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Memorandum 7 – Consequences of an increased loan-to-value ratio for the funding of mortgages with covered bonds

Summary

The purpose of this memorandum[1] is to analyse potential risks which banks' funding with covered bonds might pose to financial stability. Based on an estimate of the future average loan-to-value ratio, this memorandum analyses the consequences for the ability of banks to fund mortgage borrowings with covered bonds.

Today, the banks fund around 75 per cent of mortgage lending with so-called covered bonds. The remainder is funded with unsecured borrowings, the majority of which comprises deposits from the general public. Covered bonds involve the bank issuing a mortgage bond backed by existing mortgages. A covered bond is thus linked to this so-called cover pool. There are special rules about how this cover pool must be devised; for example, the loan-to-value ratio of the mortgages included may not exceed 75 per cent. The average loan-to-value ratio of the mortgage stock is currently at around 64.7 per cent.

There is a risk that the loan-to-value ratio of mortgages in the cover pool might rise over time and approach a critical level. This could lead to greater difficulty over time in the ability of banks to fund mortgage lending with covered bonds, particularly if house prices were to fall. It is hard to judge the loan-to-value ratio at which the market might perceive Swedish covered bonds to be less secure. In addition, what is considered acceptable can quickly change.

Even though the loan-to-value ratios of the cover pool would probably not increase to a critical level in the event of a sharp decline in house prices, uncertainty about the bonds and the value of the underlying collateral would increase in the event of a rapid decline in house prices. A drop in house prices could therefore lead to greater expense and difficulty for Swedish banks to issue covered bonds. This could in turn lead to more expensive mortgages for Swedish consumers, which could further aggravate a potential economic downturn. In a situation in which it is difficult for the banks to obtain secured funding at a reasonable cost, unsecured funding is also

[1] Large parts of the content of this memorandum have been published previously in *The Riksbank's commission of inquiry into risks on the Swedish housing market* (Janzén, Jönsson and Nordberg, 2011), and *The Swedish covered bond market and links to financial stability* (Sveriges Riksbank, 2010b).

affected in parallel because it is considered more risky. Difficulties for banks to access market funding poses a risk to financial stability in Sweden.

Swedish authorities have previously provided support to the Swedish covered bond market. For example, uneasy developments on the market gave rise to selling pressure of Swedish covered bonds during the second half of 2007 and following the collapse of Lehman Brothers in September 2008. In the autumn of 2008, Swedish market makers encountered difficulty in funding their growing stock, and the National Debt Office resolved, in consultation with the Riksbank, to undertake measures that included supplying the market with treasury bills. In parallel, the Riksbank extended the banks' ability to pledge covered bonds as collateral for loans in affiliated institutions. On the whole, the series of comprehensive measures helped resolve the problems on the market.

Today, the Swedish banking system is large and reliant on international capital markets

The Swedish financial system is special in three ways: its various parts are closely interlinked, it is large in relation to the Swedish economy and it is largely funded through the securities market. A substantial part of the Swedish financial system comprises the four Swedish bank groups Handelsbanken, Nordea, SEB and Swedbank, which together account for three quarters of the total assets of the Swedish banking system (Sveriges Riksbank, 2013a). Today, a substantial part of the assets of these major banks consists of mortgages. The Swedish banking system is also concentrated in that the four major banks are substantially exposed to each other through interbank loans and holdings in each others' covered bonds.

One reason why the Swedish banking system is large in relation to the Swedish economy is that the banks have considerable operations abroad. If such operations abroad are included, the banks' assets equal 400 per cent[2] of Sweden's GDP, which is high in an international perspective. Another reason is that the Swedish banks do not apply securitisation in lending.[3] This leads to their balance sheets expanding when lending increases.

The Swedish banking system is also characterised by the banks' lending being large in relation to their deposits from the general public. Only half of the banks' lending is currently funded by deposits, which is lower than for other European banks.[4] Today, a substantial portion of the lending of Swedish banks goes to funding the mortgages of households. Because such lending has increased, so too has the banks' assets in the form of mortgages. The banks have largely funded the mortgages by issuing covered bonds backed by mortgages. Consequently, the volume of covered bonds has also increased, and these bonds currently make up the majority of the banks' securities funding, which in turn forms a large share of the total funding of the banking system.

The total outstanding volume of Swedish covered bonds currently equates to SEK 1,940 billion, corresponding to just over half of Sweden's GDP. Hence, the

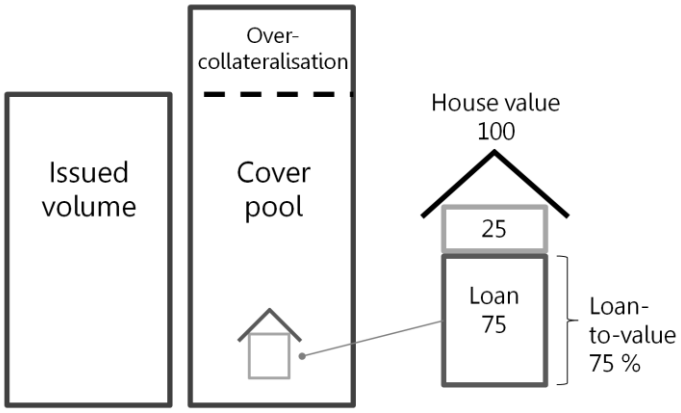
[2] The total assets of the four major banks in Sweden amounted to just over 200 per cent of GDP at the end of 2011. The total assets of monetary institutions in Sweden amounted to 300 per cent of GDP at the same time. The figures include the consolidated assets of all banks. The assets of the foreign subsidiaries of the major Swedish banks are included in the figures.
[3] Hence, they do not extract part of the loans from the balance sheet in order to place them in a separate company, which can then issue the bonds collateralised by the loans.
[4] All figures refer to monetary financial institutions.

outstanding volume of Swedish covered bonds is greater than the outstanding volume of Swedish government bonds, which amounts to around SEK 1,190 billion. The majority of Swedish covered bonds are issued in Swedish kronor, but around one quarter is issued in foreign currency, primarily euro (Sandström, Forsman, Stenkula von Rosen and Wettergren, 2013).

What is a covered bond?

Bonds can be unsecured or covered. The main difference lies in the rights of the investor in the event of the bankruptcy of the issuer – in this case the bank. For an unsecured bond, the investor only has a claim on the issuer, while for a covered bond, the investor has a claim both on the issuer and priority to special collateral linked to the bond (known as the cover pool). This secured claim means that the investor runs less of a risk of losing money in the event of the bankruptcy of the issuer if the bond is covered than if it is unsecured. This leads to the interest rate requirements of investors not being as high for covered bonds as for unsecured bonds. Because the covered bonds of the bank provide priority to specific collateral, as a rule they also have a higher credit rating than the bank's own credit rating. The issuer also usually earmarks collateral at a higher value than that of outstanding bonds. This excess collateral creates what is known as overcollateralisation, which also contributes to the higher credit rating (see Figure 1). In order for a credit rating company to issue an AAA credit rating, the value of the underlying collateral must as a rule exceed the value of the outstanding bonds by around 15 per cent. The average overcollateralisation[5] in the cover pools of Swedish banks amounted to around 35.9 per cent[6] for the second quarter of 2013.

Figure 1. Cover pool, overcollateralisation and underlying mortgages



The laws governing covered bonds vary greatly from country to country[7]. In most countries, covered bonds are governed by a well-defined set of rules that are monitored by national supervisory authorities. The legislation of most countries determines which collateral may be included in the cover pool, and how the cover pool may be compiled. Pursuant to the Swedish law, the underlying collateral may

[5] Assume a bank that has a cover pool of 1,000 and outstanding covered bonds to a value of 750. The overcollateralisation would be 250, giving overcollateralisation of 33 per cent (250/750) in percentage terms.
[6] Based on the issuers' own calculations.
[7] The interest group European Covered Bond Council has, however prepared a uniform standard for the European securities which may be classified as covered bonds. However, there is no comprehensive international standard.

comprise mortgages for homes, commercial properties and agricultural properties[8]. Commercial properties may, however, make up no more than 10 per cent of the cover pool. Certain other assets, such as loans to the public sector, may also constitute a limited portion of the cover pool. In addition, up to 20 per cent[9] of the cover pool may comprise other liquid assets, known as 'substitute assets' such as government securities, cash and covered bonds issued by other institutions. In practice, Swedish covered bonds are almost exclusively secured by Swedish mortgages.

The value of the underlying collateral must, at a minimum, constantly equal the value of the issuer's outstanding covered bonds pursuant to the Swedish law[10]. For the portion of loans included in the cover pool, the highest permitted loan-to-value ratio is 75 per cent of market value for homes, 70 per cent for agricultural properties and 60 per cent of market value for commercial properties. The market value is established by means of a valuation of the asset when the loan is issued. In the event of a sharp drop in prices, the asset is revalued and the loan-to-value ratio of the loan could then rise to a level above that permitted by the law[11]. In such a case, the issuer of the cover pool may only include the portion of the credit below the highest permitted loan-to-value ratio after taking account of the new market value.

The cover pool is dynamic in that loans that are more than 60 days overdue for payment must be removed from the cover pool. Hence, developments on the housing market affect the size of the value of the cover pool of issuers. A decline in house prices affects the loan-to-value ratio of mortgages, which can in turn lead to issuers having to remove parts of loans from the cover pool with a loan-to-value ratio exceeding 75 per cent.

According to Finansinspektionen's Regulations and General Guidelines Governing Covered Bonds, issuers must perform stress tests to ensure that the cover pool will remain sufficiently large in the event of substantial changes in exchange rates and interest rates. Also, a new feature as of 1 August 2013 is equivalent tests for substantial changes in house prices. The issuers must also describe perceivable measures that could reduce the risk of the size of the cover pool being too small in the event of declining house prices. The result of the tests and the action plan must then be sent to the independent inspector who, in his yearly report to Finansinspektionen, must describe the issuer's stress tests.[12]

[8] The loans must be issued within the European Economic Area (EEA).
[9] If there are special grounds, Finansinspektionen can authorise allowing substitute collateral to constitute up to 30 per cent of the cover pool.
[10] In order to show that Swedish issuers adhere to the provisions of the Swedish law, they must keep a register of the underlying cover pool and issued covered bonds. Finansinspektionen is the authority that ensures that Swedish issuers comply with the law. To assist it in this task, Finansinspektionen has an independent inspector who has the task of monitoring the collateral registers of the issuers.
[11] In practical terms, it is not possible for institutions to constantly have complete insight into price declines in all the underlying collateral. Therefore, in the preparatory work for the Swedish Covered Bonds Act (prop. 2002/03:107 p. 107) a limit of a 15 per cent price decline was mentioned, whereby issuers must enter the lower value in the register. However, it is not expressly mentioned, either in the law or in the preparatory work, what applies to appreciation. In Finansinspektionen's general guidelines, it is mentioned that appreciation should be permitted where needed, but that institutions that choose that option should also implement depreciation to an equal extent.
[12] Decision memorandum *New rules on covered bonds*. Ref. 11-13295. Finansinspektionen.

The major Swedish banks' dependence on covered bonds

The mortgage market is important to market participants who invest in covered bonds. Because the covered bond market is the largest bond market in Sweden, it is natural for Swedish investors to invest in them. Similarly, it is natural for foreign investors wishing to invest money in Sweden to buy Swedish covered bonds. The primary owners of Swedish covered bonds are insurance companies, banks and bond funds including pension funds. Among Swedish investors, the insurance companies are largest followed by the Swedish banks. Around one third of the covered bonds issued by Swedish credit institutions are owned by foreign investors[13], which includes bonds issued in foreign currency (Sandström et al, 2013). Because, according to several sets of rules, covered bonds are considered relatively safe, the rules allow investors to invest a relatively high amount therein. Currently, all Swedish covered bonds have the highest possible credit rating (AAA) from one or more of the three major credit rating companies. Historically, covered bonds have also given higher returns than Swedish government bonds, which appeals to a type of investor seeking higher return.

Investors in covered bonds mainly seek long-term investments. It's chiefly a matter of insurance companies and pension funds. It also occurs that covered bonds are purchased by more short-term investors. For example, the Swedish banks invest in covered bonds partly to have a buffer of liquid funds, and partly to build up a stock that facilitates the purchase and sale of bonds to other investors (i.e. the Swedish banks act as market makers). The short-term investors are important to the functioning of the market because they help sustain frequent trade in the bonds, which can improve market liquidity and provide market participants with a more up-to-date picture of market pricing.

Because many of the short-term investors are active on the repo market, it can be said that the functioning of the repo market is important to the functioning of the market at large. On the repo market, the owner of a bond can fund the holding by pledging the bond. This is done through a repurchase agreement, such that the buyer has the bonds for one week, for example, and the seller has the money for one week. Afterwards, they switch back. In such a transaction, the counterparty is usually the capital markets department of banks – the market makers in other words.

The major Swedish banks are thus exposed to and hence reliant on the covered bond market in many ways. Besides the banks relying on the covered bond market for their funding, the functioning of the market also affects the banks' liquidity buffers, which are largely made up of covered bonds. In order to convert the covered bonds into liquidity, a functioning market is required. If it is not possible for bonds to be sold or repurchased for cash or other securities, a large part of the banks' buffers would be illiquid in practice. In their role of market makers, the major Swedish banks are also dependent on the smooth functioning of the covered bond market.

Structural dependence on covered bonds can involve problems

Besides the Swedish banks' exposure to and dependence on the covered bond market, there are further structural weaknesses.

[13] While there are no official statistics about the various categories of foreign owners, judging from equivalent statistics about covered bonds issued in euro, asset managers are the biggest investors, followed by insurance companies and banks.

Implicit guarantee can give excessive risk-taking

Market participants have expectations of Swedish authorities acting in the event of problems on the covered bond market. This is based on how the authorities have acted in earlier periods of stress, and how they have communicated in reports and public presentations (see appendix 1 for further details). Because of the expectations of market participants, covered bonds are therefore probably priced as if they have an implicit liquidity guarantee. This can lead to excessive risk-taking from both issuers and investors, or to participants believing that the actual liquidity risk is covered and to them disregarding this risk.

Other debt instruments risk being at a disadvantage

As a consequence of the banks securing parts of their funding, certain investors obtain a lower risk at the expense of other investors – a process known as structural subordination. In funding through covered bonds, issuers usually earmark collateral at a market value above the legal requirement[14]. Investors who are holders of covered bonds are entitled to the earmarked collateral and, if needed, also to the other assets of the issuer with the same priority as holders of unsecured exposures. The fact that the issuer earmarks collateral in excess of the legal requirement thus means that unsecured exposures are riskier than if no assets were earmarked. Structural subordination thus involves investors in unsecured debt and deposits with banks (unsecured exposures) being worse off in the event of default (Juks 2012).

If this leads to investors in unsecured debt demanding higher compensation, the banks have an incentive to strike a certain balance between secured and unsecured funding. However, with implicit guarantees for unsecured debt and the explicit deposit guarantee, investors and depositors do not demand such higher compensation. Ultimately, it is thus in fact the government that bears a large part of the risk[15].

The presence of structural subordination may reduce investor interest in investing in unsecured bonds. A bank's need to obtain funding through unsecured debt is however dependent on the type of assets held by the bank and whether or not they qualify for inclusion in the cover pool. In addition, because unsecured debt normally involves a higher risk than secured debt, problems on the covered bond market ought in most cases also to lead to difficulties in issuing unsecured debt. The diversification effect is thus ambiguous. There are, however, situations in which it would be appropriate to have a broad diversification, in the form of unsecured debt. For example, a sharp drop in house prices could lead to no investor wishing to increase exposure to housing, while at the same time they might consider buying the bank's unsecured bonds. This could in particular be the case for investors from other parts of the world where the concept of covered bonds is not so well known.

Loan-to-value ratio remains high among new mortgage holders

The loan-to-value ratio for new mortgages has for many years been higher than the average of the existing mortgage stock. According to Finansinspektionen's 2013

[14] A reason for why issuers earmark collateral in excess of the legal requirement is that the credit rating companies have guidelines stipulating a certain amount of overcollateralisation being required to obtain a certain credit rating.
[15] It is probably this type of rationale that has led to legal limitations for covered bonds in Australia, Canada and New Zealand. In those countries there is a limitation on the amount of covered bonds that can be issued in relation to the institution's total assets.

mortgage survey, the average loan-to-value ratio for new mortgages[16] was 69.5 per cent in the third quarter of 2012. For the same period, the average loan-to-value ratio for existing mortgages was 64.7 per cent. In addition, the mortgage stock grew between the third quarter of 2011 and the third quarter of 2012 by around 5.6 per cent. Given a number of assumptions about future developments[17], it can be ascertained that there is a risk of the average loan-to-value ratio of the mortgage stock rising over time.

Because large parts of the mortgage stock are placed in the cover pools of issuers, the loan-to-value ratio of the cover pools could rise ahead. If the average loan-to-value ratio of the cover pool were to approach the maximum 75 per cent limit, interest in investing in Swedish covered bonds might wane. The banks' ability to fund mortgage lending with covered bonds could thus become more difficult over time. A higher loan-to-value ratio in the cover pool also involves greater sensitivity to falling house prices (see below).

Risks to funding mortgages with covered bonds

The banks' access to funding mortgages with covered bonds might be affected negatively if the loan-to-value ratio of new mortgage holders rises ahead. If in addition house prices were to fall, the value of the underlying cover pool would shrink, leading to even higher loan-to-value ratios for existing mortgages. In the event of a drop in house prices, there is also a risk of investors, particularly foreign ones, no longer wishing to own Swedish mortgages through covered bonds. This would give rise to increased selling pressure, making it more difficult and expensive for the banks to issue covered bonds and convert their liquidity buffers into liquid funds.

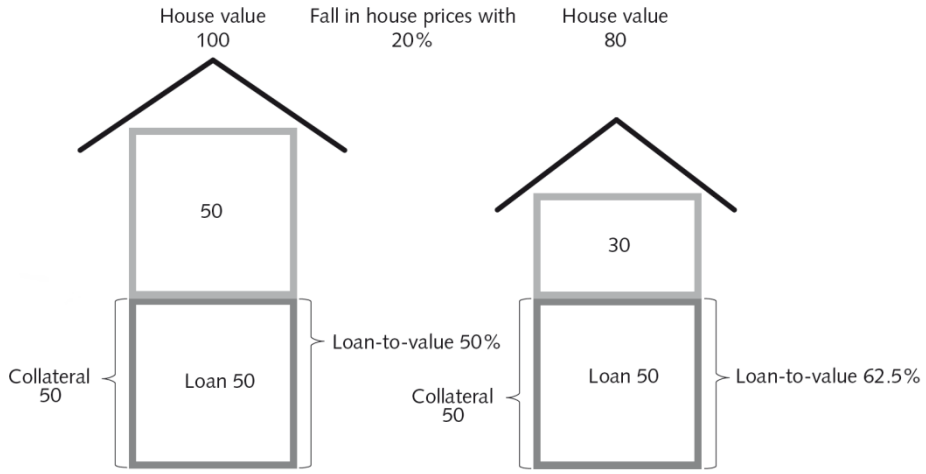
Declining house prices reduce the value of the cover pool and overcollateralisation

Usually, the nominal value of the cover pool exceeds that of the issued bonds by a comfortable margin (see Figure 1). This creates overcollateralisation, which in turn generates extra security for investors in covered bonds because their cover pool is larger than their claim on the bank. Normally a fall in property prices would lead to a fall in the value of the cover pool. The overcollateralisation falls because the outstanding volume of covered bonds does not fall.

Figures 2 and 3 illustrate how a 20 per cent fall in house prices would affect two loans that are in the cover pool, but that have different loan-to-value ratios. Loan 1 has a loan-to-value ratio of 50 per cent, while loan 2 has a loan-to-value ratio of the maximum limit of 75 per cent. In the case of the first loan, the entire loan of SEK 50 is initially included in the cover pool, as there is only a 50 per cent mortgage on the house. When house prices fall by 20 per cent, the loan-to-value ratio increases to 62.5 per cent. As this new loan-to-value ratio is less than the maximum loan-to value ratio of 75 per cent, the entire loan in the cover pool still qualifies after the fall in prices.

[16] New mortgages comprise loans granted to entirely new borrowers and existing borrowers who have increased the loan-to-value ratio by over 50 per cent on an existing collateral object. It is therefore not possible to distinguish between new loans added through switching banks from entirely new loans.
[17] See the section *Estimated future development of the mortgage stock,* p. 10.

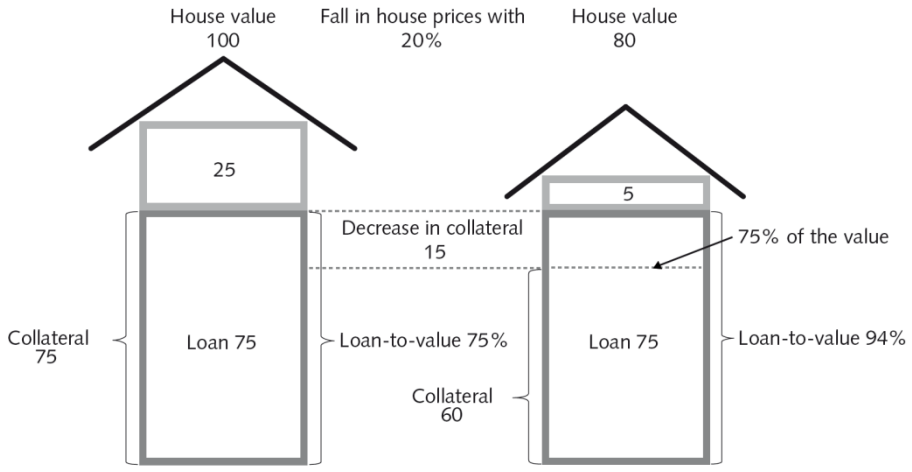
Figure 2. Loan 1, initial loan-to-value ratio 50 per cent



Source: Janzén, Jönsson and Nordberg. *A fall in house prices – consequences for financial stability. The Riksbank's commission of inquiry into risks on the Swedish housing market* (2011).

The second loan has an initial loan-to-value ratio of 75 per cent, which means that the entire loan has the exact percentage needed to be included in the cover pool at the upper limit. When house prices then fall, the value of the house falls to SEK 80; this affects the loan-to-value ratio, which increases to 94 per cent. This means that some of the loan has to be removed from the cover pool. Only SEK 60 (75 per cent of SEK 80 value of the house) can now be included in the cover pool, while the SEK 15 that exceeds the limit may not be included.

Figure 3. Loan 2, initial loan-to-value ratio 75 per cent



Source: Janzén, Jönsson and Nordberg. *A fall in house prices – consequences for financial stability. The Riksbank's commission of inquiry into risks on the Swedish housing market* (2011).

The extent to which the cover pool is affected by a fall in house prices therefore depends on the loan-to-value structure of all the loans that are included. If all loans were granted at 75 per cent of the value of the home and then house prices fell by 20 per cent, the cover pool would also fall by 20 per cent. However, the mortgage stock includes loans with mixed loan-to-value ratios to a maximum of 75 per cent. Because not all underlying mortgages have a loan-to-value ratio of 75 per cent, the cover

pool will not be affected as much as the contraction in the value of homes in the event of a drop in house prices (Janzén et al, 2011).

If the overcollateralisation decreases, this can limit the banks' ability to issue further bonds from the existing cover pool. However, the banks always have the possibility of topping up the cover pool and the overcollateralisation. In an initial step, this could be done using what is known as substitute assets, such as government and municipal bonds. In a second step, the banks could sell parts of their liquidity buffers and obtain liquid funds to transfer to the cover pool as a substitute asset. In a third step, the bank can issue short term securities, which provides them with liquid funds with which they can expand the cover pool. However, the ability to implement such measures can be questioned if the market does not function as it should (see below).

A sharp fall in house prices could disrupt market functioning and lead to problems for the banks

If the Swedish market is hit by a sharp fall in house prices, there is a risk of investors no longer wishing to own Swedish mortgages through covered bonds. The problems sustained on other international housing markets also accentuate this risk. Even though the risk of credit losses is low initially, the actual risk in the investment increases. In such a situation, investors with inferior knowledge about the credit risk might want to sell their holdings. If a general expectation about heightened selling pressure builds up, more informed investors might also choose to sell in order to avoid major value contractions. Such flocking behaviour could potentially create substantial negative price movements and possibly disrupted market functionality too.

If a situation emerges in which it is both more expensive and more difficult for the banks to obtain secured funding, at the same time problems will arise on the unsecured funding market. If the market starts to perceive covered bonds as less secure, issuers will probably transfer more collateral to the cover pool. This affects unsecured investors because there would then be less collateral remaining that is not earmarked for the covered bonds. For this reason, unsecured funding is commonly considered riskier than secured funding. Therefore, in a situation in which falling house prices render funding through covered bonds more difficult, not only secured funding would come under threat, but the total market funding of banks.

Because a substantial portion of the banks' liquidity buffers is made up of covered bonds, the banks are reliant on this market function in order to convert them to liquidity[18]. Also, a significant share of the banks' liquidity buffers is made up of the covered bonds of other banks (Sandström et al, 2013). In a scenario of a systemic crisis in Sweden, liquidity in the securities of all banks would probably decrease, and a large part of the banks' buffers would become illiquid in practice. The undertakings of the major Swedish banks as market makers might involve problems when investors wish to sell off their covered bonds in unison, because they tend to end up in the market makers' own stock. In a situation of major stress, short funding markets would probably also be affected, making it difficult for the banks to fund their growing stock. In such a situation, a bank may choose between utilising its liquidity buffer (which is partially complicated by parts of this buffer comprising covered bonds), issue unsecured instruments (which is not possible in most cases) sell off their assets

[18] The liquidity measure LCR (Liquidity Coverage Ratio) requires a bank's liquidity buffer to be no less than the net outflow of money during 30 days in a stressed scenario. In simplified terms, the liquidity buffer in the LCR may comprise government bonds and no more than 40 per cent mortgage bonds.

- or, ultimately, reduce new lending. See appendix 1 for a description of how uneasy market developments have caused selling pressure of Swedish covered bonds in the past.

Estimated future development of the mortgage stock

The future average loan-to-value ratio in the mortgage stock can be estimated using some simple illustrative calculations. The development of the mortgage stock is used here to estimate the development of the cover pool, because the majority of issued mortgages is placed in the cover pool.

The average loan-to-value ratio of the mortgage stock is currently 64.7 per cent. An estimate shows that if the mortgage stock continues to grow as it has done to date, the loan-to-value ratio of the entire mortgage stock will amount to 69.2 per cent in ten years. If in addition house prices fall by 10 per cent (20 per cent) in the tenth year, the average loan-to-value ratio will amount to 76.9 per cent (86.5 per cent). If the average loan-to-value ratio of the cover pool were to amount to 86.5 per cent, this would involve the overcollateralisation of the banks decreasing by around one third because parts of the cover pool must be substituted.

Method

In order to estimate how the mortgage stock will develop ahead, data[19] from Finansinspektionen's 2013 mortgage survey has been used. According to the mortgage survey, the average loan-to-value ratio of the mortgage stock was 64.7 per cent in the third quarter of 2012. During the same period, new mortgages were granted at an average of 69.5 per cent. The mortgage survey also shows that even if the interest-only loans of households are included, and if it is assumed that borrowers amortise the same volume in kronor annually on these loans as on those that are actually amortised, this gives an amortisation period of 148 years for the entire loan stock of bottom loans.

Between the third quarter of 2011 and the third quarter of 2012, the mortgage stock grew by around 5.6 per cent. During the same period, an estimate[20] shows that new mortgages equalling around 17 per cent of the mortgage stock were granted. The future development of the average loan-to-value ratio in the mortgage stock can be estimated using some simple assumptions. In order for the mortgage stock in the illustrative calculation to grow by 5.6 per cent annually, an annual outflow of mortgages from the mortgage stock of 11.4 per cent[21] is assumed. The mortgages exiting the mortgage stock are assumed to have a loan-to-value ratio of 64.7 per cent, and the mortgages added are assumed to have a loan-to-value ratio of 69.5 per cent.

If house prices, amortisation rate and loan-to-value ratio of new loans are kept constant while at the same time the mortgage stock grows by 5.6 per cent annually, the average loan-to-value ratio of the entire mortgage stock is estimated to amount to 69.2 per cent in ten years (see table 1). If in addition house prices fall by 10 per

[19] The mortgage survey includes data from Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, SBAB Bank, SEB, Skandiabanken and Swedbank. The material gathered includes information about the aggregate level of the mortgage stock as a whole and for new loans, a comprehensive survey of a large number of loans granted at household level (sample) and updated information about the households included in the 2011 sample.
[20] Own estimate based on the data gathered in connection with Finansinspektionen's 2013 mortgage survey.
[21] 17.0% - 5.6% =11.4%

cent (20 per cent) in the tenth year, the average loan-to-value ratio would amount to 76.9 per cent (86.5 per cent). If house prices instead rise by 4.5 annually[22] for ten years, the average loan-to-value ratio would be 47.7 per cent.

Table 1. Estimated development of the average loan-to-value ratio of the mortgage stock

	Today	+10 years, house prices rising by 4.5 per cent annually	+10 years, house prices constant	+10 years, 10 per cent drop in house prices	+10 years, 20 per cent drop in house prices
Average loan-to-value ratio of the mortgage stock	64.7%	47.7%	69.2%	76.9%	86.5%

Source: Own calculations

The average overcollateralisation[23] in the cover pools of Swedish banks amounted to around 35.9 per cent[24] for the second quarter of 2013. If the average loan-to-value ratio in the cover pool were to amount to 86.5 per cent (see table 1), parts of the mortgages exceeding 75 per cent would have to be removed from the cover pool. A simple estimate shows that the overcollateralisation in such a case would decrease by around one third[25]. It is worth noting, however, that the overcollateralisation reported by the issuers themselves varies greatly between reporting occasions; neither may it reflect the total collateral available for inclusion in the cover pool. The issuers have different strategies for the size of the share of mortgages to be included in the cover pool.

Limitations

An estimate such as that presented above has its limitations, but nevertheless shows using simple assumptions how quickly the loan-to-value ratio of the cover pool could approach the maximum limit of 75 per cent.

The estimate above uses the mortgage stock's characteristics to estimate how the cover pool's characteristics will develop ahead. What this assumption misses is that the cover pool is not solely made up of mortgages, but can also include substitute assets such as government securities and cash up to 20 per cent. At the end of the second quarter of 2013, the majority of issuers had an average loan-to-value ratio in the cover pool of between 55 and 60 per cent. In the estimate above, a 64.7 per cent loan-to-value ratio is used for the mortgage stock. The difference could be due to the fact that the cover pools do not only comprise mortgages, or to the banks possibly making the strategic choice not to include loans with a higher loan-to-value ratio in the cover pool and instead top it up with substitute assets. The estimate uses a higher initial loan-to-value ratio, so the estimated future loan-to-value ratios are slightly higher. While the estimate need not however be unreasonable with respect to the characteristics of the entire mortgage stock, it is difficult to predict which parts of

[22] The rise in house prices of 4.5 per cent annually is based on the assumption of house prices and household debt growing at the same rate. For a constant debt ratio, the debts must grow in line with average disposable income, which grows by around 4.5 per cent annually.
[23] Assume a bank that has a cover pool of 1,000 and outstanding covered bonds to a value of 750. The overcollateralisation would be 250, giving overcollateralisation of 33 per cent (250/750) in percentage terms.
[24] Based on the issuer's own calculations. Landshypotek is excluded because the cover pool is almost exclusively made up of loans for agricultural properties.
[25] (75.0%-86.5%)/35.9% = -0.3203 ≈ -32%

- the mortgage stock banks will choose to include in cover pools, and the proportion of other assets they will choose to use.

Summary of conclusions

The purpose of this memorandum is to analyse potential risks which banks' funding with covered bonds might pose to financial stability. Based on an assessment of the future average loan-to-value ratio, this memorandum analyses the consequences for the ability of banks to fund mortgage borrowings with covered bonds.

There is a risk that the loan-to-value ratio of mortgages in the cover pool might rise over time and approach a critical level. This could lead to greater difficulty over time in the ability of banks to fund mortgage lending with covered bonds, particularly if house prices were to fall. It is hard to judge the loan-to-value ratio at which the market might perceive Swedish covered bonds to be less secure. In addition, what is considered acceptable can quickly change. A rising average loan-to-value ratio risks affecting investor appetite for buying Swedish covered bonds.

Even though the loan-to-value ratios of the cover pool would probably not increase to a critical level in the event of a sharp decline in house prices, uncertainty about the bonds and the value of the underlying collateral would increase in the event of a rapid decline in house prices. A fall in house prices could therefore lead to Swedish banks finding it more expensive and more difficult to issue covered bonds, which is exactly what has happened in many European crisis countries and in Denmark and the Netherlands. This could in turn lead to more expensive mortgages for Swedish consumers, which could further aggravate a potential economic downturn. In a situation in which it is difficult for the banks to obtain secured funding at a reasonable cost, unsecured funding is also affected in parallel because it is considered more risky. Difficulties for banks to access market funding poses a risk to financial stability in Sweden.

Different types of measures can counteract the average loan-to-value ratio in the mortgage stock approaching a critical level. If the loan-to-value ratio among new mortgage holders were to come down to the current average, the trend increase of the average loan-to-value ratio in the mortgage stock would subside. In addition, higher and more amortisation among mortgage holders would reduce the average loan-to-value ratio of the mortgage stock. Such developments would render the banks' funding through covered bonds less sensitive to sharp falls in house prices.

Because Swedish authorities have previously provided support to the market for Swedish covered bonds, market participants expect the same assistance from the authorities in the event of future problems. This implicit guarantee might motivate excessive risk-taking among both issuers and investors.

Sources

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Appendix 1 – Uneasy market developments have caused selling pressure of Swedish covered bonds in the past

Pressure to sell Swedish covered bonds increased when fears on international financial markets intensified in 2007. Investors sought safe assets such as government securities, and sold what was perceived to be risky, which at the time also included Swedish covered bonds. During the second half of 2007, foreign investors sharply reduced their holdings of Swedish covered bonds from SEK 450 billion to SEK 330 billion. Resellers state that the investors that pulled out typically had a short-term investment strategy, including SIVs, conduits[26] and hedge funds (Sandström et al, 2013).

After Lehman Brothers collapsed in September 2008, the situation became more panicked. Uncertainty about the exposure of Swedish banks in the Baltic region added to this. The market fell subject to heavy selling pressure, mainly driven by foreign investors, but also Swedish ones. Thanks to the Swedish market maker system, it was nevertheless possible to sustain a certain level of trade. Here, investors had a possibility to sell assets – a possibility that was substantially lacking elsewhere. In their capacity of market makers, the Swedish banks bought the bonds, but because of the uncertainty on the market, there were few buyers to sell them to. The covered bond stock of the market makers (banks) grew, and internal risk threshold limits were soon reached. At the same time, markets for short-term funding were strained, so the banks had difficulty in funding their major holdings. All market makers tried to rid themselves of holdings by selling to their counterparties on the interbank market, and such trade "hit the ceiling" (Sandström et al, 2013).

Both authorities and market participants in Sweden understood the severity of the situation, which led to a series of measures within the course of a few weeks. In

[26] SIVs and Conduits are units controlled by banks that are not included on the bank's balance sheet, which invested in securities with expected low credit risk and which funded this through issuing short securities.

consultation with the Riksbank, the National Debt Office resolved to pump treasury bills into the market[27]. The money raised by the National Debt Office through its issues was placed in loans to banks with covered bonds as collateral.[28] This measure provided the banks with the possibility of exchanging their covered bond surplus for the government bonds their counterparties were demanding. The Riksbank extended the banks' ability to provide covered bonds as collateral for loans in affiliated institutions from 25 per cent to 75 per cent, and eventually lifted the limitation entirely[29]. The banks agreed that the guidelines for interbank trading had to be changed to stabilise the situation. Trading units were reduced and the spread between the bid and offer price widened[30]. On the whole, the series of comprehensive measures helped resolve the problems on the market (Sandström et al, 2013).

The autumn of 2010 saw renewed selling pressure in Swedish covered bonds after the Riksbank phased out its extraordinary loan facility. A number of participants used the relatively cheap funding from the Riksbank to fund longer assets, such as covered bonds. When the cheap funding disappeared, some investors chose to sell off their covered bond holdings, which led to falling prices and higher interest rates (Sveriges Riksbank, 2010a). Market participants polled in the autumn of 2010 said that it was the uncertainty on the market about the funding situation of banks that led to poorer pricing and reduced demand for bonds (Sveriges Riksbank, 2010b).

[27] In total, bills amounting to just over SEK 200 billion were issued, and the outstanding stock amounted to SEK 120 billion at most.
[28] The loans had the same term as the treasury bills issued.
[29] The use of covered bonds as collateral with the Riksbank increased from SEK 150 billion in September 2008 to almost SEK 500 billion at the beginning of 2009. Volumes have subsequently fallen and are now down to SEK 100 billion.
[30] The decision involved the smallest trading lot amounting to SEK 10 million (previously 50 for short maturities and 100 for long) and being traded at a spread of 10 basis points between the bid and offer price (previously 4).