FI-analysis

The Too-Big-To-Fail Guaratee for Swedish Systemically Important Banks

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Summary

If a major bank fails, defaults or is severely disrupted in its operations, this has major implications for the financial system and economy. There is thus an expectation among market participants – banks, counterparties and investors – that the government is likely to not allow a major bank to default. The government is expected to guarantee the bank's survival and hence implicitly guarantee the value of creditors' capital. This decrease the risks for the banks' creditors, who lend to the bank at a lower interest rate than would otherwise have been the case. Therefore, this implicit guarantee has a value for the banks, but presents a cost for the government. This equates to a transfer of wealth, although the extent to which the banks' shareholders, creditors or borrowers benefit is unclear. Besides the wealth transfer, the guarantee can also present a cost for the economy. The guarantee can weaken market discipline and increase the banks' risk-taking. Artificially low borrowing costs can also contribute to an excessively large banking sector and too-high lending.

The purpose of this study is to estimate the value of the implicit government guarantee for the four major Swedish banks. This is done using a number of approaches and for different periods of time. Similar analyses have been conducted by e.g. the International Monetary Fund (IMF, 2014), which however focus on major international banks. Where Sweden is concerned, the Riksbank (2011) has analysed appropriate capital levels for Swedish banks, which is highly correlated with the value of the implicit government guarantee.

This study shows that the value of the implicit guarantee is positive and substantial. However, the implicit guarantee varies considerably depending on the calculation method, and particularly over time, which is a consequence of the market's perception of risk changing over time. In 2009, the value of the guarantee equalled at most SEK 203 billion annually, while the average during the period 1998–2014 was SEK 26 billion annually. FI estimates that the total annual value of the implicit government guarantee for the four major banks in the summer of 2014 was between SEK 6 billion and SEK 14 billion. The relatively low level for 2014 probably reflects the fact that market sentiment was more stable than during the crisis years, and also that the banks' resilience has increased, for instance following higher capital and liquidity requirements.

In summary, the major Swedish banks continue to receive substantial implicit government guarantees. However, their value might be expected to decrease when EU's Bank Recovery and Resolution Directive (BRRD) is in place, because it establishes a resolution procedure that enables bail-in. There may therefore be reason to re-evaluate the implicit government guarantee when the Directive has been implemented, which is expected to occur in 2016.

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Major banks are systemically important

Major banks make up such an important part of the financial system that, if they fail or are severely disrupted in their operations, this would have severely negative implications for both the financial system and the economy at large. The failure of, or a major disruption of, the major banks hence poses a systemic risk, i.e. a threat to the financial system. This has led market participants to harbour an expectation that the government will step in and prop up a systemically important bank when it is on the brink of difficulty. This expectation constitutes a type of implicit, unspoken guarantee that has a value for the bank in the form of a reduced funding cost. The value of this guarantee is usually called the TBTF (too big to fail) premium.

Although government intervention prevents the most serious consequences of the failure of a systemically important bank, the very existence of an implicit guarantee gives rise to new problems. Because the banks' creditors partly or fully expect to be protected in the event of failure, their incentive to monitor the banks decreases, giving rise to a moral-hazard problem. This can lead to the banks increasing their risk-taking, which in turn heightens the risk of the bank failing. Increased risk-taking also enables the banking sector to grow too large, partly in the sense that it consumes too great a share of the resources of an economy, and also in terms of excessive lending. The implicit guarantee also involves the transfer of risk from the bank's creditors to the government, which is expected to have to bear the costs in the event of the failure of a systemically important bank. In summary, an implicit government guarantee leads to a direct transfer of wealth from the government to the banking system, and can also involve indirect economic costs in terms of greater risk-taking and an excessive banking sector.

Such negative consequences can be difficult to measure. A reasonable point of departure, however, is that a high value for the guarantee involves a greater transfer of wealth, but also greater negative economic consequences than a low value.

There are two main courses of action that can be followed to limit the negative effects of the implicit guarantee.

The first focuses on charging for the guarantee. The contributions made by the banks to the stability fund, which is a fund that can be used in a crisis situation, is an example of how the government is compensated for the implicit guarantee.[1]

Another approach is to attempt to reduce the value of the implicit guarantee. Because the implicit guarantee means that the banks' liabilities are considered less risky, the banks obtain lower funding costs, while at the same time the funding costs of the government will, at least theoretically, be higher. The value of the implicit guarantee can thus be seen as the value of the lower funding cost enjoyed by the banks. Alternatively, it can be measured as the value of the funds the government would have to inject in the event of failure, with due consideration for the probability of default.[2] A reduced probability of default thus leads to a reduction in the

1 Contributions made by the banks to the deposit guarantee fund, which protects deposits, should however been seen as part of the explicit guarantee in place to protect these creditors, and should therefore not be seen as part of the implicit guarantee addressed in this memorandum.

2 On an efficient market, these two approaches ought to be equivalent, because the sum of the annual discounted cash flows should correspond to the expected

value of the guarantee. Regulation of banks, in the form of e.g. capital and liquidity requirements and comprehensive supervision, are measures that help reduce the risk in the banks and hence curb the probability of failure, which also reduces the value of the implicit guarantee.

As a consequence of the bail-outs that many countries were forced to carry out in the crisis years, a Bank Recovery and Resolution Directive[3] is now being introduced at EU level, while at the same time global initiatives from the Financial Stability Board[4] explicitly aim to sharply reduce the TBTF premium. Both regulations involve creditors having to bear a greater part of the cost in the event of a major bank's failure, which ought to reduce or entirely eliminate the need for government support for a distressed bank.

The purpose of this study is to estimate the value of this support for the four major Swedish banks using different methods and over different time periods. Given the complexity of the task – measuring a value for a guarantee that is only indirectly observable – the results should be interpreted with caution. Yet, an obvious conclusion is that, irrespective of the choice of method and time period, the analysis shows that the value of the implicit government guarantee is substantial.

Who benefits from the implicit government guarantee?

It is only banks which the government considers to be systemically important that have an implicit guarantee. In practice, it can be difficult to know where this line is drawn, and systemic importance should rather be measured on a sliding scale. In order to avoid a discussion about which banks are perceivably covered by an implicit guarantee, focus here is on the four major Swedish banks. These banks are, because of their dominant position in the banking sector, clearly the most systemically important ones.

In practice, the implicit government guarantee does not cover all of the bank's stakeholders. The government will probably not protect shareholders; rather, they are expected to lose their entire capital. Instead, it is the bank's creditors that can be expected to be covered by the guarantee and, to varying extent, expected to be protected from losing their capital.

Because an implicit government guarantee reduces the risks for creditors, they will require lower interest on the loans they provide to the banks than they otherwise would have done. It is this yield discount, calculated in kronor, which this study uses as a measure of the value of the government's implicit guarantee. However, how this TBTF premium in the form of lower interest expense, is distributed between the banks' various stakeholders – creditors, shareholders, employees or customers – is not analysed. Neither does the study investigate how much the government's increased risk burden affects its interest expense, which would be an alternative, albeit more methodologically difficult, way of measuring the TBTF premium.

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value in the event of failure, adjusted for the probability of default and adjusted for the risk level.

3 Directive 2014/59/EC of the European Parliament and of the Council of 15 May 2014.

4 See FSB (2104) for further information.

Three methods for calculating the implicit government guarantee

CREDIT-BASED CALCULATION

The credit rating agencies Standard & Poor's (S&P) and Moody's calculate the effects of the implicit guarantee on the credit rating they give the banks. S&P estimates that the banks' credit rating would be two (SEB) or one (other major banks) notch(es) lower, according to S&P's credit rating methodology, had they not had an implicit government guarantee. Moody's estimates the implicit guarantee at three notches for all major Swedish banks according to its system (table 1).

S&P uses a methodology in which assessments of the bank's systemic importance and the government's inclination to support a bank are used to calculate the effect on creditworthiness. Many factors are included in the assessment of these two categories. For example, the strength of the country's public finances is an important element in S&P's estimation of the inclination of a government to provide support. The major Swedish banks are all considered to be "highly systemically important", which is the highest category, while the inclination of the Swedish government to provide support is considered to be "supportive", which is an intermediate category. This gives combined support of two notches for a bank (in the absence of support) with a credit rating of A-, and one notch for banks with credit ratings A and A+.[5]

TABLE 1: Credit rating (including implicit guarantee) and the effect of the implicit government guarantee on the credit rating in number of notches

	S&P credit rating	No. notches higher credit rating	Moody's credit rating	No. notches higher credit rating
Handelsbanken	AA-	1	Aa3	3
Nordea	AA-	1	Aa3	3
SEB	A+	2	A1	3
Swedbank	A+	1	A1	3

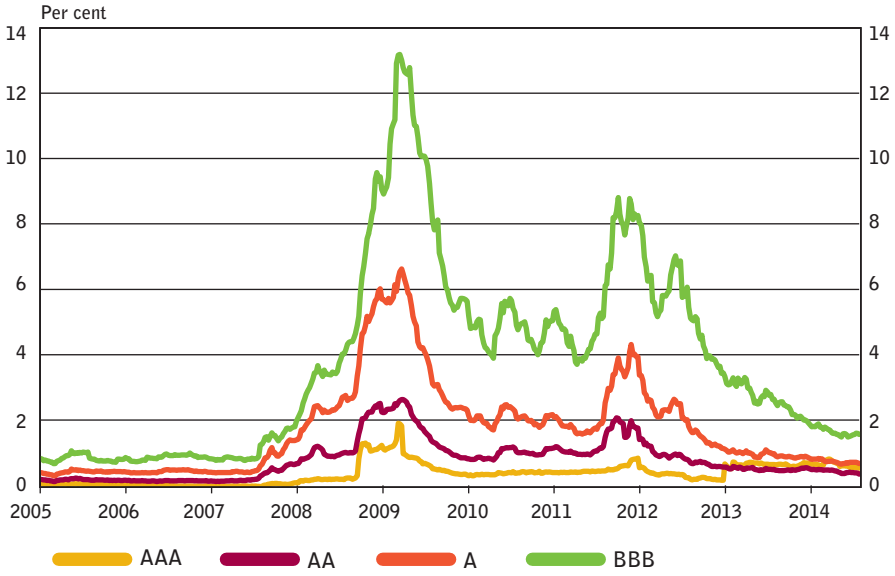
Note: The credit rating refers to the assessment in July 2014.

Diagram 1 shows the average spread for European financial firms with different credit ratings.[6] It illustrates that higher credit ratings involve lower yield. How much lower interest rate depends on the number of notches, a measure of risk, and on the risk premium. The risk premium measures how much an investor requires in return per unit of risk, i.e. the price of risk. The difference in the spread between firms with different credit ratings fluctuates sharply over time, as the risk premium fluctuates. Hence, the value of the TBTF varies over time. During the financial crisis, risk appetite decreased drastically and risk premiums rose sharply. At the end of the first quarter of 2009, risk premiums were at their highest, amounting to more than 12 percentage points for European financial firms with a credit rating of BBB.

5 See Standard and Poor's (2011) for further information.

6 More specifically, the asset-swap spread is shown in diagram 1, in which the borrowing rate of European financial firms is compared to the euro swap. See e.g. http://janroman.dhis.org/finance/Interest%20Rates/, an article on asset swaps for further information about how this spread is calculated.

DIAGRAM 1: Average spread for European financial firms shown by credit rating



Source: Bank of America Merrill Lynch.

Note: Here, the spread corresponds to the asset-swap-spread in which the borrowing rate of firms is compared to the euro swap rate.

Based on this interest rate spread, the extent of the higher interest expense a bank would have had on average, had it had a lower credit rating, can be calculated.[7] For example, if a bank had a credit rating of AA instead of AAA, in March 2009 this would have meant a 78 basis point higher funding cost (table 2). Table 2 also shows the average spreads for 1998–2014 and for the end of July 2014 (28 July). These results are based on the underlying data reported in diagram 1.

TABLE 2: Increase in yield in basis points given a downgrade, in three different time periods based on historical data

	AAA → AA	AA → A	A → BBB
July 2014	9	38	98
March 2009	78	599	1 651
Average 1998–2014	37	80	172

Source: Bank of America Merrill Lynch.

In the next step, an estimate of the increase in funding for the four major Swedish banks are calculated. This is based on the above yield calculations (table 2) together with the banks' credit ratings as well as the credit agencies' estimation of the effect of the implicit guarantee, both measured in July 2014 (table 1). As an illustration, the effect on the yield spread given Moody's assessment is shown in table 3. The change in credit rating shown in the second column is based on Moody's assessment, while the effect in the form of wider yield spread at three points in time are presented in the remaining columns. For example, the absence of a government guarantee would bring down SEB's credit rating from A1 to Baa1, which at the end of July 2014 would have translated into a 78 basis point higher borrowing rate.

7 For example, the average yield (yield-to-maturity) during the period April 1998 to September 2014 was 634 basis points for financial firms with credit rating BBB, and 462 basis points for firms with credit rating A. In other words, a downgrade from A to BBB involves an increase in the spread of 172 basis points on average (634 minus 462).

TABLE 3: Estimated increase in the interest rate in basis points given Moody's assessment of the effect of the implicit government guarantee on the credit rating

	Change, credit rating	Increase in spread, July 2014	Increase in spread, March 2009	Increase in spread, 1998–2014
Handelsbanken	Aa3 ➔ A3	58	950	111
Nordea	Aa3 ➔ A3	58	950	111
SEB	A1 ➔ Baa1	78	1 300	142
Swedbank	A1 ➔ Baa1	78	1 300	142

In tables 4 and 5, the increase in the banks' borrowing cost has been translated into an increased interest expense in Swedish kronor, calculated on an annual basis. Table 4 is based on S&P's credit assessment, while table 5 is based on Moody's. The calculations are described in detail in Appendix 1.

TABLE 4: Estimated increase in the interest expense, on an annual basis, based on S&P's credit rating

	Value of implicit guarantee July 2014 (SEK bn)	Value of implicit guarantee March 2009 (SEK bn)	Value of implicit guarantee 1998–2014 (SEK bn)
Handelsbanken	0.9	13	1.8
Nordea	0.8	13	1.8
SEB	1.7	27	3.1
Swedbank	0.2	3.6	0.5
Total	3.6	57	7.1

TABLE 5: Estimated increase in the interest expense, on an annual basis, based on Moody's credit rating

	Value of implicit guarantee July 2014 (SEK bn)	Value of implicit guarantee March 2009 (SEK bn)	Value of implicit guarantee 1998–2014 (SEK bn)
Handelsbanken	4.0	62	8.0
Nordea	3.9	59	7.5
SEB	2.9	46	5.5
Swedbank	1.5	22	3.1
Total	12	189	24

Based on Moody's credit rating, the implicit guarantee varies between SEK 12 billion and SEK 189 billion, measured as the discount in the interest expense on an annual basis. This illustrates that the implicit guarantee does not have a constant value, but fluctuates considerably over time. The value of the guarantee in March 2009 was more than 10 times greater than in July 2014. This difference is much greater than the difference between the results of the two credit rating agencies. It can thus be said that the choice of time period and hence risk premium is the single most important parameter for this calculation method. This also illustrates that it is in times of unease and crisis that the full value of the guarantee becomes visible.

It is important to point out that the calculations are based on the conditions prevailing at the end of July 2014, in terms of credit ratings and interest rate levels. The only parameter that differs across the three time periods are the interest rate spreads. Hence, the value for e.g. March 2009 does not reflect the true implicit guarantee of that time, because the banks' credit ratings then were not the same as they are now. Further-

more, S&P developed its current methodology in 2011, and estimations of the size of the implicit government guarantee in 2009 are thus not available. Nevertheless, the method provides good insight into a probable historical progression of the implicit guarantee, because changes in the risk premium (as measured by the spread) are the single most important driver of changes to the guarantee's value – a variable captured in this analysis.

The advantage of the above-mentioned method is that it is simple and intuitive. The drawback is that it is based on the credit rating agencies' assessment. However, because their assessment has a direct impact on the banks' credit ratings and hence borrowing costs, their assessment is a to a certain extent self-fulfilling. In those cases where the credit agencies has misjudged the effect of the guarantee, this method will nevertheless give a distorted perception of the value of the implicit guarantee.

A FUNDAMENTAL APPROACH

In a report from April 2014 (IMF, 2014) the International Monetary Fund, IMF, reported estimations of the TBTF premium in a number of countries. One of the methods used by the IMF resembles the credit-based calculation described above. However, the basis of the IMF study was credit rating agency Fitch's "support rating". This "support rating" is based on Fitch's own assessment of the probability of support, which in this context pertains to the probability of government support. This assessment is made on a scale of 1 to 5, and is thus not directly transferable to an effect on the credit rating, as is the case in S&P's or Moody's estimations. Instead, the IMF calculates the effect on the credit rating using a probit model, which also includes other explanatory factors. The IMF can therefore also control for the influence of other variables that can affect the credit rating.[8]

The IMF bases its calculations on a great number of banks worldwide. Unless Swedish banks differ fundamentally from foreign ones, the IMF's results can also be used to describe Swedish conditions.

According to the IMF's calculation, a support rating according to Fitch of 1 – which corresponds to the highest probability of support – has an effect on the credit rating equal to five notches. For the major Swedish banks, all of which have a support rating of 1, the IMF's calculations would entail the credit ratings of all of them being five notches lower without a government guarantee.

Table 6 shows how much the funding cost for the major Swedish banks would increase due to this five-notch drop in credit rating. The same calculation method has been used as in the previous section (see Appendix 1 for a detailed account of the calculations).

8 The IMF controls for the following variables: equity in relation to assets, return on equity and the sovereign credit rating.

TABLE 6: Estimated increase in the interest expense, on an annual basis, based on a fundamental calculation method

	Value of implicit guarantee JulY 2014 (SEK bn)	Value of implicit guarantee March 2009 (SEK bn)	Value of implicit guarantee 1998–2014 (SEK bn)
Handelsbanken	8.6	125	16.1
Nordea	8.2	119	15.2
SEB	5.4	80	10.0
Swedbank	2.8	38	5.6
Total	25	363	47

Both this and the credit-based method use the assessment of credit rating agencies. The difference between the methods depends on the extent to which the calculations are based on the credit rating agencies' assessment. In the credit-based method, their assessment is crucial because it is the only variable, besides the risk premium, that affects the value of the TBTF premium. For the fundamental method, their assessment is less important because the method controls for a number of other fundamental variables that also affects the result.

OPTION-BASED CALCULATION

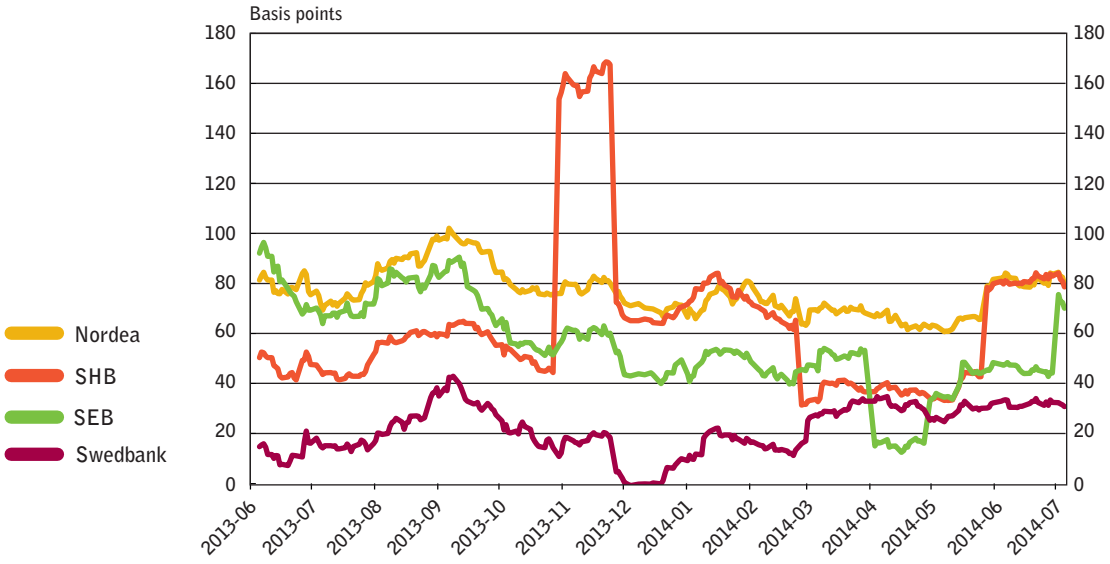
Using methods developed to calculate the value of options, a theoretical interest rate spread can also be computed based on equity market information. Because shareholders are not rescued in the event of default, this theoretical spread will – at least in theory – equal the spread that a bank would have in the absence of an implicit government guarantee. The difference between the theoretical and the observable spread will thus be a measure of the value of the implicit government guarantee. See Appendix 3 for a more detailed description.

These calculations are complex to make. However, Moody's has, as a part of its Credit Edge platform, already carried out this type of calculation. Its calculations are at the basis of the following description. Instead of corporate bonds, Moody's Credit Edge has mainly taken CDS instruments (credit default swaps) as its point of departure. Unlike corporate bonds, these instruments are standardised and hence much easier to use than corporate bonds, which require a great number of adjustments to make them comparable.

Diagram 2 shows how the difference between this theoretical spread and the actual spread for the four major banks has varied over time.[9] The theoretical spread is systematically higher than the actual one for all banks, which is the effect that ought to be obtained if a TBTF premium exists.

9 Note that the theoretical CDS spread is based on share information in SEK and should thus be considered as a CDS spread in SEK. However, the observed CDS spread is measured in EUR. In practice, a spread in relation to Stibor (in SEK) can only be compared directly to a spread in relation to Euribor (in EUR) once an adjustment equalling the level of the SEK/EUR basis swap has been made. This adjusts for the differing credit risk in the banks included in the Stibor and Euribor panels, respectively (Bank of England, 2004). However, because the theoretical CDS in SEK is a purely theoretical object that is not directly linked to a Stibor bank panel, it is highly doubtful whether it is wise to make such an adjustment. We have chosen not to. However, such an adjustment would not change the results because the SEK/EUR basis swap was only at a couple of basis points on 28/07/2014.

DIAGRAM 2: Difference between theoretical and actual spreads for the four major banks



Source: Moody's Credit Edge.

Just as before, this spread can be interpreted as the reduction in borrowing costs the banks would obtain as a result of an implicit government guarantee. At the end of July 2014, this yield discount was on average 63 basis points for the four major Swedish banks.

Although the above method is generally accepted and theoretically solid, several steps are required, with each step entailing approximations or estimations that are more or less exact.[10] As a control, an equivalent analysis is therefore performed for two more groups of companies, one consisting of Swedish non-financial corporations, and one consisting of European insurance companies. Neither of these two groups ought to contain firms that benefit from an implicit government guarantee, and the difference between the theoretical and actual spread should thus be zero.

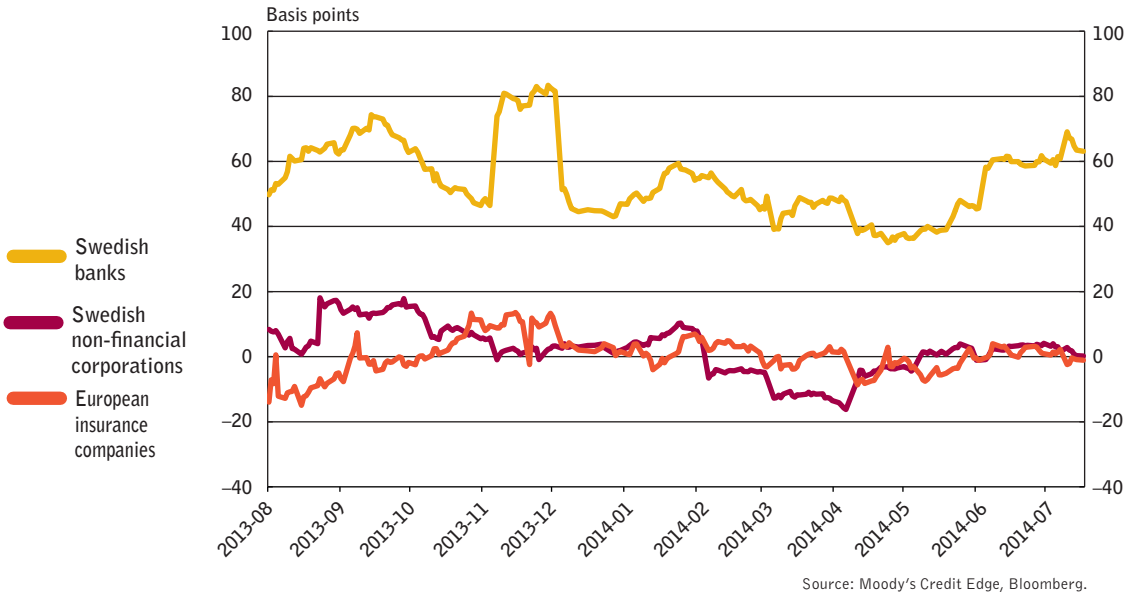
Furthermore, focusing on these two groups enables checking whether there are systematic measuring problems related to Swedish companies, which in such a case ought to be visible in the Swedish reference group, or in the financial industry, which ought also to be visible for the reference group of insurance companies. For the Swedish reference group, the starting point has been non-financial corporations in the OMX 30 index, for which Moody's Credit Edge reports both a theoretical and actual CDS spread. The group of European insurance companies includes the insurance companies in the Stoxx Europe 600 Insurance index, for which Moody's Credit Edge reports both a theoretical and actual CDS spread.[11] Actual CDS spreads from Bloomberg were also used as a complement wherever Credit Edge lacked information. Diagram 3 shows

10 For example, there is a divergence from Black & Scholes' assumption that the returns are normally distributed in favour of an estimated, fatter-tailed distribution. Another example is that, in order to be able to move between the risk-neutral and actual probability measure, the market price of risk must be estimated. See Moody's (2012) for a more detailed description.

11 ING has been excluded because this company is largely a bank, which also received explicit government support in the crisis years. L&G is also excluded because the time series contains jumps of several hundreds of basis points.

the average for the major Swedish banks and for the two control groups. The outcome for a few different time periods is summarised in table 7.

DIAGRAM 3: Difference between theoretical and actual spread



Source: Moody's Credit Edge, Bloomberg.

TABLE 7: Difference between theoretical and actual spread

	Swedish banks	Swedish non-financial corp.	European insurance co's.
July 2014 (28th)	63.1	0.2	–1.1
Average May–July 2014	50.2	–0.4	–1.4
Average Feb–July 2014	49.7	–3.2	–0.6
No. companies	4	12	11

Table 7 shows that in July 2014, Swedish banks had an interest rate discount that was around 63 basis points greater than that of Swedish non-financial corporations in the OMX index (63-0.2) and around 64 basis point higher interest rate discount than that of European insurance companies (63+1.1).[12] The two control groups both have a yield discount of around zero, a result that is consistent with the absence of any implicit guarantees.

In the next stage, the yield discount is converted into an amount in Swedish kronor, again using Swedish non-financial corporations or European insurance companies as a point of reference (table 8).[13] The total government guarantee on an annual basis is, according to this method, around SEK 13 billion or SEK 14 billion, respectively, depending on whether the comparison is made with respect to Swedish non-financial corporations or European insurance companies.

12 The difference in the rate discount between Swedish banks and the two control groups is statistically significantly different to zero a the 1% level in a t-test.

13 See appendix 1 for the technical details.

TABLE 8: Option-based outcome by major bank compared with the two reference groups

	Versus Swedish non-financial corp. (SEK bn)	Versus European insurance co's (SEK bn)
Handelsbanken	5.1	5.2
Nordea	5.1	5.2
SEB	2.5	2,5
Swedbank	0.5	0.6
Total	13	14

Note: Based on how much higher interest rate Swedish banks pay compared to the two reference groups.

The advantages of the option-based calculation method is that it is forward-looking. Given that it is a market-based method, it captures the overall information in the marketplace, making it a highly informative measure. The drawback is that it primarily captures the effect on the probability of default and that Credit Edge's theoretical spread requires several computational steps, which increases uncertainty in the calculations.

Overall analysis of the implicit government guarantee

Table 9 summarises the results for the various methods for the point in time July 2014 and the period 1998–2014.

TABLE 9: Results summary

	July 2014		1998–2014	
	Yield discount (basis points)	Government guarantee (SEK bn)	Yield discount (basis points)	Government guarantee (SEK bn)
Credit based – Moody's	68	12	126	24
Credit based – S&P	21	3.6	41	7.1
Fundamental method	133	25	241	47
Option-based method	63	13	-	-
Average	71	14	136	26

Note: The yield discount columns represent the average increase to interest expense for senior unsecured bonds and commercial papers. For the option-based method, Swedish non-financial corporations have been used as a reference group.

The average yield discount across the different methods was 71 basis points in July 2014. This equals the annual reduction in funding cost for a systemically important Swedish bank, which translates into an implicit government guarantee for the four major Swedish banks of SEK 14 billion in total. This is based on the assumption of a parallel shift in the yield curve (see Appendix 1). It is important to point out that these calculations are based on historically low risk premiums which thus also give an unusually low implicit government guarantee. Results based on the period 1998–2014 instead give an average implicit guarantee of SEK 26 billion, while the guarantee in the worst period of the crisis in March 2009 was a full SEK 203 billion annually.[14] [15] Appendix 3 also describes an alternative, in which the slope of the yield

14 The average of the results for S&P (table 4), Moody's (table 5) and the fundamental method (table 6) given a parallel shift in the yield curve.

15 Because the option-based method only extends a couple of months back in time, no option-based result can be calculated for the period 1998–2013.

curve is instead assumed to steepen, which would give a somewhat lower implicit guarantee.

Today, the banks make provisions both to the deposit guarantee fund of around SEK 1.4 billion[16] and the stability fund of around SEK 3.2 billion[17] annually. The deposit guarantee fund is to be used to compensate deposit holders in case of losses and is therefore part of the explicit deposit guarantee, which is not addressed here. Provisions to the stability fund shall however partially be seen as compensation for the TBTF premium calculated in this study. However, even with account taken of this provision, the value of the TBTF premium is substantial.

In a study conducted by the Riksbank (the Riksbank, 2011), the value of the implicit guarantee was estimated at SEK 30 billion for the major Swedish banks. Because this study is based on an average during the period 2002–2010, the outcome is however not directly comparable with the value of the guarantee calculated in this study, on account of the different time periods analysed. In order to compare how the results stand in relation to international studies, it is natural to focus on the yield discount, which is independent of the size of the bank. A study conducted by the IMF (IMF, 2014) arrived at a 60 basis point yield discount for European systemically important institutions in 2013 based on a fundamental calculation method, and a 90 basis point yield discount with an option-based method. A study conducted by Moody's (Moody's, 2011) showed that major European financial institutions (defined as the 20 largest European financial institutions) had a yield discount of around 50 basis points compared with small European financial institutions (defined as the remaining financial institutions). In this context, it was assumed that the large financial institutions could be covered by an implicit government guarantee, while the small ones would not have such a guarantee. In a study analysing US financial institutions (Acharya, Anginer and Warburton, 2014), the authors find an average TBTF premium of 30 basis points during the period 1990–2012, with the maximum level of 100 basis points being reached in 2009.

In an international comparison it is important to remember that a low TBTF premium does not necessarily imply a strong banking system, and vice versa. While the value of the TBTF premium indeed depends on how strong the banking system is, it also depends on public finances and the willingness of the government to offer support. A government with weak finances does not have the same possibility of supporting its banks, even if they were in very poor shape. On the other hand, not only does the Swedish government have strong finances, Fitch also interprets that is

16 These provisions do not only come from the four major banks, but a much broader group of banks. Furthermore, only the Swedish deposit fund is referred to here, and not deposit funds in other countries where the four major banks operate. Hence, the size of the fund cannot be directly compared with other results presented in the report. See the Deposit Guarantee Act (1995:1571) and https://www.riksgalden.se/sv/Insattningsgarantin/For-anslutna-institut/Avgifter-till-insattningsgarantin/.

17 These contributions do not only come from the four major banks, but a much broader group. Furthermore, only the Swedish stability fund is referred to here, and not stability funds in other countries where the four major banks operate. Hence, the size of the fund cannot be directly compared with other results presented in the report. See the Government Support to Credit Institutions Act (2008:814), proposal 2009/10:30 and the Swedish National Debt Office, "The National Debt Office's measures to strengthen stability in the financial system (2014:3)", 2014.

more inclined than many other governments to offer support (Fitch, 2014), despite the Swedish banking system being in good shape.

A distinction can be made between the different methods. The option-based method is the only one that is forward-looking, while the fundamental method is based on information for 2012. The credit-based method is based on information that combines today's risk premium and a credit rating which in theory is forward-looking. The introduction of EU's new BRRD legislation will however have a profound impact, because under the regulation creditors that are currently assumed to be protected in the event of default can have their capital written down, or converted into equity capital. The forthcoming legislation is probably something that will affect the credit rating institutions' assessment of the effect of the government guarantee on the credit rating (see Fitch, 2014 and Moody's, 2014, 2015), implying that the value of the TBTF premium ought to decrease. Insofar that share information and CDS spreads reflect these changes, the option-based method at least ought to reflect the introduction of the BRRD, while the other methods thus currently do not.

In summary, it would appear that the major Swedish banks are still enjoying substantial TBTF premiums. However, the value of this implicit guarantee can be assumed to decrease when a resolution procedure than enables bail-in is in place. There may therefore be reason to re-evaluate the implicit government guarantee when the Directive has been implemented, which is expected to occur in 2016.

References:

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Appendix 1

Table 10 shows the size of the banks' outstanding bonds by type of receivable. In the following calculation, it has been assumed that the groups covered bonds, commercial papers and senior unsecured bonds are all covered by an implicit government guarantee. Finally, it is assumed that subordinate bonds and other types of debt close to the share capital in the event of default are not covered by an implicit government guarantee.

TABLE 10: Liabilities of major Swedish banks (SEK billion)

	Covered bonds	Commercial papers	Senior unsecured bonds	Subordinate bonds
Swedbank	453	75	112	17
Handelsbanken	470	406	282	29
SEB	302	258	115	30
Nordea	244*	354	320	68

* *Nordea Hypotek AB.*

Source: Bloomberg.

For the credit-based calculation method, it has been assumed that both senior unsecured bonds and commercial papers have their credit rating downgraded by the number of notches shown in table 1. For the fundamental approach, the assumption for both of these bond types is instead a five-notch downgrade. For both approaches, the starting point is the credit ratings shown in table 1 equalling senior unsecured bonds. The interest rate effect used is shown in table 2. For the option-based method, it has been assumed that both senior unsecured bonds and commercial papers have a reduced interest expense of 63 basis points, which equals the difference between the theoretical and actual spread for major Swedish banks compared with Swedish non-financial corporations.

It ought to be noted that, in the described procedure, a parallel shift in the yield curve is assumed because the same yield effect is assumed for both senior unsecured bonds and for commercial papers which has a much shorter maturity. Hence, the fact that commercial papers have a higher credit rating than the senior unsecured bonds is disregarded. A more realistic change in the yield curve would therefore be a combination of a parallel shift and a "steepening". A steepening means a scenario in which the yield on longer maturity bonds increase while the shorter ones remain unchanged, leading to a steepening of the yield curve. The latter is explored in Appendix 3.

Because of their seniority, covered bonds are not assumed to be affected if less senior bonds are downgraded by only one or two notches; which is S&P's assessment. In a downgrade of a full three notches, which is Moody's assessment, it is however unreasonable to assume that covered bonds are not affected at all, and their credit rating is thus assumed to be downgraded by one notch. All covered bonds are assumed to have a credit rating of AAA. The effect of this on the covered bond yields is shown in table 2. In the fundamental approach, in which senior unsecured bonds and commercial papers are downgraded five notches, this is assumed to lower the credit rating of covered bonds by two notches.

For the sake of simplicity, it is assumed that the liabilities of the banks consist of zero coupon bonds calculated as follows: $\exp(-r)t-\exp(-r^*)t$, where r^* is the interest rate paid by the bank in the absence of a guarantee, r is the rate they pay with the guarantee, and t is maturity. Here, it

has been assumed that the banks' funding cost for senior unsecured bonds is 1.25 per cent with a maturity of 3 years, while commercial papers are assumed to have a rate of 0.45 per cent with a maturity of 3 months. For covered bonds, an average funding cost of 1.2 per cent has been assumed with an average maturity of 4 years. These numbers reflect market conditions prevailing at the end of July 2014 (28). It should be noted that, in this calculation method, sensitivity to the level of the interest rate is not particularly high; rather, it is the difference between r and r^* that is the determining factor.

Because the instruments have different maturities, this means that the guarantee also applies over different maturities. In order to be comparable, an annual guarantee has therefore been calculated by dividing the guarantee by maturity. For example, a guarantee of SEK x based on senior unsecured bonds with a 3-year maturity is thus an annual guarantee of x/3.

Appendix 2

Shareholders receive all surplus once creditors have been paid. If creditors have not received their entire payment, shareholders receive nothing. Robert Merton (1974) observed as early as in the 1970s that this is the exact definition of a call option and that the value of the shares can thus be calculated as the value of a call option. More specifically, the value of the shares can be written as:

$$max[V_{firm} - Debt, 0]$$

where V_{firm} equals the entire value of the firm while *Debt* is the value of the firm's liabilities. Hence, in an option context, the value of liabilities will be the exercise price of the option, while the entire value of the firm will be the underlying asset. A component for calculating the value of an option is the probability of the underlying asset being below the exercise price, i.e.:

$$prob(Debt > V_{firm})$$

However, if the value of the firm is below the value of the liabilities, the firm has defaulted (negative share capital). A consequence of considering share capital as a call option is therefore the ability to calculate the probability of default (PD) of a firm.[18] Because the analysis rests on the shareholders' perspective and data, the calculated probability equals the shareholders' estimation of the probability of default.

This insight can be used to calculate the value of the implicit government guarantee for systemically important banks. The bank's shareholders are not protected in the event of default. Shareholders' assessment of the probability of default will therefore, at least in theory, exclude the implicit government guarantee. The difference between the shareholders', PD^{Eq} , and debtholders', PD^{Debt}, assessment of the probability of default will thus be a measure of the size of the implicit guarantee. The difference between the two probabilities is however a fairly theoretical measure. In the next step, this difference in probability is therefore converted into an interest rate spread. The spread, *s*, is written as[19]:

$$s = LGD*PD$$

where LGD stands for "loss given default" and equals the loss given default as a share of the loan amount.

The spread from the shareholders' perspective, which excludes the implicit government guarantee, will thus be:

$$s^{Eq} = LGD * PD^{Eq}$$

While the spread from the debtholders' perspective, which does not exclude the implicit government guarantee, will thus be:

$$s^{Debt} = LGD * PD^{Debt}$$

These two interest rates are then used in the discounting described in Appendix 1 for calculating the final value of the implicit government guarantee expressed in SEK.

In practice, however, PD^{Eq} does not entirely exclude the effect of the implicit government guarantee. This is because e.g. volatility in share

18 In this context, the probabilities are the risk-neutral probabilities.

19 It is a case of a spread in a risk-neutral world.

capital (and thus in the firm) could be affected by the implicit guarantee, a parameter that is important in option pricing. The implicit guarantee can also perceivably affect share capital. Both of these factors mean that the method, if anything, underestimates the actual TBTF premium.[20]

20 For a more detailed description of the method, see Moody's (2012).

Appendix 3

In Appendix 1, the calculations were based on an assumption of a parallel shift in the yield curve. An alternative is to assume that the slope of the yield curve steepens. The size of the steepening is calibrated such that the rate change in the three-year point is still equalled by the interest rate changes shown in table 2, while the repo rate is assumed to be unchanged. This new assumption means that the rate change for commercial papers with only a 3-month maturity will be negligible. This new assumption means that the average implicit guarantee for the four systemically important banks will be SEK 6 billion per year (table 11).

TABLE 11: Summary of the results given an assumption of a steepening of the yield curve

	Value of the implicit government guarantee (SEK bn)
Credit based – Moody's	5
Credit based – S&P	1.4
Fundamental method	11
Option-based method	5
Average	6