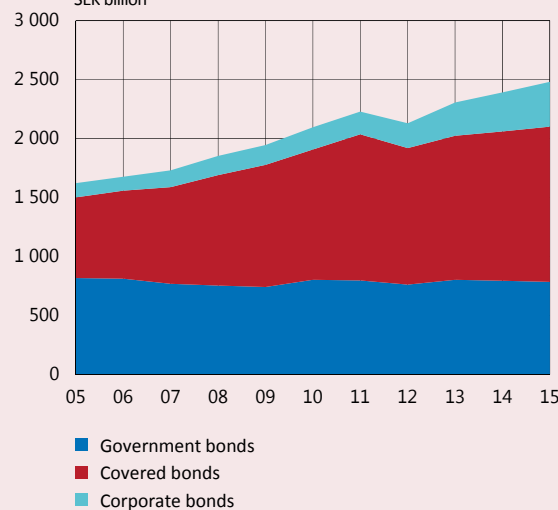
future major falls in market liquidity will hopefully be smaller. Deteriorations in market liquidity during calm market conditions therefore need not mean that the fall during stress situations is a greater threat to financial stability than if market liquidity had been higher during calmer periods. The price market participants pay in the form of poorer market liquidity, and thereby poorer efficiency, during good times could in this case be counter-balanced by less severe falls in market liquidity during stress periods and a greater general awareness of liquidity risks among market participants.

### No increased risk to financial stability

It is therefore difficult to draw any clear conclusions as to how market liquidity in Sweden has changed since the financial crisis. Some indicators point to market liquidity having fallen, but there are others pointing to this not being the case. Market liquidity also appears to have been concentrated to the most liquid bonds. The market participants' assessment is, however, that market liquidity has deteriorated. The Swedish bond markets appear to be functioning well. This is because funding liquidity does not appear to have deteriorated. The outstanding volumes of bonds issued by both banks and non-financial corporations, for instance, have increased since the financial crisis (see chart A2:6). Neither are there any signs of any substantial sales pressure of bonds.

Therefore, the risks to financial stability in Sweden are not deemed to have increased at present and market functioning does not appear to have significantly deteriorated. This does not mean, however, that we can exclude the possibility of a deterioration in market liquidity having negative consequences in the future. It is therefore important that the holders of the bonds are aware of the risks that are linked to severe deteriorations in market liquidity and that they adapt their strategies accordingly. In this regard, it is important to continue to keep track of the development of market liquidity for Swedish bonds in the future in order to identify any changes that may increase the risks to financial stability and to influence market efficiency.

**Chart A2:6. Outstanding volumes on the Swedish bond market**  
SEK billion



Sources: Statistics Sweden and the Riksbank

## ARTICLE – Cyber threats in the financial system

The financial system is increasingly dependent on IT systems and as these are also becoming interlinked to an ever-greater extent, vulnerability and the negative effects of cyber attacks are increasing. A large-scale cyber attack could threaten financial stability. As a result, cyber security, its significance for financial stability and the challenges posed are being increasingly highlighted by authorities, banks and financial market infrastructures (FMIs) alike. The surveys performed by the Riksbank among banks and FMIs show that although they have taken measures to protect themselves, awareness within the organisations and cooperation between them must be improved. This article describes in a general manner what cyber security and cyber threats entail, what risks they pose to the financial system and what conditions exist with regard to prevention and crisis management work.

### Cyber threats from the point of view of financial stability

Financial assets are no longer something stored in a safe or a bank vault. Today they mainly comprise strings of ones and zeros stored in IT systems operated by various financial agents. New functions and services based on constant access to the Internet and information exchanged in real time have meant that the interconnection between these agents has increased. This has created new possibilities but also means increased risk as different parts of the financial network become increasingly interlinked and dependent on one another. This means that the IT systems of the banks and financial infrastructure systems, as well as their external IT suppliers, and technical infrastructures such as telenetworks comprise increasingly critical parts of the financial system.

Cyber threats are the risk of being subjected to an attack where someone makes use of weaknesses in a participant's IT system or another company's system to which the participant is connected. The risk of IT-related crime in the form of cyber attacks in particular has increased.<sup>47</sup> Cyber attacks are difficult to predict and both resources and expertise are required to protect oneself against them. The interconnection within the financial system also means that a cyber attack to one participant can spread to central financial functions that are essential for the smooth functioning of the economy. An attack could involve, for instance, a disruption in a bank's operations or systems that mediate payments being put out of action or losing their reliability as a result of manipulated information.

The perpetrator of these attacks could be a foreign state or a terrorist organisation wanting to obtain information or cause damage, a criminal organisation

wanting to get hold of financial resources, or an activist organisation with political motives. The purpose of the attacks varies, and so does the method used, for instance, DDoS (Distributed Denial of Service) attacks, implementation of malicious codes or pure hacking are relatively common today.<sup>48</sup>

There are also cases where the attacker uses employees of an organisation and gets them to consciously or unconsciously enable cyber attacks. For instance, the attacker can get the employee to open e-mail attachments and visit websites with malicious codes or to use infected USB sticks. It is thus important to take into account the human factor when protecting against cyber threats.

### Information security and cyber security

Information security has long been an important issue in many financial sector organisations. The work on information security has primarily been aimed at protecting information within a specific organisation, but as internal and external IT systems have become increasingly interlinked and cyber threats have increased, the concept of cyber security has been established.

There are a number of different definitions of this concept. The definition the Riksbank has chosen to use in this article is that cyber security, in comparison with information security, to a greater extent comprises protecting the networks formed when the IT systems within an organisation are linked together with IT systems outside of the organisation.<sup>49</sup>

<sup>47</sup> Reported cyber attacks increased by 38 per cent globally in 2015 according to the report *Turnaround and transformation in cyber security*, 2016. PwC.

<sup>48</sup> *European Union Agency For Network And Information Security ENISA Threat Landscape 2015*, January 2016. ENISA.

<sup>49</sup> *Cyber security in Sweden – strategy and measures for secure information in central government*, SOU 2015:23.

### The financial infrastructure is built up of IT systems

The IT systems of banks and FMIs are closely interlinked and constitutes the base of the financial system. These systems are in turn interlinked with technical infrastructure such as telenetworks and broadband. The moment a mobile phone, computer or tablet is connected up to obtain access to the financial system, for instance, through online banking services, the expectation is that the interplay between technical infrastructure and the financial system will function smoothly.

The Riksbank's system for large-value payments (RIX) and its participants illustrate how closely interlinked the different parts of the financial system are. RIX can be described as the hub of the Swedish financial system, in that it executes payments between its participants and thus links together a large number of Swedish banks to FMIs (see figure A2:1). These participants are in turn linked to other national and international networks. Moreover, the majority of the financial transactions between these participants are distributed via the international communications network, SWIFT.<sup>50</sup> This means that a cyber attack on one of these interlinked networks could threaten financial stability in Sweden, but also abroad. One example is the cyber attack against the Central Bank of Bangladesh in February 2016. During this attack, unauthorised payment transactions were made via SWIFT, from an account in the New York FED belonging to the central bank of Bangladesh. In a press release, SWIFT has said that this cyber attack was not an isolated incident and that similar attacks have also been directed at other banks. SWIFT has therefore called upon its participants to

take a number of preventive measures to protect themselves against this type of attack.<sup>51</sup>

### Outsourcing to IT suppliers is becoming increasingly common

A trend in recent years is for banks and FMIs to outsource parts of their IT operations to an increasing extent to external suppliers. Public authorities have also chosen to outsource parts of their IT operations. As these external suppliers are specialised in their fields and have economies of scale, they can often offer solutions that are more cost efficient than internal IT operations. If banks and FMIs outsource their IT operations to a few external suppliers, this can entail risks. A cyber attack against an important external supplier of IT services could then put critical IT systems out of action for several banks and FMIs at the same time.

Banks and FMIs are obliged to report to FI if they are planning to outsource parts of their operations to external suppliers. The operations that banks and FMIs choose to outsource are within FI's supervision remit.

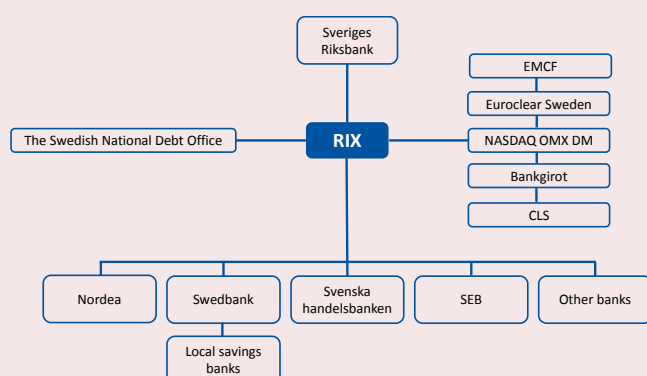
Regardless of whether banks and FMIs choose to outsource parts of their operations to external IT service suppliers or conduct these operations themselves, they always have the ultimate responsibility for them. Any outsourcing operations must be conducted in accordance with the requirements set by FI and thereby ensure a high level of preparedness against, for example, cyber threats. The challenge is often to check that the external suppliers are providing services of the quality agreed, as this requires continuous follow-up work and access to expertise.

At present there is no authority that conducts direct supervision of external supplies of IT services to financial companies and has a mandate to decide on sanctions and take measures with regard to these external suppliers. An explicit responsibility and mandate in this respect would facilitate work on highlighting and mitigating the risks that can arise when a few external suppliers of IT services are responsible for a large part of the financial sector's IT operations.

### Banks' and FMIs' work on preventing cyber threats

The work on dealing with cyber threats should involve all parts of an organisation, from the management down to different parts of the operations. It requires strategic prioritisation, good awareness and preparedness. In practice, it is a question of drawing up strategies to govern the operations that involve management, staff and decision-making processes and frameworks that cover measures to prevent, detect and manage cyber threats.

Figure A2:1. Interlinking to the RIX-system



Source: Sveriges Riksbank

<sup>50</sup> SWIFT (Society for Worldwide Interbank Financial Telecommunication) is a so-called critical services provider to banks and FMIs and thus plays a very important role in the safety and efficiency of the financial system.

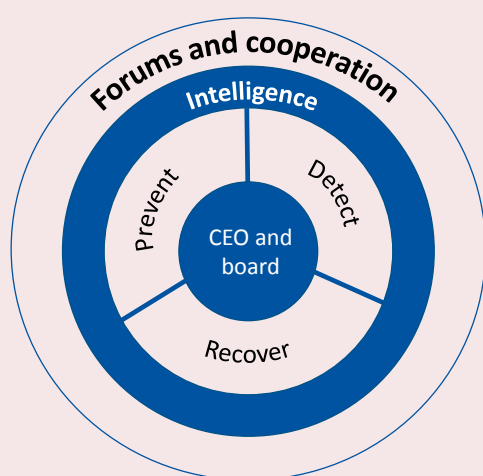
<sup>51</sup> No impact on SWIFT network, core messaging services or software, *press release*, May 2016. SWIFT.

Examples of such measures include risk analyses, monitoring transactions, incident management and information exchanges with other financial agents through business intelligence. As cyber threats are constantly changing, companies need to constantly learn from the attacks they are subjected to and also from the experiences of other companies through various types of cooperation (see figure A2:2).<sup>52</sup>

Over the past year, the Riksbank has carried out two surveys by questionnaire to find out how banks and FMIs are working to deal with cyber threats.<sup>53</sup> The results of the surveys show that the respondents have installed firewalls and make checks by, for instance, analysing transactions to prevent, detect and remedy cyber threats. The respondents have also introduced routines to be able to restart their operations following a potential attack. It is very important that these measures and routines are tested to ensure that they will work in practice.

However, the questionnaire responses show that it is necessary to a greater extent to anchor the work on dealing with cyber threats in all parts of the organisation

Figure A2:2. Preventive work regarding cyber threats



Note. The chart shows the central components needed to create a good resilience to cyber attacks. Detect, prevent and remedy concerns operational measures such as the installation of firewalls and analysis of transactions and routines to restart operations after an attack. Management and governance illustrates the importance of having clear leadership with regard to cyber security at the highest level of an organisation and that cyber security issues become integrated into strategic decisions regarding, for instance, outsourcing. Other important components in the preventive work are an active business intelligence system, information exchange and cooperation with other agents.

Source: The Riksbank's processing of the figures from CPMI-IOSCO's report *Guidance on Cyber Resilience for Financial Market Infrastructures*.

so that IT functions, business functions, senior management and boards of directors are involved. The respondents state that interest and awareness from management and boards of directors has increased in recent years. This is positive, as it is important that company boards also include one or more members who have both knowledge of the company's business operations and its IT operations.

The survey responses also show that a majority of the respondents see cyber threats as an ever-greater challenge and that they wish to have increased cooperation and more exchange of information in this field.

### The authorities' work on cyber threats

Today the overall responsibility for questions regarding cyber and information security in Sweden is divided among several different authorities.<sup>54</sup> There are also authorities with a special responsibility for information security in their respective areas of responsibility. For example, FI is responsible for issuing regulations, authorisations and conducting supervision that covers the banks' risk management. Within the scope of this responsibility there is also an assessment of the protection against operational risks, such as cyber threats. The Riksbank is owner and operator of the RIX system, at the same time as it assesses the banks and the financial infrastructure systems, including the RIX system to promote financial stability. The Riksbank is itself responsible for ensuring the RIX system is protected against cyber threats. In addition, cyber threats are discussed as an important part of the operational risks in the dialogue with banks and FMIs.

There are also a number of cooperation forums where both corporate sector agents and public authorities can share sensitive information on current cyber threats and exchange practical experiences. One example of this type of forum is FIDI-Finans, which is a forum for sharing information with a focus on the financial sector and which is led by the Swedish Civil Contingencies Agency.<sup>55</sup> Examples of broader cooperation forum are FSPOS (Financial Sector Private-Public Cooperation) in which both government and private actors are involved and FCP ES (Forum for Crisis Preparedness - Economic Security) where different agencies take preventive measures to counteract the disruptions in payment systems. However, there are at present few forums specifically aimed at cyber threats, where the focus is on the systemic importance and interlinking between IT systems.

<sup>52</sup> *Cyber Resilience in financial market infrastructures*, November 2015. The Committee on Payments and Market Infrastructures (CPMI) and the Board of the International Organization of Securities Commissions (IOSCO).

<sup>53</sup> In 2015, the Riksbank and Finansinspektionen carried out a survey based on CPMI-IOSCO's first report on resilience to cyber threats. A corresponding survey was made of the four major banks in 2016. The aim was to obtain overall information on the banks' and FMIs' work on preventing cyber threats.

<sup>54</sup> The National Defence Radio Establishment (FRA), the Swedish Civil Contingencies Agency (MSB), the Swedish Post and Telecom Authority (PTS), the Defence Materiel Administration (FMV), the Swedish Armed Forces (FM), the Swedish Police Authority and the Swedish Security Service (SÄPO).

<sup>55</sup> *MSB och samhällets informationssäkerhet [MSB and information security in society]*, Fact sheet January 2014. Swedish Civil Contingencies Agency (MSB).

In Sweden, there are currently requirements for banks and FMIs to be able to manage cyber threats in a satisfactory manner. For instance, they are obliged to report significant incidents to FI. In this respect, the companies have some scope to assess for themselves whether or not the incident is significant. Moreover, some of the banks' capital requirements are based on the size of their operational risks, with cyber threats forming part of FI's assessment. In April, a new regulation came into force<sup>56</sup> that obliges Swedish authorities to report all IT incidents that risk affecting the security of their information management, for instance, in the event of a cyber attack. The recently adopted directive on information security in networks also requires private sector agents to report incidents.<sup>57</sup> Moreover, the European Banking Authority (EBA) has been given the task of producing technical standards for uniform reporting of IT incidents from payment services providers.<sup>58</sup>

Seen in an international perspective, the Bank of England is one of the authorities that has come the furthest in the work on preventing cyber threats. The bank has developed a model to meet cyber threats that is aimed at authorities and systemically important participants in the financial market, such as FMIs and service providers.<sup>59</sup> The model supplements written documentation with a more extensive insight into how companies manage cyber threats in practice. It consists of first a threat analysis that starts with an assessment of the purpose of the cyber threat identified. Then follows an assessment of the attacker's ability to implement the threat and an assessment of the methods that can be used in a cyber attack. Finally, the model covers penetration tests, where the actual resilience is tested and assessed. The Riksbank considers it necessary to perform regular tests of individual financial agents' resilience to cyber threats to ensure that the measures taken will also work in practice.

### Challenges and the work ahead

Cyber threats are a growing operational risk that banks and financial market infrastructures (FMIs) must be able to manage. This article identifies some areas where there is room for improvement with regard to strengthening the resilience of the financial system to cyber attack.

One such area concerns the internal work on information security and cyber security in banks and FMIs. For these institutions cyber threats currently pose a significant and growing operational risk and they use considerable resources to protect against them. It is important that the work on cyber threats is done and anchored at a strategic level so that company management and budget and decision-making processes are involved.<sup>60</sup> It may also be applicable to have regular testing of the individual financial actors' resilience to cyber threats to ensure that the measures taken will also work in practice. As a few external suppliers of IT services are responsible for a large part of the financial sector's IT operations, one should consider an explicit responsibility and mandate for performing supervision on these external suppliers. Once a cyber attack occurs, it is important that these are reported to FI. The Riksbank takes a positive view of the work in Europe right now on standardising the contents and design of incident reports.

Other areas where there is room for improvement concern cooperation between authorities, banks, FMIs and external suppliers of IT services, as well as charting cyber threats. The work on cyber security and the work on financial stability are a shared responsibility between several authorities in Sweden. To enable efficient and continuous charting of cyber threats to the financial system, cooperation is required between the financial agents and the authorities with responsibility for cyber security and for financial stability respectively. It is therefore important that the responsible authorities together with the financial agents begin to discuss the need for cooperation within these areas. The results of the questionnaires also show that there is a demand from banks and FMIs for more extensive exchange of information and cooperation. As shown in the analysis, a survey of resilience should also include the use of external suppliers of IT services and the potential risks this can create. It may also be appropriate to include these external suppliers in future cooperation forms.

<sup>56</sup> *Förordning om krisberedskap och bevakningsansvariga myndigheters åtgärder vid höjd beredskap*, [Ordinance on crisis management and the supervisory authorities' measures under heightened alert] SFS 2015:1052.

<sup>57</sup> *Proposal for a Directive of the European Parliament and of the Council concerning measures to ensure a high common level of network and information security across the Union*, COM/2013/048 final - 2013/0027 (COD).

<sup>58</sup> Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market.

<sup>59</sup> *CBEST Intelligence-Led Testing. An Introduction to Cyber Threat Modelling*. Version 2.0, 2016. Bank of England.

<sup>60</sup> CPMI-IOSCO has drawn up guidelines as to how FMIs should work to maintain resilience to cyber threats.

## CHAPTER 3 – Recommendations

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The continuing rise in housing prices together with the high and increasing household indebtedness are contributing to ever greater risks that could threaten both financial and macroeconomic stability. At the same time, there are still structural vulnerabilities within the banking system, which are partly because it is so large and interlinked. It is therefore urgent to implement further measures to subdue these risks. It is extremely important that the housing market is reformed and the taxation system is reviewed to attain a better balance between supply and demand on the housing market. It is also important to implement macroprudential policy measures that limit the risks linked to household indebtedness. Moreover, the framework for macroprudential policy needs to be clarified – both with regard to mandate and tools. The major banks should also continue to strengthen their resilience by increasing their capital and reducing their liquidity risks.

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### Measures are needed to reduce the risks linked to the housing prices and to the household indebtedness

The continuing rise in housing prices and the high and increasing household indebtedness create ever greater risks that could threaten both financial and macroeconomic stability. The problems are intensified by the existence of vulnerabilities in the financial system, which make it sensitive to various shocks.

The major Swedish banks have improved their resilience in recent years, which is positive. Moreover, FI has taken measures to reduce risks, such as an amortisation requirement, a loan-to-value limit and a risk-weight floor for mortgages. FI has also decided to raise the countercyclical capital buffer requirements and decided on measures to increase capital adequacy requirements for Swedish banks using internal models to calculate their risk-weighted assets for exposures to the corporate sector. In addition, new regulations have been implemented at an international level that entail further capital requirements for the banks in the future (see the article Need for a leverage ratio requirement for the major Swedish banks).

However, further measures need to be taken that both reduce the risks linked to housing prices and to households' indebtedness, and to strengthen the resilience of Swedish banks. This is particularly important now that Sweden is experiencing high housing prices and high indebtedness combined with low interest rates. If no further measures are taken, the socioeconomic imbalances are expected to increase when indebtedness continues to rise, which can ultimately be very costly to society. This chapter describes the



measures that the Riksbank currently considers to be key to reducing the vulnerabilities and risks (see table 3:1).<sup>61</sup>

The Riksbank assesses that a combination of a number of measures in different policy areas is needed to reduce the risks linked to housing prices and household indebtedness. Measures are needed that tackle the underlying reasons for the increased indebtedness.<sup>62</sup> For example, measures that target the housing market to create a better balance between supply and demand are necessary. Reforms that make households less willing or able to take on debt are also important, such as a gradual reduction of the tax relief on interest expenditure. The responsibility for such reforms lies with the Riksdag and the Government.

It is important that FI takes macroprudential policy measures. How great this need is depends on the extent to which the underlying causes of the increased risks are tackled and how quickly this takes place. A debt-to-income limit, that is a limit as to how much debt one can have in relation to disposable income, is an effective measure for reducing the risks linked to household indebtedness. Another example of an appropriate measure is the introduction of minimum levels for the standard values that banks use in their discretionary income calculations. A further example of a measure is a limit on the number of loans at variable rates, that is, a regulation of the interest rate fixation periods for mortgages.

The Swedish banking system is large, concentrated and closely interlinked. It is also to a large degree dependent on wholesale funding and exposed to the housing sector. These structural vulnerabilities make the banking system sensitive to shocks linked to household indebtedness, for instance (see Chapter 2). It is therefore important that banks have good resilience. This means that it is essential that FI ensures that the major banks have sufficient capital by introducing a leverage ratio requirement (see the article Need for a leverage ratio requirement for the major Swedish banks). Going forward, there may also be reason to consider further tightening of the risk-weighted capital requirement. In addition, it is important that there are regulations that ensure banks are managing their liquidity risks in Swedish kronor (see the article Need for a requirement for LCR in Swedish kronor) and that they continue to reduce their structural liquidity risks. To maintain confidence in the market, it is important that the four major banks provide information on their liquidity by reporting their LCRs in Swedish kronor and their structural liquidity risks (NSFR) at least once a quarter.

If Nordea's plans for a branch structure are realised, the assets in the Swedish parent company will also become even

**Table 3:1. The Riksbank's current recommendations**

	Introduced in the report
<b>The mandate for macroprudential policy</b>	
The Government and the Riksdag should promptly clarify Finansinspektionen's mandate and instruments for macroprudential policy.	2015:1
<b>Household indebtedness</b>	
The Government and responsible authorities should take further measures as soon as possible to reduce the risks in the household sector. These measures should affect both the existing loan stock and new loans. Examples of measures are a reduction in the tax relief on interest expenditure, a debt-to-income limit and the introduction of sound minimum levels for the standard values that banks use in their discretionary income calculations. A central component is also action to improve the functioning of the housing market.	2015:2 and 2014:1 <sup>63</sup>
<b>Banks' capital levels</b>	
Finansinspektionen should, as soon as possible, introduce a leverage ratio requirement for major Swedish banks at the group level of 4 per cent. The requirement should be set at 5 per cent from January 2018.	2014:2
Finansinspektionen should set the countercyclical capital buffer value at 2.5 per cent with the aim of increasing banks' resilience.	2014:1
<b>The major banks' liquidity risks</b>	
Finansinspektionen should extend requirements for the Liquidity Coverage Ratio (LCR) to also cover Swedish kronor. The requirement should be set to at least 60 per cent.	2014:1
The major Swedish banks should reduce their structural liquidity risks and meet the minimum level of 100 per cent in the Net Stable Funding Ratio (NSFR).	2011:2
The major Swedish banks should report their LCRs in Swedish kronor at least once a quarter.	2013:2
The major Swedish banks should report their NSFRs at least once a quarter.	2013:1

<sup>61</sup> For a list of the recommendations fulfilled, see table 3:2.

<sup>62</sup> *Financial Stability Report 2015:2*, p. 17-20. Sveriges Riksbank.

<sup>63</sup> The recommendation on introducing sound minimum levels for the standard values that banks use in their discretionary income calculations was introduced in *Financial Stability Report 2014:1*. Sveriges Riksbank.

larger in relation to the Swedish economy.<sup>64</sup> The consequences for the Swedish taxpayer in the event of a crisis could thus be greater, too. A branch structure thus increases the importance of fulfilling the Riksbank's recommendations regarding capital and liquidity. The Riksbank states in its consultation response regarding Nordea that the plans for a branch structure have also put a focus on liquidity risks in other essential currencies, such as Norwegian and Danish kronor. Further investigation is needed into how a requirement for LCR in these currencies can be introduced.<sup>65</sup>

Finally, it is highly important that the framework for macroprudential policy in Sweden is reviewed. Experiences from the process that led to the amortisation requirement show deficiencies in the framework. This has also been highlighted by FI<sup>66</sup> and in Goodfriend and King's review of the Riksbank's monetary policy 2010-2015<sup>67</sup>. This is a question of flaws in the way its objectives have been formulated, in the processes for allocating tools and in the legal grounds for conducting macroprudential policy. There is also a lack of clarity in the allocation of responsibility. A fundamental review of the framework can be made in connection with the review of the Sveriges Riksbank Act that has been announced.<sup>68</sup> As this will take time, it is important that FI is now given the decision-making powers needed to adopt measures that can reduce the risks linked to household indebtedness.

## Recommendation regarding the mandate for macroprudential policy

### **The Government and Riksdag should clarify Finansinspektionen's mandate and tools for macroprudential policy without delay.**

In Sweden, the Government has allocated the main responsibility for macroprudential policy to FI.<sup>69</sup> It has become evident, however, that the regulations do not give FI a sufficiently clear assignment and mandate to take measures to counteract financial imbalances. This lack of clarity is delaying and obstructing the introduction of necessary measures to mitigate the risks posed by household indebtedness. The Riksbank considers that the flaws in the Swedish framework for macroprudential policy give reason to investigate this framework once again. However, it will probably take

<sup>64</sup> Parent company here refers to Nordea Bank AB.

<sup>65</sup> See the *consultation response* to Nordea's applications for permission to implement merger plans, April 2016. Sveriges Riksbank.

<sup>66</sup> See FI's *proposal for a framework for macroprudential policy*, dated 25 February 2016. Finansinspektionen.

<sup>67</sup> See Goodfriend, M. and King, M. (2016), *Review of the Riksbank's monetary policy 2010-2015*, (2015/16:RFR6).

<sup>68</sup> See the Executive Board's *consultation response* on the report *Review of the Riksbank's Monetary Policy 2010-2015* (2015/16:RFR6), April 2016. Sveriges Riksbank.

<sup>69</sup> See, for example, *Finansinspektionen's instructions* (Ordinance 2013:1111) (In Swedish only) and DN Debatt *Tuffare regler för bankerna krävs för finansiell stabilitet [Tougher rules for banks required for financial stability]* (In Swedish only), 26 August 2013. Dagens Nyheter.

several years before a commission of inquiry is complete and its proposals incorporated into Swedish law. At the same time, it is urgent that the risks linked to the housing prices and the household indebtedness are reduced.

It is therefore of the utmost importance that FI's assignment and tools for macroprudential policy are clarified and set out in law. It should be made clear that FI has the mandate to take measures to counteract financial imbalances regardless of whether there are risks to financial stability or to macroeconomic developments. The Riksbank further considers that FI should be able to make independent decisions on the macroprudential policy tools for which it has been given responsibility. Of course, a balance between independence and democratic control needs to be attained in macroprudential policy. However, the Riksbank considers, in line with the arguments presented by Goodfriend and King, that an appropriate means of attaining this is for the political sphere to determine which tools should be delegated but for the responsible authority to independently decide on the application of these tools. This system would make the allocation of responsibility clear and it is also in line with the ESRB's recommendation that the macroprudential policy authority should be operationally autonomous.

## Recommendation regarding measures to reduce risks linked to household indebtedness

**The Government and responsible authorities should take further measures as soon as possible to reduce the risks in the household sector. These measures should affect both the existing loan stock and new loans. Examples of measures are a reduction in the tax relief on interest expenditure, a debt-to-income limit and the introduction of sound minimum levels for the standard values that banks use in their discretionary income calculations. It is also necessary to take measures that will improve the functioning of the housing market.**

High and increasing indebtedness poses risks to both individual households and the economy as a whole. The measures that FI has taken so far are steps in the right direction, but are not assessed to be sufficient. If no further measures are taken, the risks linked to household indebtedness are expected to continue to increase. This is why a further combination of measures is needed within several different policy areas.

Above all, the reasons behind the increasing indebtedness in Sweden need to be addressed. The poor functioning of the housing market is a factor that has contributed to risks building up. Reforms are therefore needed in the housing market to create a better balance between supply and demand (see fact box on page 32). Even if housing

construction has recently shown a significant increase, housing shortages are expected to persist and grow in many regions.<sup>70,71</sup> It is thus extremely important that the political discussions now being held lead to concrete measures, so that housing construction can increase and the existing housing stock can be used more efficiently.

With regard to tax regulations for home-owners, these could be designed in different ways, either by regular taxation of the actual home or through a transaction tax when buying or selling the home. To attain a controllable development in housing prices and household indebtedness, it is necessary to take a comprehensive approach and to review capital gains tax and property tax as well as tax relief on interest expenditure.

Favourable tax regulations for homeowners, for example tax relief on interest expenditure and property tax cuts, have contributed to the build-up of debt. These tax rules should therefore be reviewed. For example, a gradual reduction of the tax relief on interest expenditure would contribute to dampening household demand for loans and thus indebtedness. The Riksbank's analysis indicates that a change in the tax relief in interest expenditure would have a significant effect on household indebtedness as it would affect all borrowers.<sup>73,74</sup> The advantage of such a measure is that it also affects the existing mortgage stock, as lower tax relief would give incentives to increase amortisation of loans. Moreover, it would contribute to increasing state tax revenues, which could then be used to counteract the potentially negative side-effects of the short-term development in consumption. As we are in a situation with low interest rates, the conditions for amending the tax relief for interest expenditure are good.

The importance of such measures will to a large extent depend on how the underlying causes of the risks are managed and how quickly this is done. One possible further measure that could be taken is a debt-to-income limit that restricts how much a household can borrow in relation to its income – something that has been presented by FI as a possible next measure.<sup>75,76</sup> At present, the levels for households' debt-to-income ratios are high, seen in an historical perspective.

### Increased mobility and supply on the housing market

To match the increasing demand on accommodation requires a combination of measures. More housing needs to be built and the existing housing stock needs to be used more efficiently.

Improved competition in the construction and civil engineering sector, for instance, could contribute to increased housing construction. In addition, municipal planning and building rules may need to be reviewed. The municipal monopoly on planning means that the municipalities themselves determine how land should be used and developed. This can mean that the supply of land, and thus housing, does not increase enough from a broader socioeconomic perspective.<sup>72</sup>

One means of using the existing housing stock more efficiently would be to review the rent-setting system. It is also important to create tax regulations that reduce lock-in effects. However, such tax changes could in themselves contribute to an increase in housing prices. It is therefore important to take a broader approach to taxation in housing policy.

<sup>70</sup> *Konjunkturläget (The economic situation)*, March 2016. National Institute of Economic Research.

<sup>71</sup> *Monetary Policy Report*, February 2016. Sveriges Riksbank.

<sup>72</sup> Emanuelsson, R. (2015), Supply of housing in Sweden, *Economic Review 2015:2*. Sveriges Riksbank.

<sup>73</sup> See the speech *The housing market and household indebtedness from a central bank perspective*, Ingves, S. 20 November 2015. Sveriges Riksbank.

<sup>74</sup> See *Financial Stability Report 2015:2*. Sveriges Riksbank. Here the Riksbank shows some example calculations for different combinations of measures, including a gradual reduction of the tax relief on interest expenditure.

<sup>75</sup> *Financial Stability Report 2015:2*. Sveriges Riksbank.

<sup>76</sup> FI's proposal for a framework for macroprudential policy, February 2016. Finansinspektionen.

The Riksbank's analysis shows that a debt-to-income limit could be an effective measure in reducing the risks linked to household borrowing and could limit household indebtedness (see fact box on this page). Moreover, it could be a good complement to the loan-to-value limit and the amortisation requirement.<sup>77</sup> This is due to incomes, which are put in relation to debt in a debt-to-income limit, showing a more stable development than housing prices, which are what debts are put in relation to in the loan-to-value limit. Whenever housing prices increase sharply, there is a risk that debts will continue to increase in relation to incomes if the only limitation is a loan-to-value limit. A debt-to-income limit is also more effective in terms of preventing interest payments taking up too large a share of incomes in the future. Several banks already apply loan limits, such as debt-to-income limits, to some extent as part of their credit assessments, but this is not the same as a requirement. There is also an international analysis that shows that a debt-to-income limit is an effective macroprudential policy tool.<sup>78</sup>

Other possible reforms that FI could implement include reducing the loan-to-value limit, limiting the percentage of loans at variable interest rates (see fact box on this page) and making requirements of banks' standard values so that households have larger financial buffers when being granted mortgages. Banks are already obliged to carry out credit checks to ensure that borrowers can fulfil their undertakings. As part of these checks, banks draw up so-called discretionary income calculations. Stipulating sound minimum levels for the standard values in the discretionary income calculations could ensure that all borrowers will at least be able to cope with certain levels of lending rates, amortisation rates and living costs, regardless of which bank issues the loan.

Another option is to increase the risk-weight floor for mortgages. A risk-weight floor of, for example, 35 per cent would increase the requirement for the major banks' CET 1 capital for mortgages to the level that applied prior to 2007. This would also correspond to what already applies for banks that use the so-called standard method to calculate risk weights for mortgages.

All in all, the Riksbank considers the implementation of measures to reduce the risks linked to household debt to be of the utmost importance as these can result in large-scale costs for the economy should they materialise. The Riksbank's assessment is that a combination of different measures is required – in several different policy areas – to reduce the risks in an appropriate manner.<sup>80</sup>

### Effects of a debt-to-income limit

The Riksbank's analysis shows that a debt-to-income limit of 400 per cent of disposable income would mean that 45 per cent of all new mortgage borrowers would not be able to borrow as much as they do now, while a limit of 600 per cent of disposable income would mean that 17 per cent could not do so. It would therefore affect a large share of new mortgage borrowers. One advantage of a debt-to-income limit is that the effect is concentrated to households with large loans in relation to their incomes. According to the calculations, a debt-to-income limit of 600 per cent for new mortgages would mean that the households affected borrow on average 20 per cent less. A stricter debt-to-income limit of 400 per cent would mean that the households affected need to reduce their debts by an average of 28 per cent. The analysis also shows that the effects of the debt-to-income limit vary for individual households, depending on income, age group and region, and depending on which bank the household uses. In the longer run, the effects on the macroeconomy are assessed as limited.

### Limiting share of variable-rate loans

A regulation of interest rate fixation periods for mortgages aims in the first instance to make households less sensitive to interest-rate changes by requiring the borrower to fix the borrowing rate for all or part of the mortgage. In addition to posing a risk for individual households, a large proportion of loans at variable rates may also entail stability risks. This is because having a high proportion of the mortgage at a variable rate, particularly in combination with high indebtedness, increases households' sensitivity to interest rates. Two countries that have introduced such regulations are Belgium and Israel. Interest rate fixation periods can be regulated in different ways. The regulations may cover all borrowers or only new borrowers. They may apply to all or part of the loan sum and they may, for example, be linked to the borrower's loan-to-value ratio. Another alternative is to set a limit as to how much the interest rate may vary.<sup>79</sup>

<sup>77</sup> See the article Debt-to-income limit as a policy measure in *Financial Stability Report 2015:1*, and Alfelt, G. Lagerwall, B. and Ölcer, D. (2015), An analysis of the debt ratio ceiling as a policy measure, *Economic Commentary* no. 8, 2015. Sveriges Riksbank.

<sup>78</sup> *The Financial Policy Committee's powers over housing tools A Policy Statement*, July 2015. Bank of England.

<sup>79</sup> See *Financial Stability Report 2015:1*. Sveriges Riksbank.

<sup>80</sup> See *Financial Stability Report 2015:2*, Sveriges Riksbank for a description of how individual measures or different packages of measures affect households' aggregate debt-to-income ratios.

## Recommendations regarding banks' capital levels

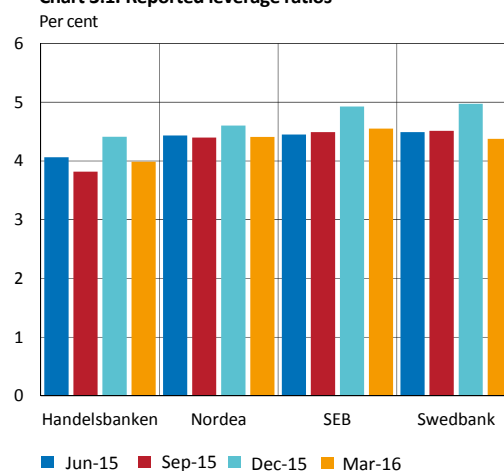
**Finansinspektionen should, as soon as possible, introduce a leverage ratio requirement for the major Swedish banks at the group level of 4 per cent. The requirement should be set at 5 per cent from January 2018.**

There are a number of risks and vulnerabilities in the Swedish banking system that make it sensitive to shocks. To ensure resilience is high, it is therefore important that banks hold sufficient capital. The major Swedish banks' risk-weighted capital requirements have been increased in recent years and are currently higher than the international minimum requirements. However, there are flaws in the risk-weighted capital requirements, which in some cases can mean that banks underestimate their risks and therefore hold too little capital. The Riksbank considers it important, therefore, that a non-risk-weighted capital requirement, in the form of a so-called leverage ratio requirement, is introduced as soon as possible as a complement to the risk-weighted capital requirements for the major Swedish banks. A leverage ratio requirement can be used to ensure that banks hold a certain amount of capital in relation to their total assets (see the article *Need for a leverage ratio requirement for the major Swedish banks*).

The Basel Committee is intending to introduce an international minimum leverage ratio requirement of at least 3 per cent with effect from 2018.<sup>81</sup> However, several countries with large and interlinked banking systems have decided to introduce a leverage ratio requirement higher than this, for instance, Switzerland, the United Kingdom and the United States. Given the size and the vulnerabilities of the Swedish banking sector the Riksbank considers that Sweden should also have a minimum leverage ratio requirement higher than the coming international minimum. The Riksbank considers that the requirement should be set at 4 per cent as soon as possible, rising to 5 per cent from 2018.<sup>82</sup>

In March 2016 the major banks' leverage ratios were between 4.0 and 4.6 per cent (see chart 3:1). To attain a leverage ratio of more than 5 per cent in 2018, the major banks would need, all else being equal, to increase their capital by an amount corresponding to around one year's joint profits.<sup>83</sup>

Chart 3:1. Reported leverage ratios



Note. According to the EU's capital requirements regulation (CRR).

Sources: Bank reports

<sup>81</sup> Revised market risk framework and work programme for Basel Committee is endorsed by its governing body, *press release*, January 2016. Bank for International Settlements (BIS).

<sup>82</sup> According to the Basel Committee's definition.

<sup>83</sup> In December 2015, the major banks had a total leverage ratio of 4.7 per cent, which was largely due to their total balance sheets being less than. At that time, all else being equal, the banks would have needed to increase their capital by an amount corresponding to around half of their joint annual profits to attain a leverage ratio of 5 per cent.

**Finansinspektionen should set the countercyclical capital buffer value at 2.5 per cent with the aim of increasing banks' resilience.**

The countercyclical capital buffer aims to strengthen the resilience of Swedish banks when systemic risks accumulate, that is, before they materialise. The countercyclical capital buffer in Sweden is 1.0 per cent as of 13 September 2015. FI has decided that the buffer shall be set at 1.5 per cent from 27 June 2016 and at 2.0 per cent with effect from 19 March 2017. The Riksbank assesses that the gradual upward adjustment is important to strengthen the banks' resilience.

However, the Riksbank assesses that the countercyclical capital buffer should be set somewhat higher, at 2.5 per cent.<sup>84</sup> With regard to the higher buffer value of 2.0 decided by FI, the Riksbank considers that this should be introduced in six months' time, instead of the proposed twelve months. This is partly because of the uncertainty abroad, which means that risks may suddenly materialise.<sup>85</sup>

## Recommendations regarding the major banks' liquidity risks

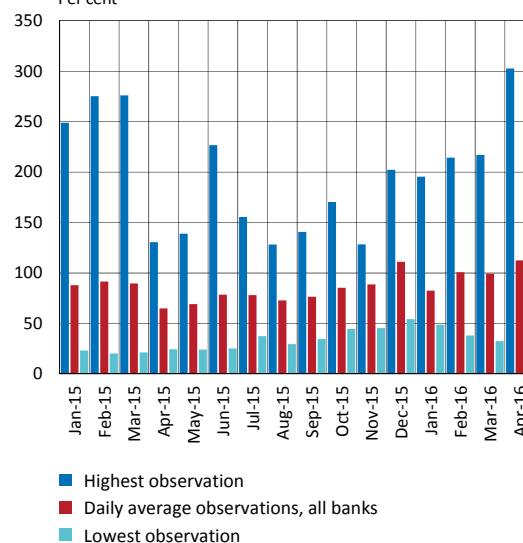
**Finansinspektionen should extend requirements for the Liquidity Coverage Ratio (LCR) to also cover Swedish kronor. The requirement should be set to at least 60 per cent.**

The major Swedish banks have had relatively small liquidity buffers in Swedish kronor in recent years. Recently, the major banks' LCR in kronor have improved. However, the banks still have periodically low or very low LCR in Swedish kronor (see chart 3:2). To ensure that the management of liquidity risks in Swedish kronor is good and that banks' liquidity in Swedish kronor does not fall too low, the Riksbank recommends that FI extends the requirements regarding LCRs to also include Swedish kronor.<sup>86</sup> The requirement should be set to at least 60 per cent (see also the article Need for a liquidity coverage ratio requirement in Swedish kronor).

**The major Swedish banks should report their Liquidity Coverage Ratios (LCR) in Swedish kronor at least once a quarter.**

The major Swedish banks already report the LCR of all currencies together and separately in euros and US dollars. By supplementing the present reporting with a separate report of the LCR in Swedish kronor, the banks could provide a

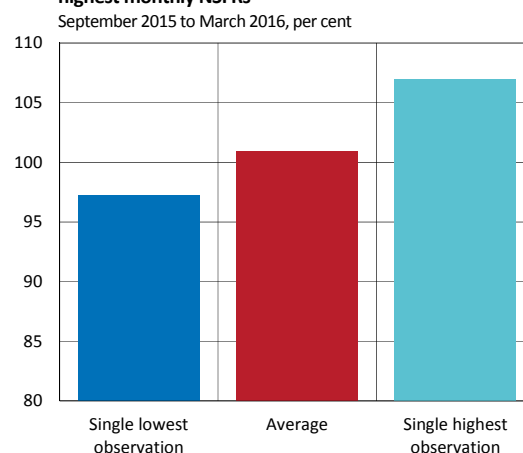
**Chart 3:2. The major Swedish banks daily LCR in kronor**  
Per cent



Note. Average daily LCR in kronor each month, and the single highest and single lowest observation each month.

Source: The Riksbank

**Chart 3:3. The major Swedish banks' lowest, average and highest monthly NSFRs**  
September 2015 to March 2016, per cent



Note. Every month the Riksbank collects the major banks' NSFRs in accordance with the Basel Committee's final definition. The chart shows the average and the single highest and lowest observations for the four major banks over the period.

Source: The Riksbank

<sup>84</sup> According to the Capital Adequacy Directive, FI may set a buffer value that is higher than 2.5 per cent if this is justified, but a buffer of more than 2.5 per cent will not apply to foreign companies' branches in Sweden without the prior approval of the authorities in the company's home country.

<sup>85</sup> See the *consultation response* regarding Finansinspektionen's proposal to amend its regulations on countercyclical capital buffer value, February 2016. Sveriges Riksbank.

<sup>86</sup> The Basel Accord states that a bank shall have liquid assets that can meet the outflows in all significant currencies in which outflows can arise.

better picture of their liquidity risks in different currencies. This would create increased confidence in the banks' management of their liquidity risks in Swedish kronor. At present, only Swedbank reports its LCR in Swedish kronor every quarter.

However, quarterly reporting disregards variations in LCR within the quarter as it only states the value on the final day of the quarter. If the banks' reporting is designed in such a way the reported value may overestimate their capacity to manage short-term liquidity stress. To ensure that their reporting provides a truer picture of liquidity risks on a continuous basis, it is therefore important that it is clear how LCR in Swedish kronor has developed over the course of the period reported.

**The major Swedish banks should reduce their structural liquidity risks and meet the minimum level of 100 per cent in the Net Stable Funding Ratio (NSFR).**

The NSFR is an internationally agreed measure that makes it possible to monitor the development of structural liquidity risks over time and between banks (see fact box on page 15). Swedbank, which currently discloses NSFR, reported a level of 107 per cent in March 2015. Over the past six months, the four major Swedish banks have on average had an NSFR of 100 per cent. However, in some months not all of the banks have attained 100 per cent (see chart 3:3).

According to the Basel Committee's timetable, the banks will have to meet a minimum NSFR level of 100 per cent from 2018. However, it is reasonable to expect banks with a large share of wholesale funding, such as the Swedish banks, to ensure that they fulfil this requirement as soon as possible.

**The major Swedish banks should report their Net Stable Funding Ratios (NSFR) at least once a quarter.**

At present, Swedbank reports NSFR in its income statement reports. It would be desirable for the other major banks to also increase transparency regarding their structural liquidity risks by reporting their NSFR. This could create increased confidence in the banks' management of their structural liquidity risks. If the major banks consider that other measures better illuminate the structural liquidity risks they are taking, the Riksbank urges them to report these measures together with the NSFR.

**Table 3.2. Recommendations that have been fulfilled**

Recommendations	Introduced in the report	Fulfilled in the report
The Government and the Riksdag should urgently work to make it possible to introduce an amortisation requirement for new mortgages.	2015:1	2016:1
The major Swedish banks should report their leverage ratios at least once a quarter.	2013:2	2015:1
The risk weight floor for Swedish mortgages should be raised.	2013:2	2014:2
The major Swedish banks should ensure that they have a CET 1 capital ratio of at least 12 per cent on 1 January 2015.	2012:1	2013:2
The framework for the reference rate Stibor should be reformed through the establishment of clear responsibility, clear governance and control, better transparency, the possibility of verification and an obligation for banks to conduct transactions at their stated bids on request.	2012:2	2013:2
The major Swedish banks should improve the transparency of their public reporting as regards information on asset encumbrance.	2012:2	2013:1
The major Swedish banks should report comparable key ratios in the form of the subcomponents of the Liquidity Coverage Ratio (LCR).	2011:2	2013:1
The major Swedish banks' Liquidity Coverage Ratios (LCR) should amount to at least 100 per cent.	2011:2	2012:2
The major Swedish banks' Liquidity Coverage Ratios (LCR) should amount to at least 100 per cent in euro and US dollars respectively.	2011:2	2012:2
The major Swedish banks should report their Liquidity Coverage Ratio (LCR) at least once a quarter beginning no later than the interim report published after 1 July 2012.	2011:1	2012:2
The major Swedish banks should improve the transparency of their public reporting by reporting maturity information per asset and liability type, broken down per currency.	2011:1	2012:2



## ARTICLE – Need for a leverage ratio requirement for the major Swedish banks

Following the financial crisis, comprehensive reform work was initiated to strengthen the resilience of the financial system. One result of this work is the minimum requirement for a leverage ratio that the Basel Committee intends to introduce from 2018. Other countries, which, like Sweden, have large and closely interlinked banking systems, have in recent years decided to introduce leverage ratio requirements that are higher than the planned international minimums. The Riksbank considers that Sweden should also have a leverage ratio requirement that is higher than the minimum and has therefore recommended that the requirement for the major Swedish banks should be set at 4 per cent today and 5 per cent from 2018. This article analyses the need for such a requirement.

There are structural vulnerabilities in the Swedish banking system that make it particularly sensitive to shocks. A necessary condition for the banks to have sufficient resilience is that they have sufficient equity. Even if there has recently been a certain increase in the proportion of equity in the Swedish banks in relation to total assets, the proportion has decreased significantly when seen over a longer perspective (see chart A3:1). At the same time, their assets as a percentage of Swedish GDP have increased, which means that the banking system has gained an increasing significance for the economy.

To strengthen resilience in the Swedish banking system, the Ministry of Finance, FI and the Riksbank came to an agreement in 2011 to raise the risk-weighted capital requirement for the major Swedish banks.<sup>87</sup> In recent years, the major banks' CET1 capital has increased significantly in relation to their risk-weighted assets.<sup>88</sup> However, CET1 capital in relation to total assets, that is, the leverage ratio, has not increased to the same extent (see chart A3:2).

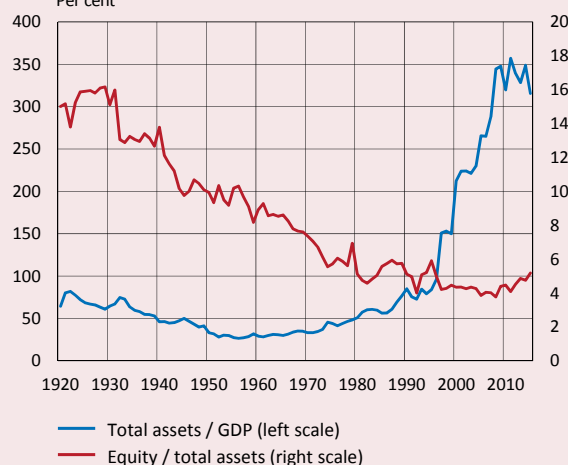
The reason for the capital adequacy measures developing in different ways is that the banks' average risk weights have fallen (see chart A3:3). This is partly because the risks in the banks' lending have decreased. Among other things the proportion of corporate loans has decreased, while the proportion of mortgages has increased. The most important reason is, however, that the banks have increasingly begun to use internal models to calculate their risk weights.<sup>89</sup> Although the banks have the right to

do this if they obtain the approval of the financial supervisory authority, it should be pointed out that the increase in risk-weighted capital adequacy brought about by the changeover to internal models does not reflect an equally large increase in resilience in the banking system.

### Lack of credibility for risk-weighted capital requirement

The risk-weighted capital requirement has advantages, as it tries to link together the banks' capital requirements with the risks banks have. Requiring more capital in banks that take greater risks is reasonable.

**Chart A3:1. Equity in relation to total assets in Swedish banks and the size of the Swedish banking system**  
Per cent



Note. Up to 1997 the graph refers to all Swedish commercial banks, after that refers to the four major Swedish banks at group level.

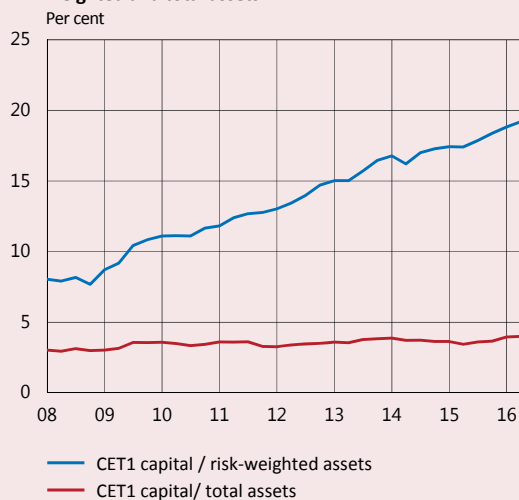
Sources: Hortlund P., Do Inflation and High Taxes Increase Bank Leverage?, SSE/EFI Working Paper Series in Economics and Finance, No 6122005, November 2005. Statistics Sweden and the Riksbank.

<sup>87</sup> New capital requirements of the Swedish banks, *press release*, November 2011. Sveriges Riksbank. The higher capital requirements have been implemented through a so-called systemic risk buffer of a total of 5 per cent.

<sup>88</sup> This is normally measured using the so-called Common Equity Tier 1 (CET1) ratio, which is defined in the Basel III Accord and the EU's Capital Requirements Regulation (CRR).

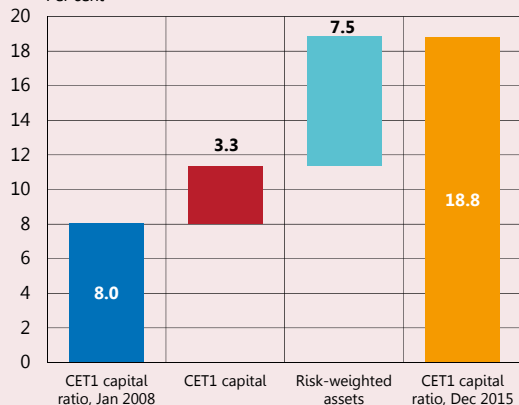
<sup>89</sup> *Stability in the financial system*, December 2014. Finansinspektionen.

**Chart A3:2. The major banks' CET 1 capital in relation to risk-weighted and total assets**



Sources: Banks' annual reports and the Riksbank

**Chart A3:3. Development of major banks CET1 capital ratios**



Note. The CET1 capital and the risk-weighted assets are calculated in relation to total assets. The red and the turquoise bar illustrate how these factors have contributed to the development of CET1 capital ratio.

Sources: Bank reports and the Riksbank

At the same time, there are several problems linked to the calculation of the risk-weighted capital requirement. This applies in particular when the requirement is calculated using internal models, but also when it is based on the standardised approach<sup>90</sup>. One problem is that the models are largely based on historic data and previous experiences. It is therefore uncertain whether they capture the risk of future losses. Moreover, the bank have incentives to meet the shareholders' interests by trying to reduce their risk weights to reduce the amount of capital they need to hold.

<sup>90</sup> The standardised approach is a more standardised way for a bank to calculate its capital requirement. The bank then classifies its exposures into various predetermined exposure categories. For each exposure category there are prescribed risk weights, which in some cases are based on external ratings.

Several surveys have shown that there are major differences in the banks' risk weights even for identical portfolios. This means that capital adequacy is not entirely comparable between the banks.<sup>91</sup> During the most recent financial crisis, moreover, it became apparent that assets with low or even zero risk weights actually had a very high level of risk and led to substantial losses.

These are some of the reasons why there is unease among both authorities and investors that the risk-weighted capital requirement does not sufficiently reflect the risks in the banks. This has in turn contributed to a decline in confidence in the banks' capital adequacy.<sup>92</sup>

### A leverage ratio requirement is needed

To remedy some of these problems, the Basel III Accord contains a leverage ratio requirement as a supplement to the risk-weighted capital requirement. The leverage ratio is the ratio between a bank's capital and its assets and the idea is that it should be simpler and more transparent than the risk-weighted capital requirement. The leverage ratio requirement limits the size of the banks' indebtedness and at the same time ensures that they hold capital for risks that are difficult to capture in models.<sup>93</sup> The plan is to introduce an international requirement in 2018. The minimum level is set at 3 per cent, with a higher requirement for globally systemically-important institutions.<sup>94</sup>

Given the size and vulnerability of the Swedish banking system, the Riksbank considers that a Swedish leverage ratio requirement, like the risk-weighted capital requirement, should be set at a higher level than the international minimum requirement. Since 2014, the Riksbank has therefore been recommending that the major banks should be subjected to a leverage ratio requirement of 4 per cent from 2016 and 5 per cent from 2018. According to the recommendation, the requirement should take the form of a minimum requirement of 3 per cent with an additional buffer requirement.<sup>95</sup> The recommended levels are based on an earlier assessment of the economically optimal capital level in the Swedish banking system<sup>96</sup> and on experiences in other countries.

<sup>91</sup> See, for example, *Analysis of risk-weighted assets for credit risk in the banking book*, July 2013. Basel Committee. *Risk sensitivity: the important role of internal models*, September 2014. Institute of International Finance. *EBA Report on CCR benchmarking 2014*. European Banking Authority.

<sup>92</sup> See, for example, *Global Financial Stability Report*, October 2013. International Monetary Fund (IMF). *Reducing excessive variability in banks' regulatory capital ratios*, 2014. Bank for International Settlements (BIS). *Bye, Bye Basel? Making Basel more relevant*, May 2012. Barclays Equity Research. *Risk-weighted assets – DIY capital*, December 2012. The Economist.

<sup>93</sup> *Basel III: A global regulatory framework for more resilient banks and banking systems*, December 2010. Basel Committee.

<sup>94</sup> Revised market risk framework and work programme for Basel Committee is endorsed by its governing body, *press release*, January 2016. Basel Committee.

<sup>95</sup> *Financial stability 2014:2*. Sveriges Riksbank.

<sup>96</sup> *Appropriate capital ratio in major Swedish banks – an economic analysis*, 2011. Sveriges Riksbank.

**Table A3:1. Appropriate leverage ratio according to studies**

Name	Appropriate level
Admati, Hellwig	20–30 %
Bair	8 %
Calomiris	10 %
Dagher et al.	8.5–13 %
Fender, Lewrick	4–5 %
Haldane	4–7 %
King	10 %
Miles et al.	7–10 %

Sources: Admati A. and Hellwig, M. (2013), *The Bankers' New Clothes*. Princeton University Press. Bair S. (2015), How a supplemental leverage ratio can improve financial stability, traditional lending and economic growth, *Financial Stability Review*, April 2015. Banque de France. Calomiris, C. *Is a 25% bank equity requirement really a no-brainer?*, November 2013. Vox. Dagher J. Dell'Ariccia G. Laeven, L. Ratnovski, L. and Tong, H. (2016). Benefits and Costs of Bank Capital, *IMF Staff Discussion Note*, March 2016. Fender I. and Lewrick U. (2015), Calibrating the leverage ratio, *BIS Quarterly Review*, December 2015. Haldane A. (2012), *The dog and the frisbee*, speech at the Federal Reserve of Kansas City's 36th economic policy symposium. King M. (2013), *The End of Alchemy: Money, Banking and the Future of the Global Economy*. Little, Brown Book Group. Miles et al. (2011), Optimal bank capital, *Economic Journal*, vol 123 (567).

International organisations such as the IMF have assessed, like the Riksbank, that a leverage ratio requirement of around 5 per cent would improve the Swedish banks' capacity to manage losses and the OECD has assessed that European banks should have a leverage ratio of around 5 per cent to be regarded as well capitalised.<sup>97</sup> In recent years, several studies have also called for a leverage ratio requirement on a considerably higher level than the planned minimum requirement (see table A3:1).

#### Leverage ratio requirements in other countries

In recent years, several countries have decided to introduce leverage ratio requirements that are higher than the planned international minimum level. A common factor for several of these countries is that they, like Sweden, have large banking systems (see chart 2:12 in Chapter 2). Although the requirement levels differ somewhat, they are all essentially comparable with the Riksbank's recommendation of 4 and later 5 per cent (see table A3:2). The formulation of the requirements also partly differs from country to country. Certain countries have only introduced requirements for banks that are considered systemically important, while other countries have requirements for a wider circle of banks. However, in the latter case, the systemically important banks face higher requirements than the other banks. The decisions to introduce a leverage ratio requirement have often been motivated by the need to increase the banks' resilience and at the same time manage the weaknesses linked to

**Table A3:2. Leverage ratio requirements in other countries**

	Level	Introduced
Canada	General minimum requirement of 3%, stricter requirements for individual institutions.*	2015
Netherlands	4 % for systemically important institutions.**	2018 at latest
Switzerland	Minimum requirement for global systemically important institutions of 3 % and a buffer of 2 %.	Until 2019
United Kingdom	Minimum requirement of 3 % plus a buffer of 0-1.95 % depending on the degree of systemic importance.***	Until 2019
USA	Minimum requirement of 3 % plus a buffer of 2 or 3 % depending on the type of institution.	2018

Note: \*requirements for individual institutions are not public, \*\*planned requirement, not adopted, \*\*\*1.95 % includes countercyclical supplement.

Sources: *Leverage Requirements Guideline*, October 2014. Office of the Superintendent of financial institutions. *Kabinetsvisie Nederlandse Bankensector*, August 2013. Netherlands Ministry of Finance. Swiss "too big to fail regime" significantly strengthened, *press release*, October 2015. FINMA. *The Financial Policy Committee's review of the leverage ratio*, October 2014. Bank of England. *Regulatory Capital Rules: Regulatory Capital, Enhanced Supplementary Leverage Ratio Standards for Certain Bank Holding Companies and Their Subsidiary Insured Depository Institutions*, May 2014. Office of the Comptroller of the Currency, Federal Reserve System and the Federal Deposit Insurance Corporation.

the calculation models for the risk-weighted capital requirement. All the countries have also introduced risk-weighted capital requirements that are higher than the minimum requirements for systemically important banks.

#### New reforms will give stricter capital requirements

In addition to the leverage ratio requirement, there are also several other ongoing reforms aimed at strengthening the banks' resilience and managing some of the deficiencies in the regulations regarding the risk-weighted capital requirement. One important reform in this context is the revisions to the regulatory framework currently being formulated by the Basel Committee. Limitations regarding the type of loan portfolio for which banks will be allowed to calculate their capital requirements using internal models are being planned as are new capital floors aimed at preventing the risk-weighted assets from falling too low.<sup>98</sup>

As the revisions are not yet complete, it is not possible to say exactly how they will affect the major Swedish banks' capital requirements. Based on the information available now, however, the Riksbank assesses that the new capital floors will have the most effect on the capital requirements. Assuming that there are no other changes,

<sup>97</sup> Sweden: Article IV Consultation – Staff Report, *IMF Country Report No. 14/261*, augusti 2014. Internationella valutafonden (IMF). Box 1.5 i *OECD Economic Outlook*, November 2012. OECD.

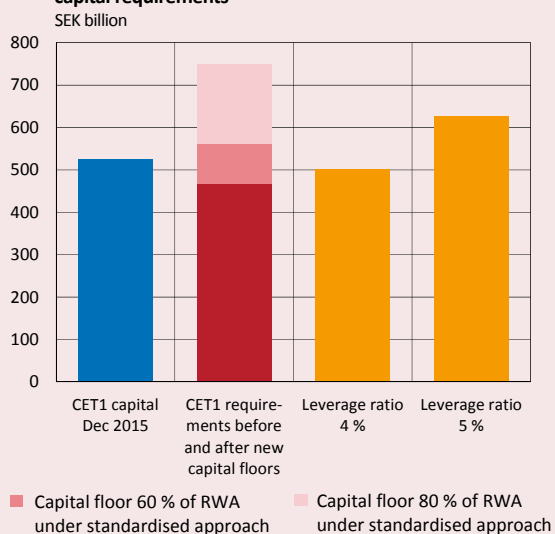
<sup>98</sup> Niemeyer, J. (2016), Basel III – what and why?, *Economic Review 2016:1*. Sveriges Riksbank.

a preliminary assessment shows that the floor regulations could increase the major banks' CET 1 capital requirements by between SEK 100 and 300 billion (see chart A3:4). Given the current size of the banks' balance sheets, the risk-weighted capital requirement could correspond to an average leverage ratio requirement of around 4.5 to 6 per cent.

FI will also increase the capital requirements for Swedish banks that use internal models to calculate their risk-weighted assets for exposures to the corporate sector.<sup>99</sup> This will also help to increase the capital requirements, although it is not clear how much.

Two further reforms that aim to make the banking system more robust at an international level are the TLAC (Total Loss Absorbing Capacity) and MREL (Minimum Requirement for own funds and Eligible Liabilities). These regulations will require that the banks hold a certain amount of equity and eligible liabilities to be able to absorb losses. The regulations are similar to one another but there are some differences. For one thing, the TLAC will apply to globally systemically important banks, while the MREL will apply to all banks within the EU.

**Chart A3:4. How new regulations can affect the major banks' capital requirements**



Note: The calculations are based on the major banks' balance sheets in December 2015. The dark red part of the second column includes all Pillar 1 and Pillar 2 requirements. The light red areas in the second column show the Riksbank's assessment of how much the capital requirements can increase if the planned new regulatory floors are set at 60 and 80 per cent respectively of the risk-weighted assets (RWA) based on the standard method. Capital requirements for risk weight floors for Swedish and Norwegian mortgages have then been excluded. The banks can also meet the leverage ratio requirement with other Tier 1 capital. In December 2015, the major banks' other CET1 capital amounted to SEK 64 billion.

Source: The Riksbank

<sup>99</sup> Capital requirements within Pillar 2 for maturity assumptions and FI's supervision of the banks' calculations of risk weights for corporate exposures, *consultation memorandum*, March 2016. Finansinspektionen.

For another thing, there are internationally established minimum requirements for TLAC which are formulated in both risk-weighted and non-risk-weighted terms. The formulation of MREL will instead be determined by the national authorities and the requirements will be set at institutional level. For TLAC the minimum requirement for the non-risk-weighted measures is set at 6.75 per cent. As more types of instrument are counted as loss-absorbing in TLAC, however, it is not entirely comparable with the Basel Accord's leverage ratio requirement.<sup>100</sup>

### The reforms do not remedy all of the problems

The new regulations regarding the banks' capitalisation and capacity to absorb losses are very important for financial stability. Both the Basel Committee and FI's new regulations contribute to remedying some of the deficiencies in the risk-weighted capital requirements. However, it is important to point out that it is difficult to remedy all of them. There will, for example, still be risks that are difficult to capture in the models and the risk-weighted regulatory framework will continue to be complex. There will also still be incentives for the banks to try to reduce their risk-weighted assets. The Riksbank therefore considers there to be a need for a supplementary leverage ratio requirement that is sufficiently high.

### Arguments for and against the leverage ratio requirement

Although the leverage ratio requirement has many advantages, there is also criticism of it. This criticism mainly concerns the incentives problems that can arise if the leverage ratio requirement is stricter than the risk-weighted capital requirement, thereby tying up more capital. Concerns have been expressed that this can give the banks an incentive to increase the risk level of their assets, as in this situation they would need to maintain as much capital regardless of how risky their assets are. As higher risk assets generally give a higher return, it is more profitable to hold such assets.<sup>101</sup>

As the regulations for the risk-weighted capital requirement are currently being revised, it is still unclear whether a leverage ratio requirement at the level recommended by the Riksbank would be binding in Sweden. It is also unclear to what extent a binding

<sup>100</sup> Ferenius, C. and Tietz, R. (2016), Total loss-absorbing capacity, TLAC and Swedish banks, *Economic Commentary* no. 1, 2016. Sveriges Riksbank.

<sup>101</sup> See, for example, Blåvarg, M. (2014), Riskvägda kapitalkrav – fungerar de? [Risk-weighted capital requirements - do they work?], *Handelsbankens småskriftserie*, nr 30. Frenkel, M. and Rudolf, M. (2010), *The implications of introducing an additional regulatory constraint on banks' business activities in the form of a leverage ratio*. Leverage ratio requirement for Swedish banks, *promemoria*, December 2014. Finansinspektionen. *Interim Report on the Cumulative Impact on the Global Economy of Proposed Changes in the Banking Regulatory Framework*, June 2010. Institute of International Finance. Leverage ratio requirement for Swedish banks, January 2015. Swedish Banker's Association.

leverage ratio requirement would actually lead to higher risk-taking. Making risk assessments is part of the banks' business models and good risk management should also be in shareholders' interest. It is also difficult to find any evidence that a binding requirement has led to a clear increase in risk-taking among banks in the United States, where a leverage ratio requirement has been in place for a long time.<sup>102</sup> A study published by the ECB indicates that European banks, for which the leverage ratio requirement has in practice been binding, have in fact slightly increased their risk-taking.<sup>103</sup> However, this has been well compensated for by the fact that capital has increased even more in these banks and their resilience has thus been strengthened.<sup>104</sup>

Moreover, a leverage ratio requirement applies parallel to the risk-weighted capital requirement. This means that the risk-weighted requirement would become binding again in the long run if the banks were to increase their risks, as the risk weights would then also increase. There is thus a limit to the banks' possibilities to increase the risk level in their assets without at the same time having to increase their capital base. This is particularly true if the leverage ratio requirement and the risk-weighted requirements give rise to capital requirements that don't differ so much. As chart A3:4 shows, the difference between the risk-weighted capital requirement and the leverage ratio requirement recommended by the Riksbank is relatively small.

#### **Important to ensure the banks have sufficient capital**

Given the vulnerabilities in the Swedish banking system, it is important to ensure that the banks are holding sufficient capital. The actual amount of capital is ultimately the deciding factor for how much loss a bank can manage. Experience has also shown that it is difficult to estimate risks in advance and it is therefore important to impose several different requirements for banks' capital adequacy. A leverage ratio requirement prevents the banks' capital from falling too low and can simultaneously contribute towards improving the credibility of their capital adequacy. Thus, a leverage ratio requirement is an important complement to the risk-weighted capital requirements.

The Riksbank's stance is that the risk-weighted capital requirement in most cases should be the binding capital restriction and that the leverage ratio requirement should be a complement. It is therefore preferable that the risk-

weighted regulatory framework is designed so that the leverage ratio requirement is a supplementary floor and not binding. A leverage ratio requirement that is set so low that it can never be expected to be binding will not fulfil its purpose, however.

#### **Leverage ratio requirement an important complement**

Like other countries with large and interlinked banking systems, Sweden should set both high and several different capital requirements for the systemically important banks. Although reforms are currently being drafted that will increase the risk-weighted capital requirement, the Riksbank considers there still to be strong reasons to introduce a leverage ratio requirement for the major Swedish banks of 4 per cent today and 5 per cent with effect from 2018.

Despite the measures taken to protect the taxpayer from the costs of bank crises, it is still likely that a bank crisis could entail significant broader economic costs, not least by dampening economic growth over a long period of time. By ensuring that there is sufficient capital in the Swedish banking system, resilience is increased and the risk of costly crises arising in the future is reduced.

<sup>102</sup> Furlong, F. (1988), Changes in Bank Risk-Taking, Federal Reserve Bank of San Francisco *Economic Review*, spring 1988, and Sheldon, G. (1996), Capital Adequacy and Risk-Seeking behavior of Banks: A Firm-Level Analysis, *Swiss Journal of Economics and Statistics*, vol 15.

<sup>103</sup> Risk-taking is estimated by means of an average risk weight.

<sup>104</sup> The impact of the Basel III leverage ratio on risk-taking and bank stability, *Financial Stability Review*, November 2015, ECB.

## ARTICLE – Need for a liquidity coverage ratio (LCR) in Swedish kronor

To strengthen the resilience of Swedish banks to short-term liquidity risks, a minimum requirement for a liquidity coverage ratio (LCR) in US dollars and euros and in all currencies in total has been in place since 2013. There is no such requirement for Swedish kronor, however, despite it being the currency in which the major banks obtain most of their funding. The Riksbank recommends that the LCR requirements are complemented with a requirement in Swedish kronor. This article analyses the need for such a requirement.

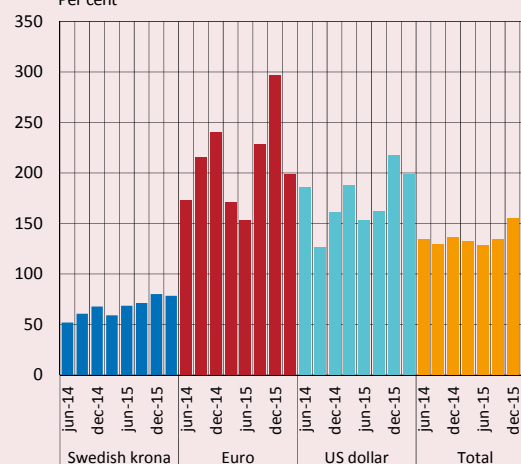
One of the reforms in the Basel III Accord is the regulatory framework for Liquidity Coverage Ratio (LCR).<sup>105</sup> The purpose of the LCR is to improve banks' resilience to liquidity stress. The regulatory framework requires banks to have a buffer of liquid funds to cope with unexpectedly large cash outflows for at least 30 days. The idea is that banks would then be able to keep their operations going long enough to bridge over a period of liquidity stress or give both themselves and the supervisory authorities enough time and room for manoeuvre to implement suitable measures. In addition, the requirement helps to increase confidence in banks' ability to cope with liquidity stress, which in itself can reduce the risk of problems arising.

### The major Swedish banks operate in several currencies

All four major Swedish banks have significant cross-border operations and therefore operate in several different currencies. In addition, they obtain much of their funding on the international financial markets, especially in US dollars and euros.<sup>106</sup> All in all, this means that the banks may take significant liquidity risks in various currencies. Imposing requirements for LCRs in several different currencies is therefore justified.

Since 2013, there has been a requirement for Swedish banks to have an LCR of at least 100 per cent in both all currencies combined as well as separately in US dollars and euros.<sup>107</sup> There is no such requirement for Swedish kronor, however, despite it being the currency in which the major banks obtain most of their funding. The Riksbank does not therefore consider the current LCR requirements to be sufficiently comprehensive and believes this risks leading to Swedish banks having too low a resilience to liquidity stress in Swedish kronor.

Chart A3.5: The major banks' LCR in different currencies  
Per cent



Note. The chart is based on monthly data and shows the average for the four major banks.

Source: The Riksbank

### Risk of very low LCR in Swedish kronor if there is no requirement

Since the LCR requirements were introduced, the major banks have built up large liquidity buffers in US dollar and euros and have therefore had high LCRs in these currencies. In recent years, however, the major Swedish banks have had relatively small liquidity buffers in Swedish kronor. In certain cases, some banks' buffers have not been insufficient to cope with one week's stressed liquidity outflows in accordance with the LCR.<sup>108</sup> However, their LCRs in Swedish kronor have improved recently.

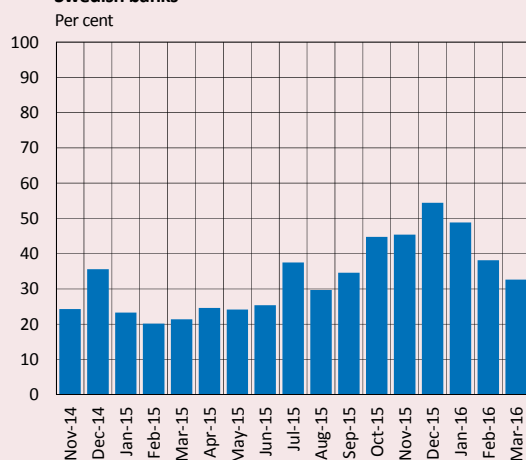
<sup>105</sup> Basel III: *The Liquidity Coverage Ratio and liquidity risk monitoring tools*, January 2013. Bank for International Settlements (BIS).

<sup>106</sup> For charts showing the geographical distribution of the major banks' operations and a currency breakdown of their funding, see the chart appendix.

<sup>107</sup> Finansinspektionen regulation *FFFS 2012:6*

<sup>108</sup> This is a simplification, which assumes that cash outflows are evenly divided over the 30-day scenario.

**Chart A3:6. The lowest level of LCR in SEK per month, major Swedish banks**



Note. The chart is based on daily data and shows the single lowest observation each month.

Source: The Riksbank

During certain periods, on the other hand, some banks still have low or very low LCRs in Swedish kronor (see chart A3:5 and A3:6). To be able to meet large outflows in Swedish kronor, the banks rely instead on their ability to use assets that are not fully taken into account in the LCR, mainly covered bonds in Swedish kronor.

During the last financial crisis, however, support from the public sector was required to maintain liquidity in these bonds. If covered bonds are not sufficiently liquid without public support, they do constitute any self-insurance against liquidity problems. In addition, banks rely on being able to change foreign currency into Swedish kronor on the currency swap market during periods of stress.<sup>109</sup>

#### **Not certain that the currency swap market works at all times**

It is not a foregone conclusion that banks can always change foreign currency into Swedish kronor on the currency swap market if unexpected cash outflows arise. This was the case in 2010 when the Riksbank's fixed interest-rate loans expired.<sup>110</sup> The need for Swedish kronor then increased sharply and it became difficult and expensive to obtain them through the currency swap market. Since the major banks do not have enough liquid assets to fully cover possible outflows in Swedish kronor, their need to use the currency swap market may become

<sup>109</sup> See, for example, Hilander, I. (2014), *Short-term funding in foreign currency by major Swedish banks and their use of the short-term currency swap market*, *Economic Review 2014:1*. Sveriges Riksbank.

<sup>110</sup> During the last financial crisis, the Riksbank issued loans with a maturity of about one year at a fixed rate of interest. Behind this decision was the assessment that extraordinary measures were required in a situation when the repo rate was approaching its, then estimated, lower bound and there was still a need for monetary policy stimulation.

very great. If liquidity stress were to arise today, they could potentially need to convert foreign currency into Swedish kronor up to an amount that corresponds to just over the monthly turnover in currency swaps between Swedish kronor and US dollars.<sup>111</sup> Even when the markets are functioning well, situations may nevertheless arise where individual banks are associated with an elevated counterparty risk and therefore have difficulty finding counterparties to conduct currency swaps with.<sup>112</sup>

The Basel Accord also highlights the risks of relying on the currency swap markets. The rules state that banks shall have liquid assets in currencies that match the outflows that may arise, and that they cannot assume that they will be able to use the currency swap market to exchange one currency for another in a stress situation.<sup>113</sup> The European Commission's delegated regulation 2015/61 on liquidity coverage requirements for credit institutions contains similar wording on the currency swap markets.

#### **The Riksbank can inject liquidity, but not without costs**

Under certain circumstances, a central bank may need to lend money to banks that have liquidity problems. The central bank therefore has a role as *lender of last resort* for a solvent bank that is unable to obtain funding on the market.

The ability of a central bank to increase the amount of money in the economy is sometimes cited as an argument for banks not needing to hold large buffers in their domestic currency. It is important to remember, however, that there may be costs associated with a central bank lending money to banks, especially when it is a question of banks to whom other participants are not willing to lend. This is due to the central bank assuming credit risk in connection with the loan. The risk is mitigated to a certain extent by the fact that the lending is against collateral, but if it occurs during a period of financial unease, it may be difficult to assess the value of such collateral.

Furthermore, expectations of state support may lead to banks taking greater risks than they otherwise would. The risks associated with such action is greater in countries like Sweden, where the financial sector is large and dominated by a small number of systemically important institutions.

More generally, it is important for the banks to insure themselves against risks in their operations, including liquidity risks. Central government, via the Riksbank, shall

<sup>111</sup> Calculated as a deficit of liquid assets in order to achieve a 100-per cent LCR in Swedish kronor. Average over the past 12 months.

<sup>112</sup> Baba, N. Nagano, T. and Packer, F. (2008), *The spillover of money market turbulence to FX swap and cross-currency swap markets*, *BIS Quarterly Review*, March 2008. Bank for International Settlements (BIS).

<sup>113</sup> Article 145, *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*, January 2013. Basel Committee.

only in exceptional cases intervene as a liquidity supplier if there is adequate collateral.

The role of the central bank as a lender of last resort is therefore, in a socioeconomic sense, not free of cost. This is one of the lessons learnt from the global financial crisis and one of the main reasons why substantially greater requirements are now imposed on banks' management of liquidity risks, including LCR requirements.

#### **LCR in separate currencies in other countries**

LCR requirements in separate currencies can also be found in other countries. In Singapore, for example, there is a requirement for a 100-per cent LCR in Singapore dollars. Switzerland has a requirement stating that outflows in Swiss francs must be covered by liquid assets in the same currency, although the banks, given certain conditions, may use liquid assets in foreign currencies to cover some of the outflows. Norway has a requirement for LCRs in US dollars and euros, and Norges Bank has also recommended the introduction of a LCR requirement in Norwegian kroner.<sup>114</sup>

In countries where banks mostly operate in a large domestic currency, such as US dollars or euros, the need for an LCR requirement in the domestic currency is limited. The requirement for all currencies combined would, to all intents and purposes, coincide with a requirement in the domestic currency.

#### **The conditions for introducing an LCR requirement in Swedish kronor are good**

Since 2014, the Riksbank has recommended that FI introduce an LCR requirement in Swedish kronor for Swedish banks. In light of the limited supply of government bonds in Swedish kronor, a level of 60 per cent was recommended. Since the Riksbank issued the recommendation, the banks' LCRs in Swedish kronor have improved and are now significantly higher than this level on average, even if they can still be periodically low for certain banks. One explanation for this is that the Riksbank's purchases of government bonds have increased the amount of liquidity in the banking system, which has had a positive effect on LCRs. The purchases have, on the other hand, led to a fall in the supply of government bonds. This has not led to a deterioration in the functioning of the government bond market, however (see the article Market liquidity on the Swedish bond market and its importance for financial stability). All things considered, this means that the conditions are good for the introduction of an LCR requirement in Swedish kronor without negative effects on the financial markets.

#### **An LCR requirement in Swedish kronor should be introduced as soon as possible**

The Riksbank considers it important to ensure that Swedish banks are able to cope with shorter periods of liquidity stress in all currencies that constitute a significant proportion of their funding.

In light of the Swedish krona being the currency in which Swedish banks obtain most of their funding, the current rules should rather be supplemented with a separate requirement for an LCR in Swedish kronor.

Even if the major Swedish banks have improved their LCRs in Swedish kronor, a requirement would fulfil an important function in avoiding a return to the previously very low LCR levels in Swedish kronor. A requirement would also ensure that the banks don't fall below the minimum level on certain days, as the LCR requirement must be fulfilled at all times when the markets are functioning normally.

Nordea's plans for a branch structure have also turned the spotlight on liquidity risks in other essential currencies, such as the Norwegian and Danish kroner.<sup>115</sup> How the LCR requirements for Swedish banks can be complemented so that they cover all currencies that are of substantial importance for their funding is something that needs to be examined going forward.

<sup>114</sup> See, for example, *Financial Stability Report*, 2014. Norges Bank.

<sup>115</sup> See also *Consultation response to Nordea's applications for permission to implement merger plans*, April 2016. Sveriges Riksbank.



# Glossary

**Basel III:** International regulations for banks' capital adequacy and liquidity. The Basel III Accord will be progressively phased in by 2019.

**CET 1:** Common Equity Tier 1. A definition of a bank's capital in accordance with the Basel III Accord. Core Tier 1 capital: Tier 1 capital with a deduction for capital contributions and reserves that may be included in the capital base as Tier 1 capital in accordance with chapter 3, section 4 of the Capital Adequacy and Large Exposures Act (2006:1371).

**Core Tier 1 capital ratio:** Core Tier 1 capital in relation to risk exposure amount.

**Covered bond:** A bond whose holder has a special benefit right in the event of a bankruptcy. Covered bonds normally entail a lower credit risk than unsecured bonds, which means that the borrowing costs are lower.

**Credit risk:** The risk of a borrower failing to meet commitments.

**Credit terms:** The terms and conditions laid down in a loan agreement covering, for example, the interest rate and the repayment schedule. Credit terms can also include the maximum loan-to-value ratio allowed for a mortgage.

**Currency swap:** An agreement to buy or sell a currency at the daily rate and then sell or buy back the same currency on a later date at a pre-determined rate.

**Debt-to-income ratio:** Total household debt in relation to disposable income.

**Disposable income:** The total of a person's or a household's incomes less taxes and charges.

**Equity:** Item in a company's balance sheet showing the difference between assets and liabilities, including, for example, capital provided by owners, retained profits and reserves.

**Interbank rate:** The interest rate on unsecured loans that the banks offer other banks. Stibor (Stockholm Interbank Offered Rate) is usually used to measure the Swedish interbank rate. Stibor is used as a reference for rate setting or pricing of derivative contracts.

**Interest rate swap:** A bilateral agreement to exchange a specific interest rate in return for another interest rate for a predetermined period according to specific conditions.

**Interest ratio:** Household interest expenditure in relation to disposable income.

**LCR, Liquidity Coverage Ratio:** Liquidity measurement defined by the Basel Committee that measures a bank's ability to deal with a stressed net outflow of liquidity for 30 days. In simple terms, an LCR of 100 per cent means that a bank's liquidity buffers are adequate to enable the bank to manage an unexpected liquidity outflow for 30 days.

**Liquidity:** Measure of the ability of a company or organisation to meet its payment obligations in the short term.

**Liquidity buffer:** Funds a financial institution holds to ensure its short-term debt-servicing ability.

**Liquidity risk:** The risk of not being able to meet payment commitments due to a lack of liquidity.

**Loan-to-value ratio:** A borrower's debt in relation to the market value of the collateral for the loan. For a household with a loan collateralized by the home, the loan-to-value ratio corresponds to the debt divided by the market value of the home.

**Loan-to-value limit:** A measure which limits how large a borrower's mortgage is permitted to be in relation to the value of the property.

**Market liquidity:** With market liquidity refers to the possibility to quickly sell significant volumes of a financial instrument at a low transaction cost without any significant movements in the market price.

**Net interest income:** Interest income from lending minus interest expenditure for funding and deposits.

**Policy rate:** Interest rate that a central bank sets for monetary policy purposes. In Sweden, they are the repo rate and the deposit and lending rates to the banking system. The repo rate is the Riksbank's most important policy rate.

**Risk premium:** The additional return an investor requires as compensation for an additional risk.

**Risk weight:** In simplified terms, to calculate a bank's risk-weighted assets, the amount lent is multiplied by a risk weight. The risk weights are determined on the basis of how likely it is that the borrower will be unable to fulfil its loan obligations and thus varies from borrower to borrower – a high risk weight implies a greater risk than a low risk weight.

**Risk-weighted exposures or risk-weighted assets:** Assets recorded in the balance sheet and off-balance sheet obligations valued by credit, market and operational risk in accordance with the capital adequacy regulations (see Basel III).

**Solvency ratio:** Financial measure of a company's ability to meet their payment obligations. Also a measure of an insurance company's financial position that measure the assets in relation to the liabilities, in which the liabilities primarily consist of their total commitments.

**Tier 1 capital:** Equity and possibly some debt instruments, minus proposed dividends, deferred tax assets and immaterial assets (such as goodwill).



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