

ECONOMIC IMPACT OF THE FINAL BASEL III OUTPUT FLOOR

How the output floor can be implemented and
what it entails for the Swedish economy

SWEDISH BANKERS' ASSOCIATION
16 MARCH 2021

AUTHORS

Sigurd Næss-Schmidt
Jonas Bjarke Jensen
Hendrik Ehmann
Martina Facino
Antti Lemberg

PREFACE

The Final Basel III Framework from December 2017 sets out revised international standards for banking regulation. The package is now about to be implemented in the EU, and the European Commission is expected to publish a proposal this summer.

In preparation for the implementation, the European Commission has recently put forward a note on different options for implementing the package. In light of this note and our previous research, the Swedish Bankers' Association has asked us to analyse the impact of the different options on the Swedish banking sector and the real-economy.

TABLE OF CONTENTS

Preface	0
Executive summary	3
1 What is the output floor and why is it important?	6
1.1 The original Basel III package significantly increased capital requirements	6
1.2 The Final Basel III framework sets out new standards for bank regulation	7
1.3 Output floor and its impact on the banking sector	8
1.4 Impact on banks' customers	12
1.5 Impact on the real-economy	16
2 Impact of Final Basel III: An international comparison	20
2.1 Low-risk countries experience the highest increase in capital requirements	20
2.2 Is the high increase in capital requirements in Sweden justified from a risk perspective?	21
3 Options for designing the output floor and how it would affect Swedish banks and economy	25
3.1 Alternative to EBA's suggested implementation: the parallel stack approach	25

3.2 A way forward	28
References	29

EXECUTIVE SUMMARY

The Final Basel III Framework introduces the concept of an output floor, which impacts the minimum level of capital banks are required to hold for each type of asset. The motivation behind the output floor is to create a backstop for excessively low modelled capital requirements, thus reducing excessive variability and enhance comparability between banks.

In this context, the European Commission has recently put forward two main options for implementing the output floor: 1) the *single stack approach*, which is the preferred approach by the European Banking Authority (EBA), and 2) the *parallel stack approach*, which is preferred by several member states, including Denmark, Germany and France. In this report, we have investigated both options and their impact on the Swedish banking sector and the Swedish economy.

The choice on how to implement the output floor might seem like a technical issue, but the different alternatives can lead to fundamentally different outcomes for the Swedish economy.

The importance of this question varies considerably between member states. For some countries, the choice will have little impact. For others, like Sweden, Germany and Denmark, borrowing costs could increase considerably, depending on how the output floor is implemented. This will have ramifications for GDP and investments. For Sweden, the increase in borrowing costs will be particularly pronounced for corporates, who do not have a credit rating (i.e. almost all corporates except for some of the largest). In addition, the package could distort incentives for banks to provide low-risk lending.

1) Single stack: Pushing capital requirements above underlying risks

Implemented the way EBA suggests, the output floor will de facto entail a significant increase in capital requirements for low-risk assets. As the Swedish banks have historically had low credit losses, Sweden is one of the most affected countries with an increase in capital requirements of 28%, against 18% for the EU average.

The increase in capital requirements for Swedish banks is particularly pronounced for unrated corporates, which will de facto all be subject to the same capital requirements,¹ no matter the underlying risk. This means, for example, that a large international unrated corporate with decades without default will have a higher associated risk weight and therefore higher capital requirement than a newly started SME.

As numerous studies show that banks' internal models in Europe have on average been shown to well reflect the level of risk of their exposures – and importantly not being biased towards lower capital requirements – we assess that the package will push capital requirements away from underlying risks.

¹ This is a consequence of the application of the same *risk weights*, a measure of risk applied to a bank's exposure. The level of risk of a bank's exposures defines the capital requirements for that bank. We explain what risk weights are in Chapter 1.

Increased borrowing costs for banking customers

We expect that, in time, the increase in capital requirements for low-risk assets will translate into higher borrowing costs for end-customers. The reason being that capital (i.e. equity) is an expensive source of funding (compared to debt). If the single stack approach is chosen, we estimate that annual borrowing costs for Swedish banking customers will increase some SEK 18 bn.

For corporates, this translates into an increase in borrowing costs of around half a percentage point on average. In the most extreme cases (i.e. for the most low-risk corporates) borrowing costs could increase by up to 1 percentage point.

Some large corporates will likely have difficulties accepting such hikes in financing costs and look elsewhere, e.g. at the corporate bond market or at less regulated financial providers (collectively known as shadow banking).

Smaller companies have fewer options for financing and will have to accept the higher borrowing costs. Consequently, we expect this to reduce investments in the Swedish economy, which will eventually impact productivity and GDP.

Concretely, we estimate that choosing the single stack approach for the implementation of the output floor will imply a permanent reduction in the level of Sweden's GDP by around 0.7%, corresponding to around SEK 40 bn. Put in other words, every year, Swedish GDP would be SEK 40 bn lower than it otherwise would have been.

Additional capital has few societal benefits

At the same time, we find little benefit of the higher capital requirements in EBA's suggested approach. Capitalisation of the Swedish banking sector is currently at a point, where additional increases do little to reduce the risk of a new financial crisis. Indeed, international studies including by the IMF suggest that the current level of capitalisation of Swedish banks is already at levels where the costs of additional capital exceed benefits.

The few benefits are confirmed by international benchmarks of key risk indicators:

- Sweden has one of the lowest shares of non-performing loans in the EU.
- In a stress test by EBA, the Swedish banking sector comes out with the highest capital of all, and with a significant buffer against a potential government bailout.
- Ratings agencies rate Swedish banks among the most robust in the EU.

Given the strong documented robustness of the Swedish banking sector, we find it somewhat paradoxical that Swedish banks should be subject to one of the highest increases in capital requirements in EU due to the package.

2) Parallel stack: Keeps risk sensitivity of capital requirements

The second interpretation of the Final Basel III agreement, where the output floor applies as a separate requirement only including capital requirements from the original Basel III package. This approach is dubbed the *parallel stack* approach.

Our assessment is that the approach is more consistent with economic considerations as well as the original spirit behind the Final Basel III framework, as it would:

- Lead to a much smaller total impact of the Final Basel III framework on capital requirements (around 6% increase in Sweden), with resulting smaller impact on borrowing costs.
- Largely keep the link between capital requirements and underlying risks, letting the output floor work as original intended; a backstop for excessively low modelled risks.
- More closely resembling the impact on a global level, e.g. as in Americas where capital requirements are expected to increase with around 1%-2%.
- Bring the impact in line with the original G20 mandate, stating that the Basel III framework should be completed “*without further significantly increasing overall capital requirements across the banking sector*”.

Thus, the parallel stack approach is consistent with the fact that international studies, including by EBA, show that the internal models used by the banks in scope are not too optimistic.

This underlines that imposing fixed global international standards on banks with highly different structures can reduce economic welfare. Hence, Sweden as well as the EU, would be best served with an implementation that reflects this variation hereby adhering to the original aim of the Basel proposals.

CHAPTER 1

WHAT IS THE OUTPUT FLOOR AND WHY IS IT IMPORTANT?

This chapter provides an explanation of what the output floor, contained in the Final Basel III framework, is and how it affects the Swedish economy. Section 1.1 and 1.2 provide an overview of the original Basel III and of the Final Basel III frameworks respectively. Sections 1.3, 1.4 and 1.5 present the impact of the Final Basel III's output floor (based the single stack approach) on the Swedish banking sector, Swedish banking customers and the Swedish economy.

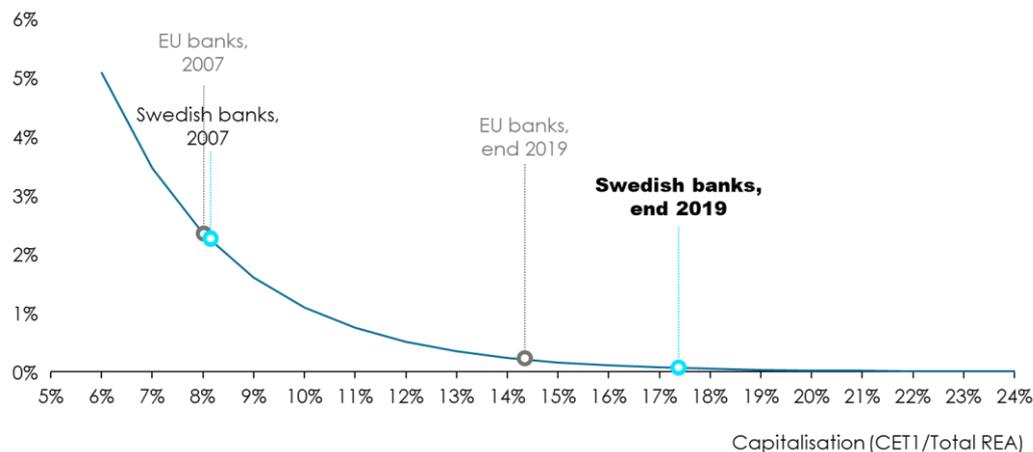
1.1 THE ORIGINAL BASEL III PACKAGE SIGNIFICANTLY INCREASED CAPITAL REQUIREMENTS

The third instalment of the Basel agreements, Basel III, was developed in response to the 2008 financial crisis with the objective of increasing the resilience of the financial sector by increasing bank capitalisation (i.e. the amount of equity banks have to hold).²

The Basel III measures significantly reduced the risk of a financial crisis arising from insufficient capitalisation of the banking sector by increasing banks' capitalisation in the EU from around 8% on average in 2007 to close to 15%. For Sweden, capitalisation increased to 17.5%, see Figure 1.

² A bank's capitalisation is dictated by the bank's capital requirements, i.e. the amount of equity that a bank is required to hold, based on the riskiness of its assets. The capital requirements are prescribed to ensure a sufficient level of capital to absorb losses that could arise within a credit institution and thus prevent financial imbalances.

Figure 1
Risk of a crisis for EU and Sweden given pre and post financial crisis capitalisation
Risk of a crisis in a given year



Note: The figure shows the relationship between the level of capitalisation of banks (horizontal axis) and the probability of a financial crisis, in any given year. The higher the level of capital held by banks, the lower the probability of a financial crisis. The level of capitalisation is expressed as CET1 in % of un-floored Risk Exposure Amount (REA).

Source: BIS (2010), page 15 and own calculations.

1.2 THE FINAL BASEL III FRAMEWORK SETS OUT NEW STANDARDS FOR BANK REGULATION

In December 2017, the Basel Committee agreed on a new regulatory framework to finalise the post-crisis reforms denoted the ‘Final Basel III Framework’. The main objective of the framework was to ensure better alignment between banks’ capitalisation based on their internal models and the banks’ underlying risks. Most large banks estimate their capital requirements (i.e. how much capital they need to hold) using internal models, which calculate the level of risk of the different assets the banks hold.³

To address this, the Basel Committee has suggested (among other measures)⁴ the implementation of a floor (so called *output floor*) providing a minimum capital requirement for the different exposures, thus working as a back-stop for excessive low estimated risk.

Now, the package is in the hands of the European Commission, who will design its implementation. See Figure 2 for an overview of the timeline.

³ See Box 1 in Copenhagen Economics (2020) *Impact of The Final Basel III Framework in Sweden, Effects on the banking market and the real economy*, from now on abbreviated as “CE (2020)”.

⁴ See CE (2020) for more details.

Figure 2
Timeline of Final Basel III framework: agreement and implementation



Source: Illustration by Copenhagen Economics, based on publicly available information.

1.3 OUTPUT FLOOR AND ITS IMPACT ON THE BANKING SECTOR

The required capitalisation of banks is not only determined by the total amount of exposures but also by the level of risk of these exposures. For example, holding a SEK 100,000 unsecured corporate loan entails a larger risk than holding a SEK 100,000 government bond.

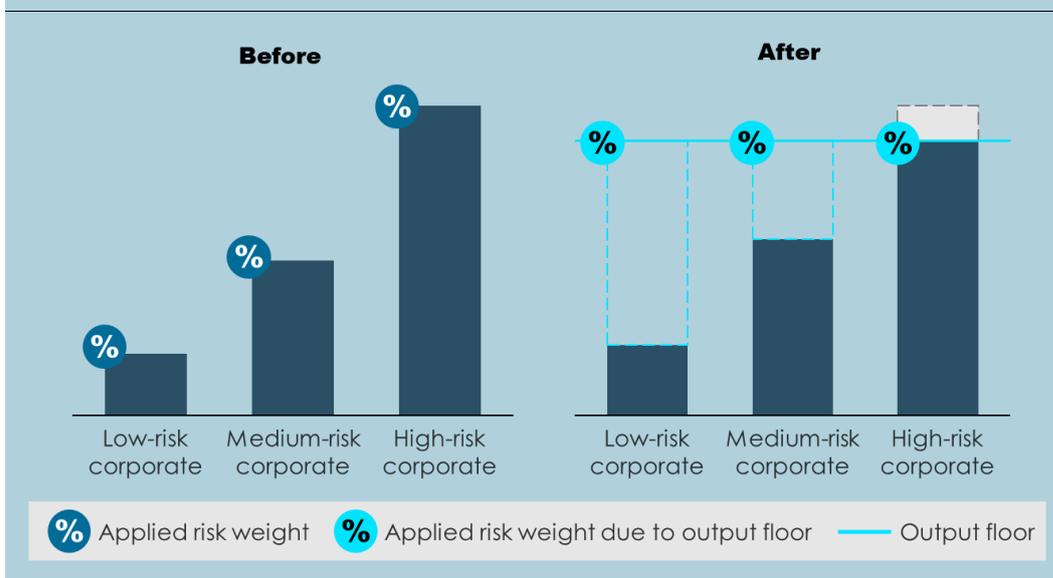
The level of risk of each exposure is identified by its *risk weight*. Risk weights are normally, for large banks, estimated by using their internal models. The internal models are designed according to EU regulation and have to be authorised by the supervision authority.

The output floor proposed in the Final Basel III Framework imposes a minimum level of risk weight applied to banks' risk-weighted assets. If the output floor is binding, this means that banks will de facto have to apply a minimum risk weight to each category of assets (e.g. loans to rated corporates and mortgage loans), instead of applying a risk weight to each asset based on the estimated risk of that asset, see Figure 3. Thus, at the moment the output floor becomes binding for a given bank, even by just 1 SEK, it impairs the risk sensitivity of capital requirements.

Box 1 Illustration of the application of the output floor on unrated corporates

Figure 3 below illustrates how the output floor would increase risk weights for certain assets. As an example, we show how risk-weights for low- and medium-risk corporates will increase, because the risk estimated by banks' models is lower than when the output floor is applied (and binding). The risk weights for the high-risk corporate will actually be lower with a binding output floor, because the internal models set a risk weight above the output floor. It should be noted that the output floor is actually one floor applied on the totality of risk-weighted assets a bank holds. However, the effect in practice has a different impact on different categories of assets, as illustrated in the figure below. Please note, that there are different risk weights applied to different categories of borrowers (e.g. unrated corporates, rated corporates, SMEs, etc), so the purpose of the figure is merely to illustrate the effect of the output floor.

Figure 3
Illustration of application of output floor on unrated corporates
Estimated level of risk



Source: Illustration by Copenhagen Economics

1.3.1 Impact on capitalisation for the banking sector

As stated by the original G20 mandate, the purpose of the output floor is *not* to increase the overall level of capitalisation of the banking sector, but to provide a back-stop for excessive low risk-weights by individual institutions.

”

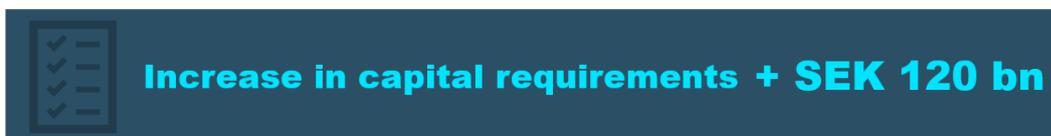
We confirm our support for the Basel Committee on Banking Supervision's (BCBS) work to finalise the Basel III framework without further significantly increasing overall capital requirements across the banking sector, while promoting a level playing field.

Source: G20 Communique, March 18th, 2017

This is true when considering the global average. For example, in the Americas, capital requirements are expected to increase by around 1.5%.⁵

However, in Europe, given the structure of the European financial sector, the package could lead to a significant increase in the level of capitalisation, up to around 18.5% in EBA's main interpretation of the Final Basel III Framework.

In Sweden, the effect is larger, with an increase of up to 28% in EBA's main interpretation, corresponding to Swedish banks having to raise an additional capital of SEK 120 bn.⁶ The impact would be around twice as large if Sweden did not already have a risk-weight floor of 25% on Swedish mortgages.



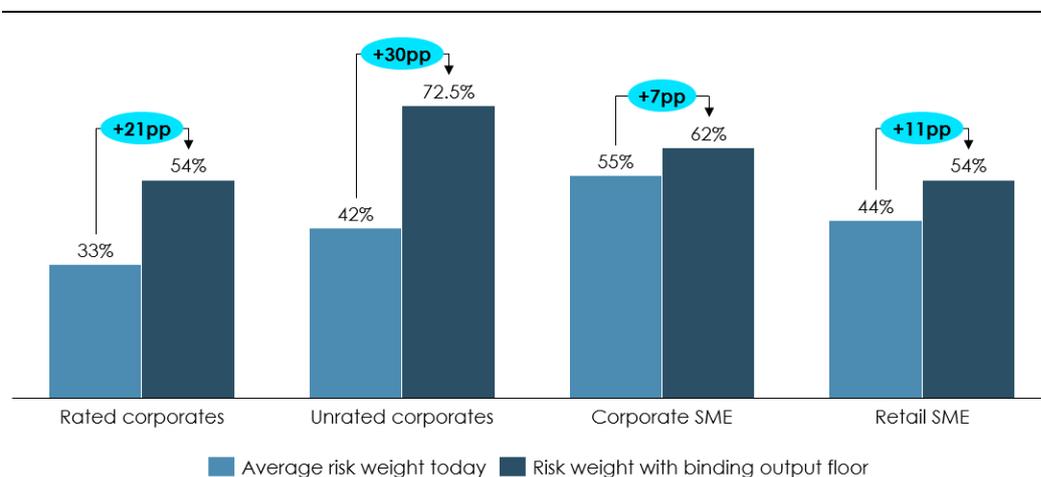
Thus, for Europe in general – and Sweden in particular – the output floor does not only represent a back-stop for excessive estimated risks, but also a significant increase in overall capital requirements.

In Sweden, the corporate portfolios will in particular be affected because of their current low risk weights compared to the risk weight in the Final Basel III Framework. Figure 4 below shows the impact of the output floor (implemented as proposed by EBA) on the average risk weight applied to different classes of assets. Average risk weights for unrated corporates, for instance, could rise by more than 30 percentage points. Mortgages, on the contrary, will not be affected due to the already existing floor, as mentioned above.

⁵ See in BIS (2019) “*Basel III monitoring report*”. The country group “Americas” also contains Canadian, Brazilian and Mexican banks but is dominated by US banks in the sample. The impact in the Americas is therefore indicative of the impact in the US. The results stated here are the numbers for highly capitalised, internationally active banks (Group 1 banks). No US banks are represented in the sample of Group 2 banks.

⁶ This value takes into account the buffers that banks usually hold on top of the required capital and therefore gives an estimate of the capital banks will actually have to raise after the reform. If we were not taking these buffers into account, the amount would correspond to SEK 50 bn.

Figure 4
Selected risk weights before and after the implementation of Final Basel III
 Risk weight, %, and increase in percentage points (pp)



Note: The risk weights correspond to the portfolio REA as share of portfolio exposure values.
 Source: Estimates by the three largest Swedish banks and Nordea.

1.3.2 Loss of risk-sensitivity

For low-risk assets, the output floor will remove the risk sensitivity of capital requirements, i.e. below the output floor the same risk level is applied to all exposures, independently of their actual risk. Internal models in Europe have in average been shown to well reflect the level of risk and are generally not biased towards lower capital requirements.⁷ Thus, the Final Basel III framework will create a gap between capital requirements and underlying risks of portfolios of Swedish banks.⁸

The loss of risk sensitivity could distort incentives for financial institutions. Using internal risk weights, there is a clear incentive for banks to reduce the risk within each asset class; if the risk of an asset increases, the capital requirement for that particular asset will also increase, and the bank is required to hold more (costly) capital. However, with the output floor, increased risk-taking will not lead to higher capital requirements (when below the output floor). Consequently, risk-taking becomes “cheaper”.

⁷ As shown by empirical research. In fact, banks generally use conservative assumptions in their internal models. We elaborate further on this in CE2020, Chapter 1 and Box 2. Sources: BCBS (2013) *Analysis of risk-weighted assets for credit risk in the banking book*; EBA (2017) *Results from the 2016 High Default Portfolios (HDP) Exercise*; BCBS (2016) *Analysis of risk-weighted assets for credit risk in the banking book*; IMF (2017) *Heterogeneity of Bank Risk Weights in the EU*.

⁸ This is the case because the capital requirement depends on the level of risk associated with the different exposures. By increasing the risk weights on low risk assets, the measure increases the overall capital requirement for the different exposures.

1.4 IMPACT ON BANKS' CUSTOMERS

The higher capital requirements will translate into higher costs for banks, which we expect will eventually be passed on to bank customers in terms of higher borrowing costs, i.e. interest rates and fees.^{9,10} This is widely accepted in the economic literature, e.g., from Bank of England, IMF and ECB.¹¹

The reason being that higher capital requirements means that banks should hold more equity for each loan they hold. Equity is a significantly more expensive source of funding than debt; equity typically has a required return rate in the range 10%-15%, whereas debt funding is around 1%-2% (main reason being that equity is subordinated to debt in case of default).^{12 13}

Banks' business customers will be the most affected in Sweden. We estimate that on average the package will increase companies' borrowing cost by 0.38 percentage points, up around 30% from current average borrowing costs.

However, the impact of the package varies significantly among businesses: Newly established SMEs with high leverage might experience little impact. In contrast, large unrated corporates, with a long track record of no default will be highly affected. On average, unrated companies will experience an increase in borrowing cost of 0.53 percentage points, see Figure 5.

⁹ We refer to these costs of borrowing from banks collectively as 'borrowing cost' below.

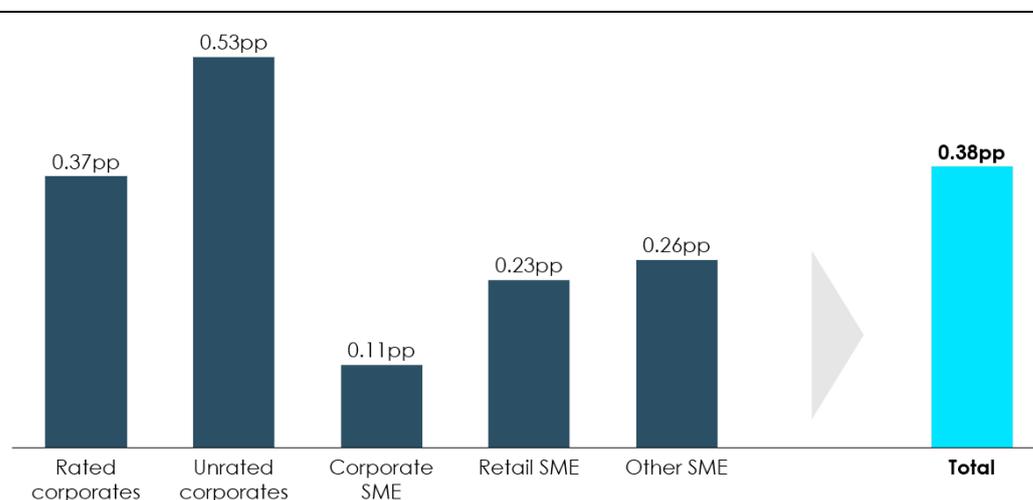
¹⁰ We expect the package to have little effect on the retail mortgage market. This is because of the Swedish risk-weight floors on mortgages, as explained above.

¹¹ See, for instance, BIS (2010), Miles et al. (2011), The Riksbank (2011), IMF (2016), ECB (2016) and Bank of England (2016). Note, that this is a long-run consideration – in the short to medium run pass-on can be influenced by competitive dynamics in the banking market, see discussion in Copenhagen Economics (2020) *Impact of the Final Basel III Framework in Sweden*.

¹² In Sweden, the average cost of equity funding after taxes is 10% while the average debt cost is 1%. The cost of equity is based on the European banking study by ZEB (2018), covering the 50 largest European banks. The debt funding rate is calculated on a bank level using data on bank interest expenditure and total financial liabilities from EBA's transparency exercise.

¹³ A mitigating effect is that a higher share of equity leads to a lower required return, both for debt and equity – this is known as the Modigliani-Miller effect and is included in our results – see discussion in Copenhagen Economics (2020) *Impact of the Final Basel III Framework in Sweden*.

Figure 5
Increase in companies' borrowing cost due to the Final Basel III
 Increase in cost of borrowing, percentage points (pp)



Source: Own calculations, based on EBA transparency exercise and data input from the three largest Swedish banks.

To illustrate the heterogeneous impact of the package, we have provided a case of the impact on two businesses in Box 2.

Box 2 Impact of output floor on unrated corporate vs corporate SMEs

To illustrate the impact of the output floor for different types of business borrowing costs, let us consider two businesses:

- A large, established unrated corporate with a long track record of solid financial performance and positive business outlook; and
- A small, newly established corporate SME, with a relatively high debt burden and uncertain business outlook.

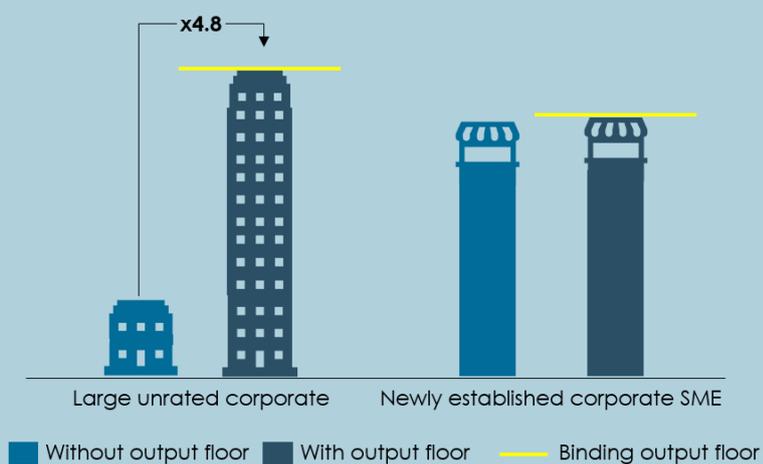
These two businesses have very different risk characteristics, and the small, newly established business is reasonably expected to be less likely to repay their loan.

This difference in the credit risk would be reflected in the risk weights resulting from banks' internal credit risk models. Consequently, banks would hold more capital for lending to the riskier business. In our simulation, the established large corporate would receive a risk weight of 15% and the small new business a risk weight of 80%.

The output floor (implemented as proposed by EBA) would increase the risk weight of the large corporate to 72.5%, while it would leave the risk weight for the small business almost unaffected. This, in turn, would lead to an increase in capital requirements of almost five times for the bank lending to this corporate, with the potential to increase the corporate's borrowing cost of around 1 to 1.1 percentage points.

In contrast, capital requirements for the newly established corporate SME would not be significantly affected by the output floor, see Figure 6.

Figure 6
Illustration of impact on capital cost for unrated corporates vs SMEs
Capital costs, thousand SEK



Note: For details on the numbers we use and assumptions we make in this example, please refer to CE (2020), Box 3.

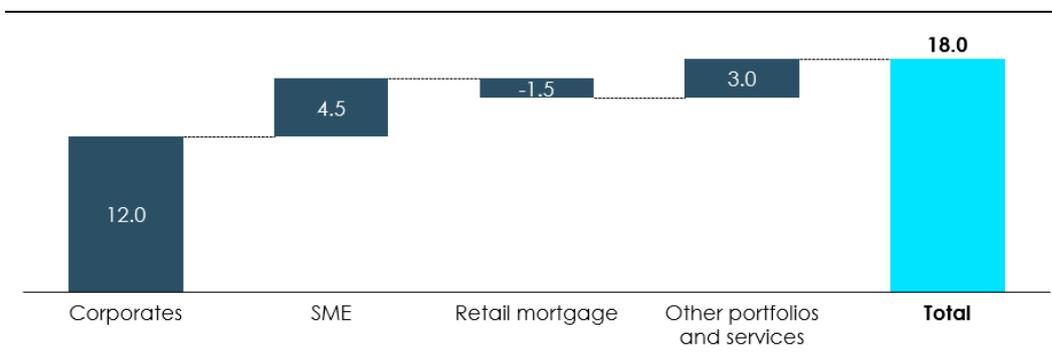
Source: Illustration by Copenhagen Economics, using EBA transparency exercise and data input from the three largest Swedish banks and Nordea.

In total, we estimate that the annual increase in the cost of borrowing for customers of Swedish banks will correspond to some SEK 18 bn (given they do not change to market-based lending, as discussed below), see Figure 7.¹⁴ By comparison, this increase amounts to around 13% of the annual corporate tax revenue in Sweden (which is around SEK 140 bn).

¹⁴ Note that this estimate does not include Nordea in its calculation which has relocated its headquarters to Finland but is still present on the Swedish market. The inclusion of Nordea would drive the absolute increase in borrowing costs up.

Figure 7
Total increase in costs for customers of Swedish banks (main estimate)

SEK bn



Note: The numbers are based on our banking balance sheet model that covers around 80% of the Swedish credit market. We assume that the rest of the banking sector follows the price increase of the banks in our model. The cost decrease on the retail mortgage portfolio results from the risk weight floor for Swedish mortgages of 25%. The impact on capital costs for banks related to other exposure classes such as lending to banks, sovereigns, equity exposures as well as costs related to the revised rules for operational risk, market risk and credit valuation adjustment (CVA) risk are pooled within the group of 'Other portfolios and services'.

Source: Copenhagen Economics based on data from EBA transparency exercise and SNL.



The estimated increase in borrowing costs is permanent and will be sustained across business cycles. Thus, the impact is not comparable to ordinary interest rate hikes, but should rather be interpreted as a permanent cost wedge in capital allocation between lender and borrower.¹⁵

In time, we expect the increase in businesses borrowing costs will have real-economy consequences as described in the section below. In addition, the EBA's proposed method to implement the output floor could distort companies' funding incentives, through two main channels:

- *First*, increased borrowing costs from banks provide a strong incentive to bypass the traditional banking system and seek financing elsewhere, especially for large unrated corporates that are often considered quite low-risk exposures, e.g. issuing more corporate bonds.
- *Second*, there is also a risk that credit will flow to less-regulated institutions, often referred to as shadow banking. This could include credit hedge funds and limited-purpose finance companies.

¹⁵ In our study, we primarily consider long-term effects as The Final Basel III Framework is a permanent regulation, intended to be in effect for many years. In the short-to-medium term, the competitive dynamics on the banking market could affect how banks adjust to the changing costs, and typically imply a lower pass-through of costs.

There appears to be no economic or financial stability rationale for such reallocation of businesses' financing channels, pushing corporate customers to the bond market and less-regulated finance providers. We also find it unlikely that such reallocation will improve financial stability or economic efficiency.¹⁶

1.5 IMPACT ON THE REAL-ECONOMY

In time, we expect that the increase in capital requirements and businesses' borrowing costs will impact the real economy. The higher capital costs passed on to banks' customers reduce credit demand. This curbs investment activity, causing a decline in overall productivity that eventually contracts GDP, see Figure 8.

Figure 8

Higher capital requirements decrease GDP, productivity and average wages



Source: Illustration by Copenhagen Economics

To estimate the impact on the Swedish economy, we use a modelling framework that was initially developed by the Canadian Central Banks and is similar to the analytical framework used during the development of the original Basel III package.¹⁷ Within a structural macroeconomic framework, the model allows to take into account banks' responses to financial regulation and translates changes in capital requirements into an impact on investments and GDP. The impact on GDP from higher capital requirements that the model estimates is in line with findings in other studies.¹⁸

1.5.1 Macroeconomic costs

We estimate that if the Final Basel III framework were implemented the way EBA proposes, it would lead to a permanent decline in the Swedish GDP level of around 0.7% per year, corresponding to around SEK 40 bn per year^{19,20} In other words, the GDP level will, every year, be 0.7% lower than it otherwise would have been.²¹



¹⁶ See Plantin (2014): *Shadow Banking and Bank Capital Regulation*, https://www.esrb.europa.eu/pub/pdf/reports/esrb.report180910_shadow_banking.en.pdf, Hansson et al. (2014): *Shadow Banking from a Swedish Perspective*.

¹⁷ See CE (2020), Chapter 3. The model framework has been developed by Meh & Moran (2010) and is proven model to analyse the relationship between the real economy and changes in the capitalisation of banks.

¹⁸ See CE (2020), Figure B.1 in the appendix. Note that the model is calibrated to fit the Swedish economy, see appendix of Copenhagen Economics (2016) *Cumulative impact of financial regulation in Sweden*.

¹⁹ 2017-level.

²⁰ The fact that the annual increase in GDP is higher than the increase in borrowing costs can be explained by the following: (i) the increase in borrowing costs does not include Nordea, (ii) there is a multiplier effect, meaning that 1 SEK spent in the economy generates more than 1 SEK in GDP. This effect also works in the other direction, e.g. in the case of not realised investment due to higher borrowing costs.

²¹ See CE (2020), Chapter 3 for details.

While such estimations are entailed with significant uncertainty, the estimated effect from a higher interest rate on GDP is consistent with evaluations by EBA as well as the study behind the original Basel III package.

The decline in GDP is driven by a decline in investments in Sweden. For a ten-year period, following the implementation, we estimate that annual investments will be some SEK 30 bn lower, corresponding to a decline of around 2.6%.



Decrease in annual investments SEK 30 bn

Finally, we note that the higher capital requirements could also be an obstacle for Swedish banks in terms of the finance investments needed for the transition to a low-carbon economy, see Box 3.

Box 3 Hindrance to “green” lending

To be compliant with the Paris agreement, we (based on a similar study for Denmark) find it reasonable to assume that each year, Swedish banks would need to finance in the magnitude SEK 20 bn of investments by businesses.

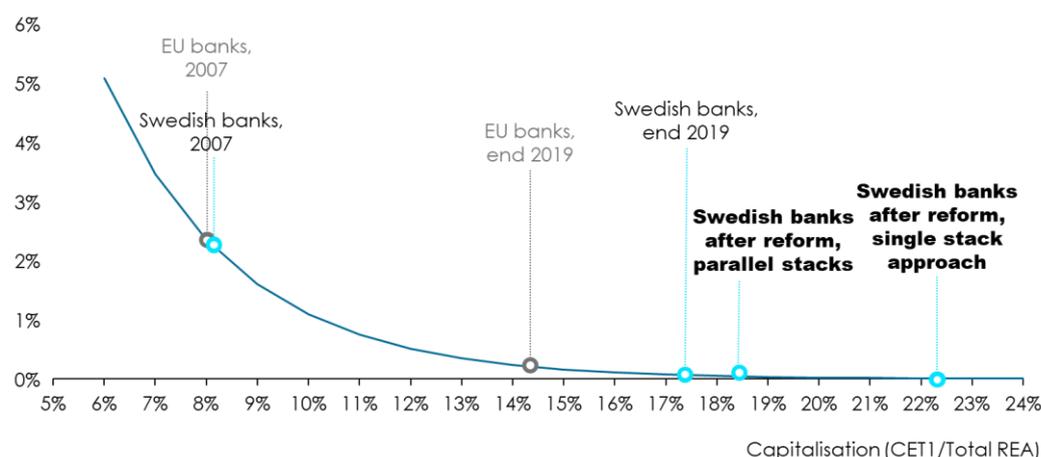
Viewed in isolation, this would mean that Swedish banks, under the current rules, each year would need to raise some SEK 1.3 bn of additional capital for green loans to businesses. With the Final Basel III Framework, that number increases to around SEK 2 bn per year.

The reduction in risk sensitivity due to the output floor, could entail that favourable risk attributes of green investments are not adequately accounted for in the capital requirements framework. If green investments entail fewer risks than their non-green counterparts – for example due to lower risk of becoming stranded in the transition to a carbon neutral economy – then the removed risk sensitivity in the output floor would lead to a larger increase in borrowing costs for realising green investments.

1.5.2 Macroeconomic benefits

In general, economic research shows that higher capital requirements provide societal benefits in terms of lower risk of a crisis. However, since the financial crisis in 2008, the Swedish banking sector has increased solvency to a point where further general increases in capitalisation bring very little benefits in terms of reducing the risk of a crisis, see Figure 9.

Figure 9
Risk of a crisis for EU and Sweden given pre and post Final Basel III capitalisation
Risk of a crisis in a given year



Note: This is the same figure as Figure 1, now showing the current level of capitalisation resulting from the Final Basel III package (implemented according to EBA's approach) and the corresponding probability of a financial crisis. The figure shows that for Sweden, the gain in terms of a reduction in the probability of a financial crisis is very small compared to the increase in capitalisation. Note that during the Covid-19 pandemic the capital requirements for Swedish banks have been lowered. However, Swedish banks have kept their level of capitalisation (and have in practice likely not been allowed to lower it). Moreover, we expect capital requirements to go back to pre-Covid-19 levels once the pandemic is over. The level of capitalisation is expressed as CET1 in % of non-floored REA. The two impacts on capitalisation from the Final Basel III Framework describe to different potential implementations of the output floor, see chapter 3.

Source: BIS (2010), page 15 and own calculations.

Concretely, we estimate that the benefits from the Final Basel III Framework correspond to a permanent increase in GDP of around 0.05%.²² This result is again based on estimates from the original analytical work behind the Basel III package.²³

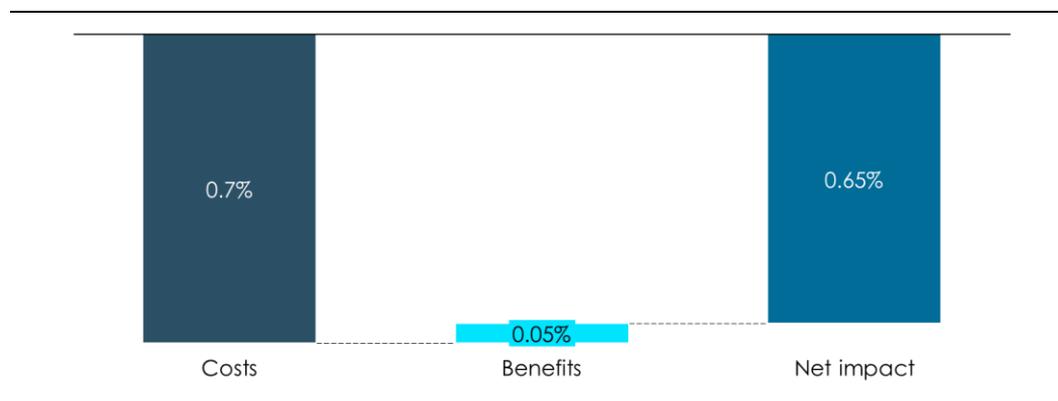
Putting costs and benefits together, we find that the Final Basel III Framework will deliver a net economic loss to the society corresponding to around 0.65% of GDP. The basic driver of this loss is the current high level of capitalisation of the Swedish banking sector. This is confirmed by a recent literature review by the Basel Committee, where the majority of research assesses the current level of capitalisation to be above or within the optimal level.²⁴

²² Note that this does not rule out that financial or economic crises could happen in Sweden. Capital requirements for banks are not the only parameter determining the risk of a crisis. For example, ill-advised fiscal or monetary policies could still build up financial bubbles, with a following burst. We merely point out that the benefits from higher capital requirements have been exhausted.

²³ The main analytical work behind the original Basel III package (known as the LEI report): Basel Committee on Banking Supervision (2010) *An assessment of the long-term economic impact of stronger capital and liquidity requirements*.

²⁴ Basel Committee on Banking Supervision (2019) *The costs and benefits of bank capital – a review of the literature: Swedish banks' capital ratios are currently within or above all of the recent estimates on the optimal level of capital, except for one estimate for the US banking sector. One noteworthy exception is the recent macroeconomic impact assessment conducted by EBA (2019) *Macroeconomic assessment, credit valuation adjustment and market risk*. We discuss the implications of the report in CE (2020), p. 39.*

Figure 10
Net GDP impact of Final Basel III measures in Sweden
% of long-run GDP



Source: Copenhagen Economics' estimations. See Appendix B in CE (2020) for details on the estimations.

CHAPTER 2

IMPACT OF FINAL BASEL III: AN INTERNATIONAL COMPARISON

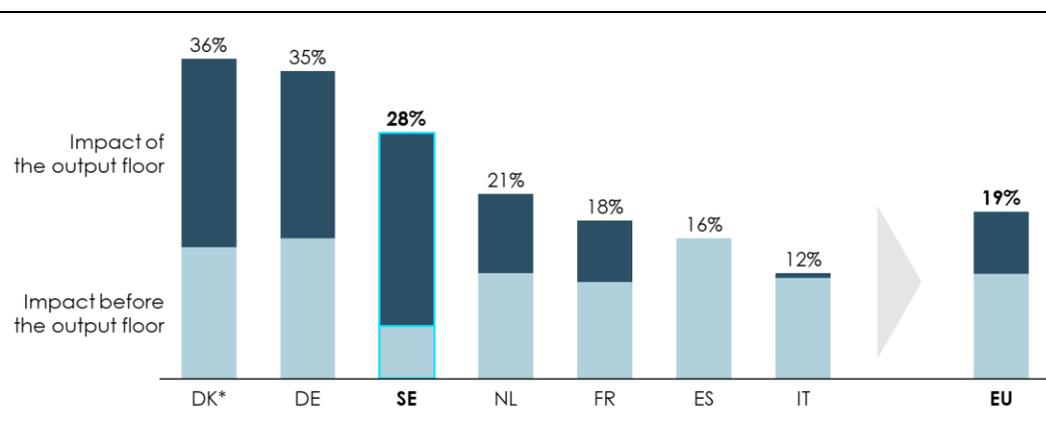
Having analysed the impact of the Final Basel III framework in Sweden, we now turn to an international perspective, by considering other EU countries. Section 2.1 compares the impact of the output floor on the Swedish economy to the impact on other EU economies. Section 2.2 shows the level of riskiness of the Swedish economy based on different standard indicators.

2.1 LOW-RISK COUNTRIES EXPERIENCE THE HIGHEST INCREASE IN CAPITAL REQUIREMENTS

As described in Chapter 1, the application of the output floor implies an increase in risk-weights for assets with low risk. In the same way, banking sectors with generally low-risk assets,²⁵ such as Germany and Sweden, will experience the highest increase in capital requirements with the introduction of the output floor according to EBA's main interpretation, see Figure 11.²⁶

Figure 11**Increase in capital requirements following Final Basel III for main EU countries**

% increase in capital requirements



Note: * The impact for Denmark has been underestimated in the most recent EBA study due to an error in the reported data. We therefore calibrate our model to the Danish FSA's corrected calculation which estimates an increase in risk exposure of Danish banks of around 36%.

Source: EBA (2020) and own calculations.

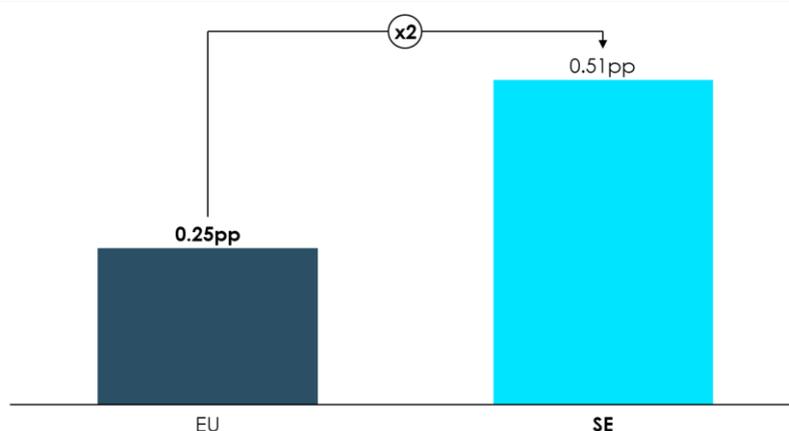
As mentioned, the impact in Sweden is somewhat muted due to the risk-weight floors on mortgages. Looking at the corporate portfolios, the impact is among the highest in the EU and twice as high as the EU average, see Figure 12.

²⁵ I.e. whose banks have on average low risk weights applied to their exposures.

²⁶ While the output floor is the main driver of the increase in capital requirements in countries like Sweden and Germany, this is not the case in all EU countries. For instance, will the output floor barely affect banks in Spain and Italy, where the increase in capital requirements is due to other aspects of the Final Basel III reform.

Figure 12**Increase in corporate borrowing costs**

Increase in corporate borrowing cost from banks, percentage points (pp)



Note: Estimates for countries other than Sweden are based on high-level assumptions, for instance regarding the share of rated corporates, etc.

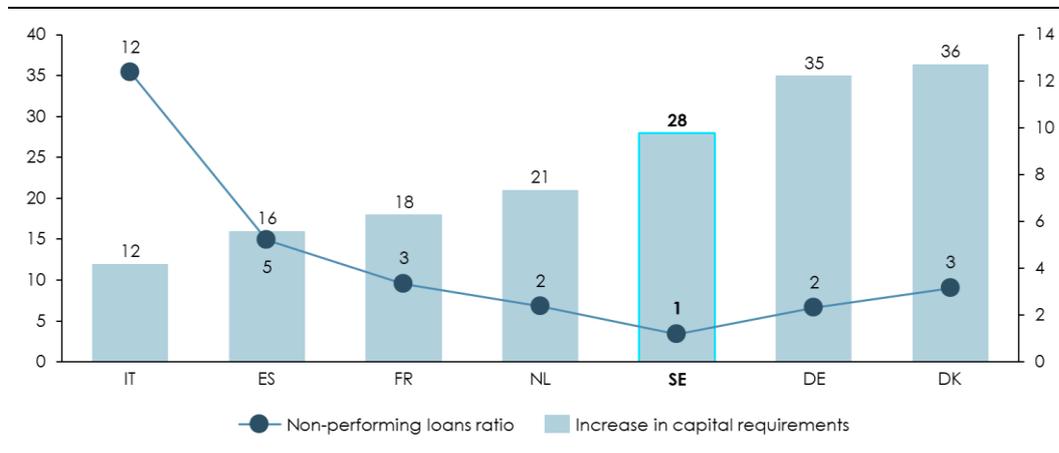
Source: Own calculations, based on data from EBA's transparency exercise and data input from the three largest Swedish banks. See Appendix A in CE (2020) for details on the estimations.

2.2 IS THE HIGH INCREASE IN CAPITAL REQUIREMENTS IN SWEDEN JUSTIFIED FROM A RISK PERSPECTIVE?

We find no evidence that the Swedish banking sector in general, and the corporate portfolio specifically, should be particularly vulnerable so as to justify this significant increase in capital requirements. On the contrary, when looking at standard indicators to assess banking sector robustness, the Swedish sector comes out on top. We provide four examples:

First, the Swedish banking sector has historically had low credit losses. For example, Sweden has had the lowest share of non-performing loans among the biggest European economies since 2014, see Figure 13.

Figure 13
Gross non-performing loans and increase in capital requirements
% increase in capital requirements (left axis), % of gross non-performing loans (right axis)



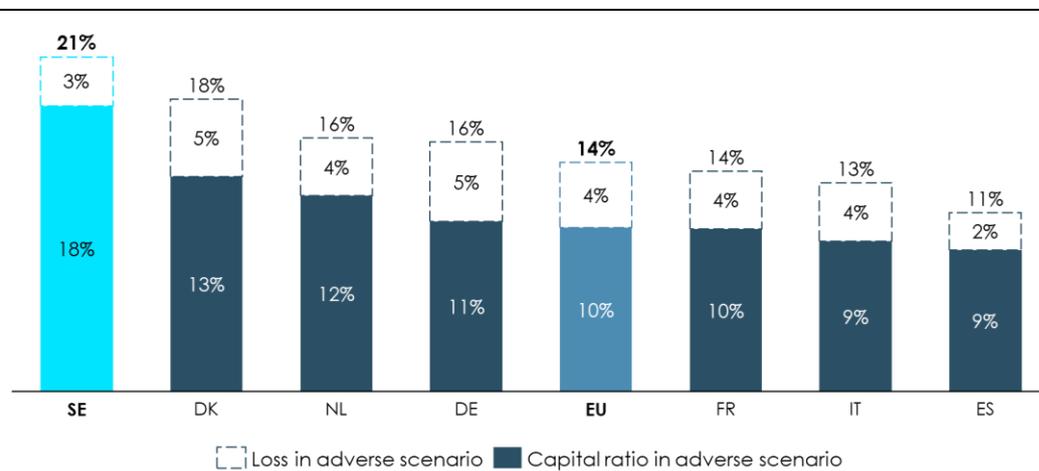
Note: Gross non-performing loans are expressed as average share of gross loans for the period 2014-2019 (i.e. non-performing loans as a share of total loans), domestic and foreign entities.

Source: Eurostat (2020) Gross non-performing loans, domestic and foreign entities - % of gross loans, 2014-2019 [TIPSD10]. EBA (2020). Own calculations.

Second, in the EBA's stress test, the Swedish banking sector comes out in the very top. In the stress test, EBA simulates what would happen in a financial crisis where GDP declines around 10%, (which is more than double the decline during the 2008 financial crisis). Sweden's capital ratio of 18% is higher than the starting point of most countries, despite the fact that the Swedish scenario was considerably more severe than in most other countries, see Figure 14.²⁷

²⁷ The assumed decline in commercial and residential real estate prices in Sweden was around twice as large as the average decline in the EU and the decline in GDP was around four times larger than on average in the EU. See ESRB (2018b) for a detailed description of the stress test scenarios used in EBA's stress test.

Figure 14
Total capital ratio now and after a simulated financial crisis
Capital ratio (equity as share of total assets)



Source: EBA EU-wide stress testing 2018. Note that the CET1 ratio for Sweden here does not account for the conversion of the mortgage floor to Pillar 1.

Third, Swedish banks receive some of the highest credit ratings in the EU, see Figure 15. Credit ratings provide an indication of the likelihood of a company to default. They are provided by independent credit agencies that specialise in evaluating the financial robustness of companies.

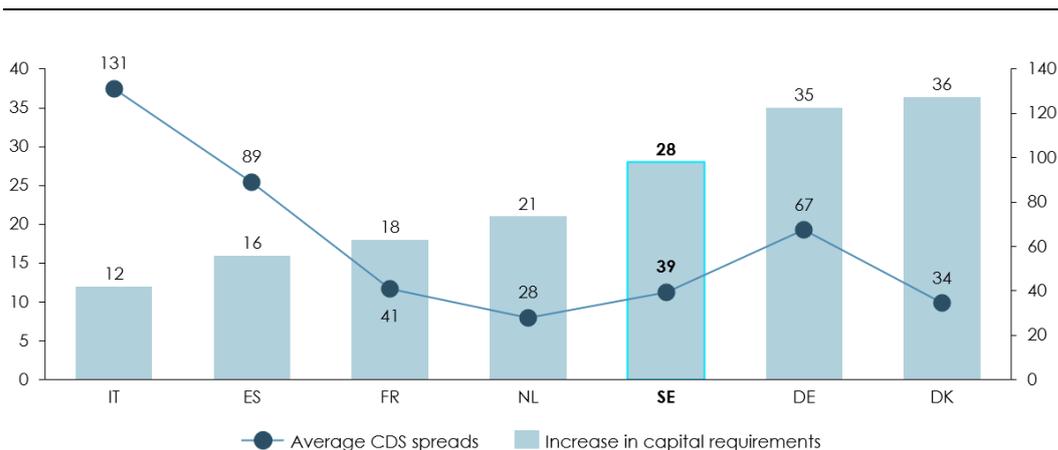
Figure 15
Average credit rating of banks within each country, March 2020, and increase in capital requirements
% increase in capital requirements (left axis), Fitch long-term issuer default rating (right axis)



Note: The average country rating is based on the largest banks in the respective country.
Source: Eikon Refinitiv database.

Fourth, Swedish banks have some of the lowest credit default swaps (CDS) in EU. Credit default swaps identify the cost of buying an insurance against the default of a specific bank. Thus, the low CDS means that the market assesses Swedish banks to have a low risk of default, see Figure 16.

Figure 16
Average CDS spreads in 2020, selected banks
% increase in capital requirements (left axis), basis points (right axis)



Note: The average CDS spread in each country is calculated as the simple average of CDS spreads of selected large banks in the respective country.

Source: Eikon Refinitiv database.

CHAPTER 3

OPTIONS FOR DESIGNING THE OUTPUT FLOOR AND HOW IT WOULD AFFECT SWEDISH BANKS AND ECONOMY

The large impact of the Final Basel III package outlined in the previous two chapters is primarily the result of the application of the output floor as interpreted by EBA – the so-called *single stack* approach.

However, there is another way of interpreting the output floor, denoted the *parallel stack* approach. This approach would serve more as a backstop and would be non-binding for most banking assets, thus keeping the risk sensitivity of capital requirements. In turn, this will avoid the large increase in capital requirements in some European countries, thus leading to a much more uniform impact across Europe.

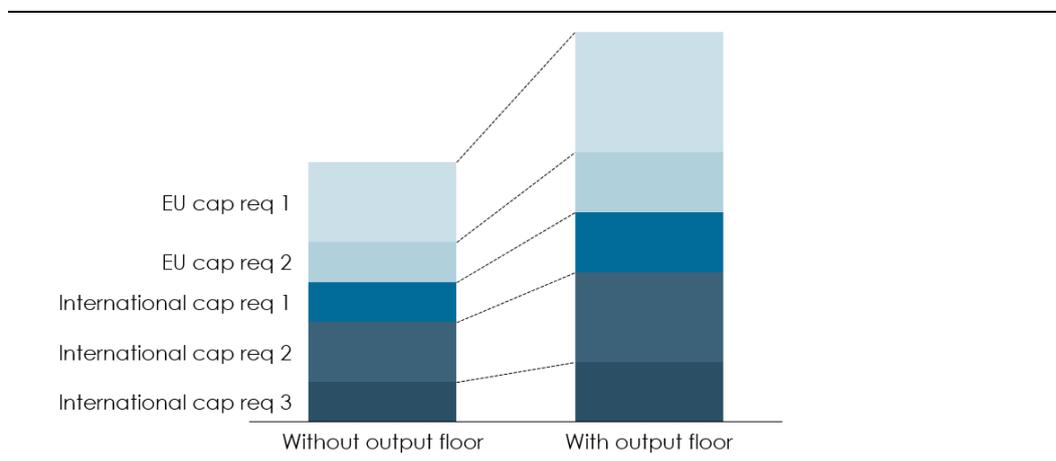
3.1 ALTERNATIVE TO EBA'S SUGGESTED IMPLEMENTATION: THE PARALLEL STACK APPROACH

EU banks are subject to a range of additional capital requirements (aside from those agreed on internationally) to guard against different risks, e.g. many large banks (including the three largest Swedish banks) are subject to the *systemic risk buffer* that takes into consideration that certain banks are systemically important²⁸.

The interaction between the EU specific capital requirements and the output floor is one of the reasons why the impact is larger in the EU than it is globally (and why the impact is particularly large in Sweden), see Figure 17.

²⁸ I.e. their default could potentially trigger a financial crisis.

Figure 17
Illustration of single stack approach, without output floor vs with output floor
%, level of overall capital requirement, as sum of different individual capital requirements



Source: Illustration by Copenhagen Economics.

To avoid this interaction, the *parallel stack* approach suggested, which was also included as an option in a recent note²⁹ by the EU Commission.³⁰

Fundamentally, the approach means that banks are subject to two parallel calculations of capital requirements:

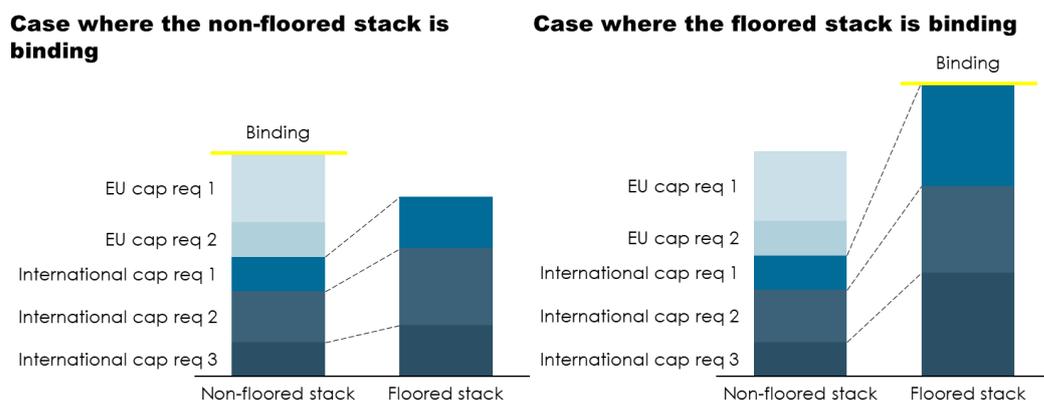
- The *floored stack* calculation, where the output floor is *only* applied to capital requirements that are internationally agreed (and not the EU specific ones).
- The *non-floored stack* calculation, where EU banks are subject to all capital requirements – including the EU specific ones – in a calculation *without* the output floor.

The binding capital requirement for banks is then the highest of the two stacks, see Figure 18.

²⁹ We refer to the note “Next banking package – implementation of the Basel III output floor in the EU” which was prepared for the Commission Expert Group on Banking, Payments and Insurance.

³⁰ For more details on the technical workings see CE (2020), Chapter 4.

Figure 18
Illustration of parallel stack approach
%, level of capital requirement, as sum of different buffers

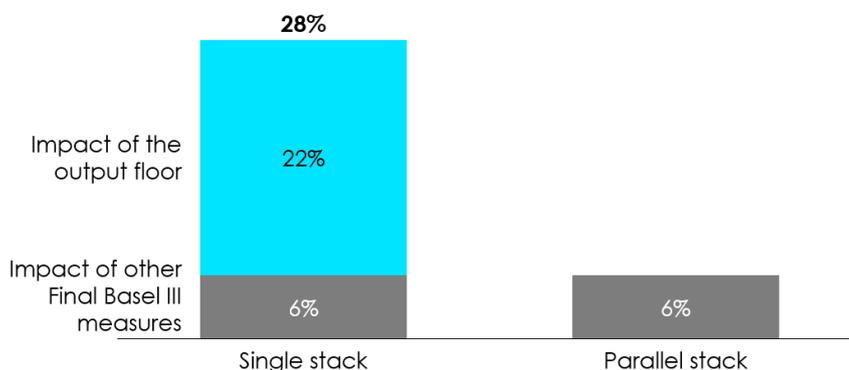


Source: Illustration by Copenhagen Economics.

The two approaches have very different impact on capital requirements for Swedish banks:

- *With the single stack approach*, we estimate that the output floor alone would increase capital requirements in Sweden by 22%. This comes on top of the other measures in the Final Basel III proposal, bringing the total to 28% (as seen in Chapter 1).
- *With the parallel stack approach*, we find that the output floor will (in its standard implementation) not be binding for Swedish banks. Thus capital requirements will only increase by the 6% from the other measures in the Final Basel III framework, see Figure 19.³¹ This also means that the risk sensitivity of capital requirements is maintained.

Figure 19
Increase in capital requirements, single stack vs parallel stack approach
Increase in capital requirements, average among Swedish banks



Source: Own calculations based on data from EBA's transparency exercise

³¹ The impact before the output floor refers to the impact of other aspects of the Final Basel III reform such as the revisions of the standardised approach, revisions to market risk or revisions to the CVA framework.

It should be noted that the actual impact depends on the exact design. Concretely, the European Commission has in their discussion note put forward a total of six different options, three following the single stack approach and three following the parallel stack approach. We elaborate further on these options and their impact on capital requirements and borrowing costs in the Appendix.

3.2 A WAY FORWARD

This note has highlighted two fundamentally different paths the implementation of the Final Basel III can take. Both from an economic as well as a financial stability perspective, we find the parallel stack approach to be the best suited option for the Swedish economy, due to two main reasons:

- It will lead to a much smaller impact on capital requirements, with resulting smaller impact on borrowing costs and therefore fewer real-economy costs;
- It will largely keep the link between capital requirements and underlying risk for assets, i.e. risky lending remains more expensive for banks, which ensure incentives for banks are better aligned with financial stability considerations.

In addition, applying the parallel stack approach in Sweden will also bring the impact on the Swedish banking sector closer to the impact at a global level, thus in line with the original spirit of the Final Basel III framework of not significantly increasing capital requirements.

In parallel, we suggest continuing the work to increase transparency, comparability, and precision of internal models of financial institutions. This is for example the focus of the ECB's targeted review of internal models (TRIM) as well as the ongoing monitoring by the national competition authorities (NCAs). Ultimately, financial institutions that have (1) solid, verifiable models identifying their risks and (2) can document their solidity, even in very adverse economic conditions, through stress tests, should be able to use these models in determining their capital adequacy.

REFERENCES

- Bank of England (2016) *Pass-through of bank funding costs to lending and deposit rates*
- Basel Committee on Banking Supervision (BCBS) (2010) *An assessment of the long-term economic impact of stronger capital and liquidity requirements*
- BCBS (2013) *Analysis of risk-weighted assets for credit risk in the banking book*
- BCBS (2016) *Analysis of risk-weighted assets for credit risk in the banking book*
- BIS (2010) *An assessment of the long-term economic impact of the new regulatory framework*
- BIS (2019a) *Basel III Monitoring Report*
- BIS (2019b) *The costs and benefits of bank capital - a review of the literature*
- Christensen, I., Meh, C., & Moran, K. (2011). *Bank leverage regulation and macroeconomic dynamic.*
- Copenhagen Economics (2016) *Cumulative impact of financial regulation in Sweden*
- Copenhagen Economics (2020) *Impact of The Final Basel III Framework in Sweden, Effects on the banking market and the real economy*
- EBA (2017) *Results from the 2016 High Default Portfolios (HDP) Exercise*
- Eikon Refinitiv database
- European Banking Authority (EBA) (2019) *Basel III reforms: Impact study and key recommendations – Macroeconomic assessment, credit valuation adjustment and market risk*
- European Banking Authority (EBA) (2020) *Basel III Reforms: Updated Impact Study*
- European Central Bank (2016) *The impact of bank capital on economic activity*
- European Systemic Risk Board (ESRB) (2018a) *EU Shadow Banking Monitor*

ESRB (2018b) *Adverse macro-financial scenario for the 2018 EU-wide banking sector stress test*

Eurostat (accessed in 2020), selected statistics

G20 Communique, March 18th, 2017

Hansson, Oscarius and Söderberg (2014) *Shadow banking from a Swedish perspective*

IMF (2016) *Benefits and Costs of Bank Capital*

IMF (2017) *Heterogeneity of Bank Risk Weights in the EU*

Meh and Moran (2010): *The role of bank capital in the propagation of shocks*

Miles, Yang and Marcheggiano (2011) *Optimal bank capital*

Plantin (2014) *Shadow Banking and Bank Capital Regulation*

The Riksbank (2011) *Appropriate capital ratio in major Swedish banks*

ZEB (2018) *European Banking Study*

APPENDIX

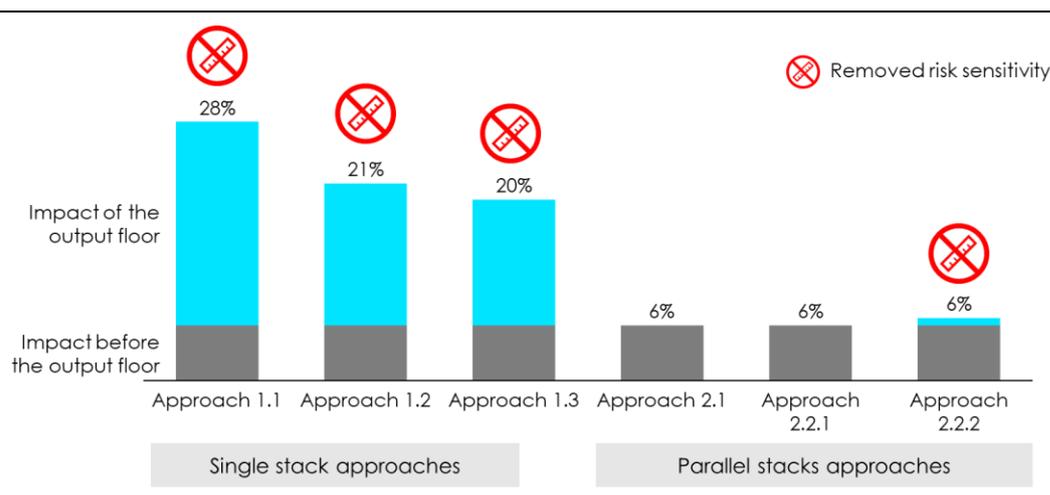
DETAILED OPTIONS FOR IMPLEMENTING THE OUTPUT FLOOR

A recent note by the European Commission puts forward a total of six options for implementing the output floor. Three options following to the single stack approach and three options following the parallel stack approach.

All three options of the single stack approach will lead to a significant increase in capital requirements for most Swedish banks and will remove the risk sensitivity for low-risk assets, see Figure 20.

Figure 20
Increase in capital requirements for the different output floor options as put forward in the Commission note

Increase in capital requirements, average among Swedish banks



Note: Approach 1.1 corresponds to EBA's baseline approach. In approach 1.2, the capital requirements are calculated by applying the output floor to capital requirements explicitly mentioned in the Basel III standards (i.e. the international buffers) and non-floored risk weights to the EU buffers. With approach 1.3, the EU buffers do not mechanically increase from the pre-Final Basel III level. Approach 2.1 is the standard parallel stack approach described above. Approaches 2.2.1 and 2.2.2 differ from the standard parallel stack approach in that different parts of one of the EU buffers, the Pillar 2 Requirements (P2R), are added to the floored stack. In approach 2.2.1, a smaller part of P2R (that covers risk from aggressive modelling) is floored. In approach 2.2.2, a bigger part of P2R (that covers risks not sufficiently captured in Pillar 1 in addition to aggressive modelling risk) is floored, making this approach binding more often and therefore less risk sensitive.

Source: Own calculations based on data from EBA's transparency exercise

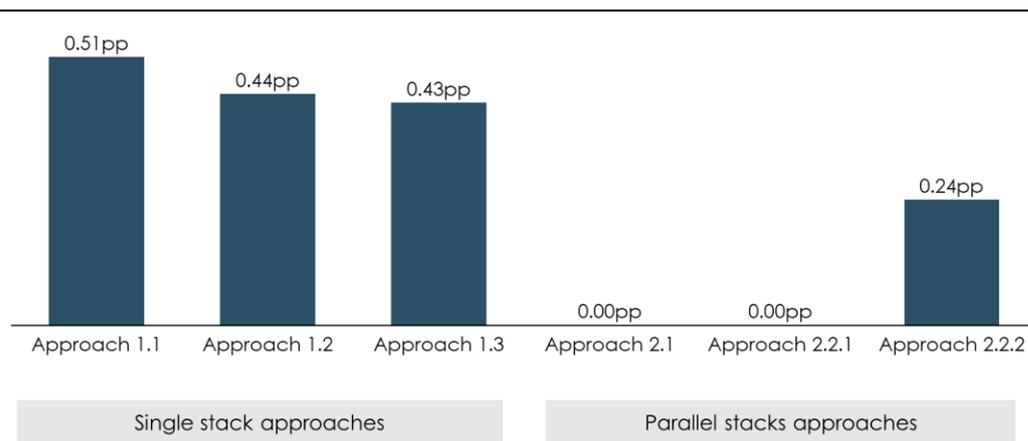
On the other hand, the three parallel stack options will not lead to a significant increase in capital requirements for most Swedish banks. For two of the parallel stack options (2.1 and 2.2.1), the output floor is not binding for any Swedish banks, meaning that risk sensitivity is entirely kept.

However, in option 2.2.2, the output floor is applied to some of the EU specific buffers, and the output floor will be binding for around 2/3 of the Swedish banking sector (even though the increase in overall capital requirements is small).

The loss of risk sensitivity by 2.2.2 is illustrated by looking at the impact on corporate borrowing rates. Here, the relatively low-risk corporates will, on average, have increased borrowing costs by some 0.2 percentage points, see Figure 21. This is because the parallel stacks approach in option 2.2.2 is binding for some Swedish banks, which results in the capital allocation being guided by floored risk exposure amounts. This affects corporate borrowers more than other portfolios because of the large impact of the output floor on this asset class. On the contrary, more high-risk customers will actually experience a decline in borrowing costs.

Figure 21
Impact on corporate borrowing costs of different options

Increase in corporate (rated and unrated) borrowing rates from banks, percentage points (pp)



Note: The impact on corporates before the output floor is implemented is almost zero in Sweden.

Source: Own calculations based on data from EBA's transparency exercise