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## Will German banks earn their cost of capital?

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# **Non-technical summary**

## **Research Question**

This paper analyses the effect of a sustained period of low interest rates on the outlook for the German banking sector. Low interest rates provide a particular challenge for German banks, which are highly dependent on interest income and exhibit relatively high cost-income ratios. It is thus an open question whether German banks will manage to earn their cost of capital in this environment.

## **Contribution**

We analyse the interest earnings from loans and the interest expenses for deposits, i.e. the core business interest margin of a bank. We consider different future interest rate scenarios and analyse the extent to which they cause a further narrowing of the core business interest margin. Finally, we test whether a special feature of German accounting standards could serve as a buffer in sustaining profitability for some time.

## **Results**

Our results indicate that a sustained period of low interest rates will increase the pressure on the core business interest margin earned by German banks. Even if interest rates stayed constant at current levels, the core business interest margin of German banks would be reduced by 16% over the next four years. Moreover, this projected decline in the core business interest margin will result in only 20% of German banks earning a cost of capital of 8% by the end of this decade. However, by applying a special feature of German accounting standards and using hidden and open reserves, German banks may alleviate this decline to a certain extent.

# **Nichttechnische Zusammenfassung**

## **Fragestellung**

In diesem Forschungspapier werden die Auswirkungen einer anhaltenden Phase niedriger Zinsen auf die Ertragsaussichten des Bankensektors in Deutschland untersucht. Das Niedrigzinsumfeld stellt für die deutschen Banken eine besondere Herausforderung dar, weil sie stark vom Zinseinkommen abhängig sind und vergleichsweise hohe Aufwand/Ertrag-Relationen aufweisen. Daher steht die Frage im Raum, ob es den deutschen Banken gelingen wird, in diesem Umfeld ihre Kapitalkosten zu erwirtschaften.

## **Beitrag**

Wir analysieren die Zinserträge aus Krediten und die Zinsaufwendungen für Einlagen, d. h. die Zinsmarge im Kerngeschäft einer Bank. Dabei betrachten wir verschiedene künftige Zinsszenarien und untersuchen, inwieweit diese zu einer weiteren Verringerung der Zinsmarge im Kerngeschäft führen. Schließlich wird geprüft, ob eine Besonderheit der deutschen Rechnungslegungsstandards eine Pufferbildung ermöglichen könnte, die die Rentabilität für einige Zeit aufrechterhalten würde.

## **Ergebnisse**

Unsere Ergebnisse zeigen, dass eine anhaltende Phase niedriger Zinsen den Druck auf die von den deutschen Banken erwirtschaftete Zinsmarge im Kerngeschäft erhöhen würde. Selbst wenn die Zinsen konstant auf ihrem aktuellen Niveau blieben, würde sich die Zinsmarge im Kerngeschäft der Banken in Deutschland in den nächsten vier Jahren um 16 % verringern. Zudem hätte diese prognostizierte Margenverringern zur Folge, dass am Ende dieses Jahrzehnts nur noch 20 % der deutschen Banken Kapitalkosten in Höhe von 8 % erwirtschaften. Die deutschen Banken könnten diesen Rückgang allerdings bis zu einem gewissen Grad abfedern, wenn sie eine spezielle Regelung aus den deutschen Rechnungslegungsstandards nutzen und stille und offene Reserven auflösen.

## Will German banks earn their cost of capital?

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### Abstract

In recent years, the German banking sector has overcome major challenges such as the global financial crisis and the European debt crisis. This paper analyses a recent development as a particular determinant of the future outlook for the German banking sector. Interest rates are at historically low levels and may remain at these levels for a considerable period of time. Such levels pose a specific challenge to banks which are heavily dependent on interest income, as is the case for most German banks. We consider different interest rate scenarios and analyse the extent to which they cause a further narrowing of the interest rate margin. Our results indicate that a projected decline in this margin will result in no more than 20% of German banks earning a cost of capital of 8% by the end of this decade. This decline is somewhat alleviated by the fact that German banks can apply a special feature of German accounting standards by using hidden and open reserves.

**Keywords:** German banking sector, low interest period, profitability, hidden and open reserves.

**JEL-Classification:** G21, G28.

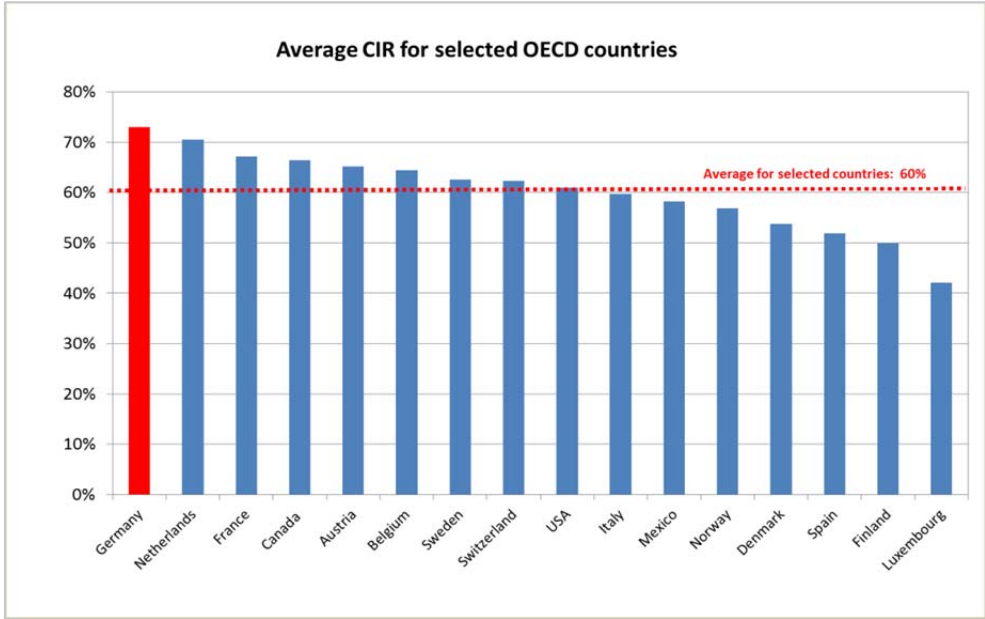
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# 1 Introduction

Studies have consistently shown that German banks are, on average, less profitable than their international peers. In particular, studies by the OECD and other institutions show that average cost-income ratios for German banks are considerably higher than those for banks in other countries. In fact, in the period between 1999 and 2009, German banks exhibited the highest average cost-income ratios (CIR) among the OECD countries (Figure 1). While the OECD ceased to compile cross-country banking statistics in 2009, the Deutsche Bundesbank’s September 2015 *Monthly Report* puts the CIR of German banks at 69.8% in 2014, which is very close to the earlier OECD figures.<sup>1</sup> Comparisons with other countries indicate in general that these high values are due to low revenue generation rather than higher costs.

Figure 1. Average cost-income ratio (CIR) for selected OECD countries.



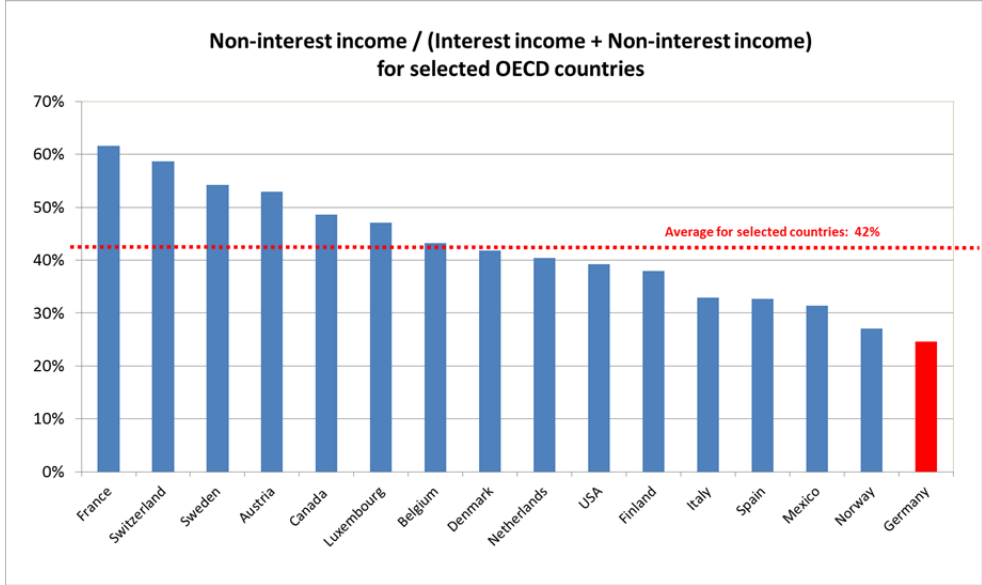
(Source: OECD Bank Profitability Statistics, 1999-2009)

Furthermore, on average, German banks exhibit a higher dependency on interest income than banks in any other OECD country (Figure 2). Although the OECD again ceased

<sup>1</sup> Deutsche Bundesbank (2015), September Monthly Report, “The performance of German credit institutions in 2014.”

to report figures for this after 2009, the Bundesbank showed – also for 2014 – that, at 24.8%, non-interest income represented a relatively small share of German banks’ overall interest and non-interest income. Again, this is very close to the earlier OECD figures.<sup>2</sup>

**Figure 2. Percentage of non-interest income for selected OECD countries.**



(Source: OECD Bank Profitability Statistics, 1999-2009)

It is often argued that high cost-income ratios combined with a heavy dependency on interest income make the average return on equity (RoE) lower for German banks than for their international peers.<sup>3</sup> Figure 3 presents the RoE in the three pillars of the German banking system between 1994 and 2013. It shows that the average RoE for German banks was less than 10%, and even less than 5% for savings and commercial banks.

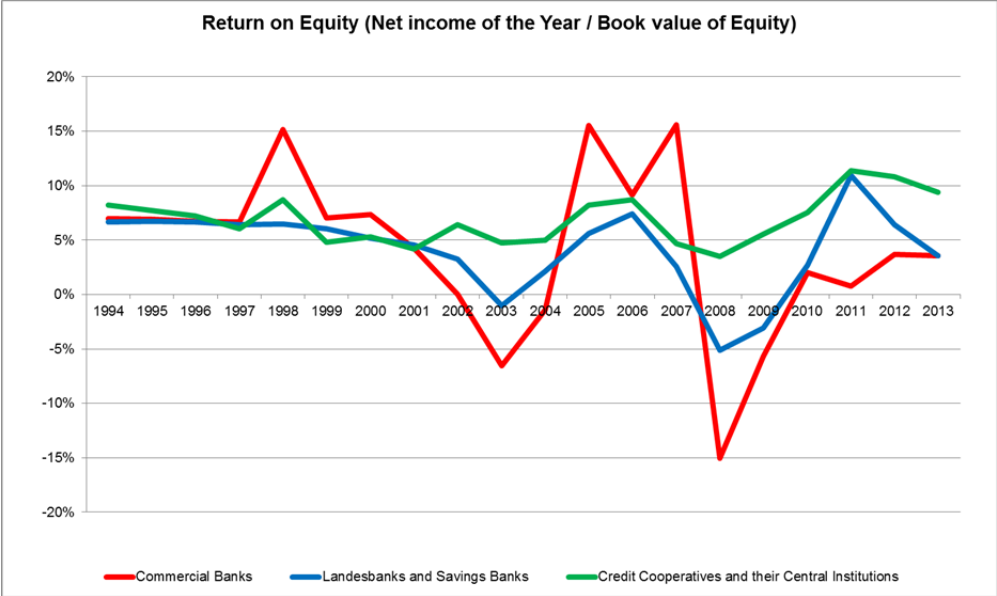
These figures have to be compared to the cost of capital that these banks face. On a global level, the International Monetary Fund (IMF) reports that profitability in the banking sector is decreasing. In particular, its 2015 Global Financial Stability Report identifies an average RoE of 8% in 2014 for a sample of more than 300 global banks, down from an

<sup>2</sup> Ibid.

<sup>3</sup> See, for instance, Brunner et al. (2004), Council of Economic Experts (*Sachverständigenrat*) (2008), and the Opening Statement by Andreas Dombret (2014a) at the unveiling of the Deutsche Bundesbank’s Financial Stability Review, “The Risk situation in the German financial system”, November 25, 2014.

average of 13% between 2000 and 2006.<sup>4</sup> At the same time, this report estimates the current cost of capital through the CAPM model for a similar set of banks to be around 13%, declining from its peak in 2010, but still 5% higher than the 2000-2005 average.<sup>5</sup> In light of these figures, German banks seem unable on average to earn the cost of capital that would be demanded by international investors.

**Figure 3. Mean return on equity for three banking sectors in Germany.**



(Source: Deutsche Bundesbank, Income Statement Statistics.)

This observation raises questions about the long-term sustainability of the average German bank even more than in normal times, being described as “the biggest challenge facing the German banking sector”.<sup>6</sup> The persistent low-interest rate environment has put German banks under pressure. On the one hand, costs for interest-bearing liabilities have already hit the zero lower bound. On the other hand, earnings from interest-bearing assets are

<sup>4</sup> International Monetary Fund (2015) Global Financial Stability Report, pp. 17-21.  
<sup>5</sup> International Monetary Fund (2014) Global Financial Stability Report, pp. 23.  
<sup>6</sup> Speech by Andreas Dombret delivered at the press conference to unveil the Financial Stability Review (2015), “The situation in the German banking sector: Challenges in striking a balance between weak profitability and the low-interest-rate environment”, November 25, 2015. See also Dombret (2014b), Dombret (2014c) and Dombret (2016).



continuing to decrease, since newly transacted loans enter the books with lower interest rates than before.

One of the key tasks of the supervisory authority is to maintain a well-functioning financial system through the use of micro and macroprudential supervisory tools. In 2015, the Deutsche Bundesbank surveyed 1,459 small and medium-sized German banks about their revenue expectations in the low-interest rate environment. The survey concludes that the sample banks expect their profitability to decline by 25% by 2019. The banks were given alternative interest rate scenarios under which they were to specify their revenue expectations. The results of the Bundesbank's survey indicate that the persistently low interest rates constitute a challenge for German banks, which has prompted us to conduct a further analysis based on the Bundesbank's MFI interest rate statistics. In contrast to the interest rate expectations of the small and medium-sized banks in the survey, we aim to look at the interest margin between interest earnings from loans and interest expenses through deposits, i.e. the core business of a bank. The analysis thus focuses on the question of whether the core business of banks is still profitable in the context of the low-interest rate environment.

Section 2 introduces the cost of equity measures of profitability, such as the ROE. It also discusses how these variables are affected by capital regulation.

In Section 3, we begin our analysis by presenting the Bundesbank's MFI interest rate statistics, which we use in order to answer the abovementioned question. Our results in this section will show that a sustained period of low interest rates will increase the pressure on the core business interest margin earned by German banks. Our analysis indicates that even a constant level of interest rates would result in a reduction of the core business interest margin by 16% over a period of four years.

Section 4 will further look at whether the increased pressure will be reflected in a depletion of German banks' hidden and open reserves. A special feature of the German banking system is that, pursuant to German commercial law, under sections 340f and 340g of

the German Commercial Code (*Handelsgesetzbuch*, HGB), German banks are allowed to form hidden and open reserves in better times and make use of them in more difficult times. In principle, German banks may utilize these reserves during a sustained period of stress caused by the period of low interest rates. Therefore, we specifically look at the amount of reserves that remain after taking into account a projected decline in the core business interest margin (CBIM). Without the use of any reserves, the projected decline in the CBIM indicates that no more than 20% of German banks will achieve a cost of equity capital of over 8% by 2018. On the other hand, if the hidden and open reserves are utilized such that the 2014 levels of net income are maintained annually, only 10% of the banks will have depleted their reserves by 2018, and only 7% will have negative profits and depleted reserves, assuming that the balance sheet is static and that no other responsive actions are taken by the banks.

Our paper contributes to the literature on the interest rate income dependency of German banks (Busch and Memmel, 2016; Busch and Kick, 2015; Memmel and Schertler, 2013; Memmel, 2011), their use of hidden and open reserves (Bornemann et al., 2012; Bornemann et al., 2014), and their response to interest rate shocks (Busch et al., 2016). Overall, our paper adds to the recent findings by showing that the German banking sector seems to have the capacity to overcome such challenges by means of its reserves in the near future.

## **2 Cost of Equity and Profitability**

The cost of equity measures the return that shareholders demand in exchange for providing a bank's equity. The return on equity (RoE), which is net income as a percentage of equity, can be used to measure banks' profitability.

In its 2014 Global Financial Stability Report, the International Monetary Fund (IMF) documents an average long-term benchmark cost of equity of 8%. Banks are thus expected to

surpass this benchmark in order to generate value. Applying this concept to an analysis of the German banking sector involves challenges. First, there are only a small number of publicly listed German banks, which means it is necessary to use book values of equity. Second, German banks, especially credit cooperatives and savings banks, finance themselves primarily through deposits. Bond issuance is not as common as in the United States and other countries. This fact could have an implicit effect through deposit insurance regimes and be reflected indirectly in German banks' profitability. Third, German accounting rules (pursuant to the HGB) enable small and medium-sized German banks to smooth their earnings by forming reserves. These factors mean it is necessary to analyse the German banking sector's cost of equity and profitability on an individual basis.

Recent regulatory initiatives, such as Basel III and its European implementation, the Capital Requirements Regulation (CRR), have prompted discussions on the cost of bank equity. On the one hand, it is argued that higher capital requirements increase the cost of funding for banks, since greater amounts of equity would imply higher required returns. On the other hand, more equity means banks are more resilient, resulting in a lower required risk-adjusted return on capital.<sup>7</sup>

Another dimension has been added to this debate through the regulatory preparation of bail-in tools such as the Total Loss Absorbing Capacity (TLAC) standard and its European implementation, the Minimum Requirement for Eligible Liabilities (MREL). The medium-term goal of TLAC and MREL is to facilitate a stable international banking system through a heterogeneous set of capital providers and reduced too-big-to-fail costs, whereas, in the short term, the new regulation will decrease the burden on taxpayers in the case of a systemic financial event. The Bank for International Settlements (2015) shows that if the global banks aim to maintain the same level of RoE, they will need to take alleviating measures. The

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<sup>7</sup> Admati, DeMarzo, Hellwig, and Pfleiderer (2013) provide a comprehensive discussion of capital regulation and funding costs.

introduction of TLAC would cause an increase in funding costs only for G-SIBs, leaving the majority of German savings banks and credit cooperatives unaffected.

The following analysis examines whether German banks can generate sustainable profitability and earn the required cost of equity even with persistent stress on interest rates.

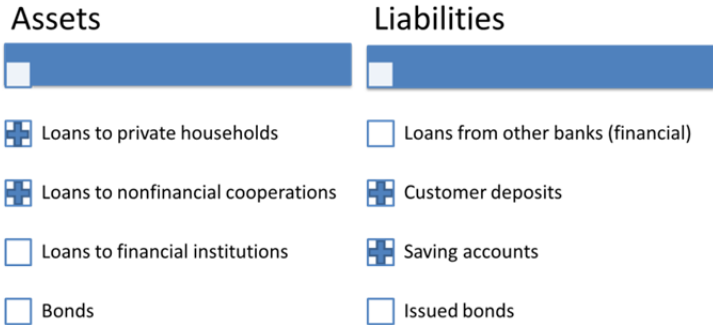
### 3 Core Business Interest Margin in a Low-Interest Environment

#### 3.1 MFI Interest Rate Statistics Data

The Bundesbank’s monetary financial institutions (MFI) interest rate statistics provide the starting point for our analysis. These statistics report the volumes of a sample of about 230 German banks’ euro-denominated deposits and loans to households and non-financial corporations domiciled in euro-area countries.<sup>8</sup> They separately report deposits and loans as outstanding amounts in a given month and as new business in each month.

As Table 1 indicates, while the MFI interest rate statistics do not include the full set of interest-bearing instruments, they allow us to work on what we term the core business interest margin (CBIM) between loans and deposits, leaving out interbank loans, bond issuances, and bond purchases.

**Table 1. Interest earning/paying items in MFI interest rate statistics from balance sheet assets & liabilities**



<sup>8</sup> The term monetary financial institutions (MFI) refers to the set of around 230 domestic banks that are selected by the Deutsche Bundesbank in a way that represents the full set of banks in Germany. MFIs normally include money market funds, which are, however, excluded from these statistics. For sample selection and methodology, see Deutsche Bundesbank (2004) Monthly Report, January, pp. 45-59, and Deutsche Bundesbank (2011) Monthly Report, June, pp-45-57.

In addition to the outstanding amount and new business volume in each month, the MFI interest rate statistics provide the weighted average interest rate in each business sector, starting in January 2003. The full datasets of household real estate loans, consumer loans, loans to non-financial companies, and deposits from household and non-financial companies are available in the statistics.

## 3.2 Estimation of Core Business Interest Margin

### 3.2.1 Estimation from Outstanding Volumes (Stock-level)

We make use of the volume-weighted interest rates for each of the different loan types. We generate a volume-weighted monthly loan and deposit rate separately and then take their difference to obtain a monthly CBIM value. We call the resulting value CBIM (Stock), in order to indicate the value being estimated from outstanding amounts (stock-level information).

$$CBIM(\text{Stock})_T = \frac{\sum_{i=1}^N (\text{OutstandingVolume}_{Ti} * r_{1i})}{\sum_{i=1}^N \text{OutstandingVolume}_{Ti}} \quad (1)$$

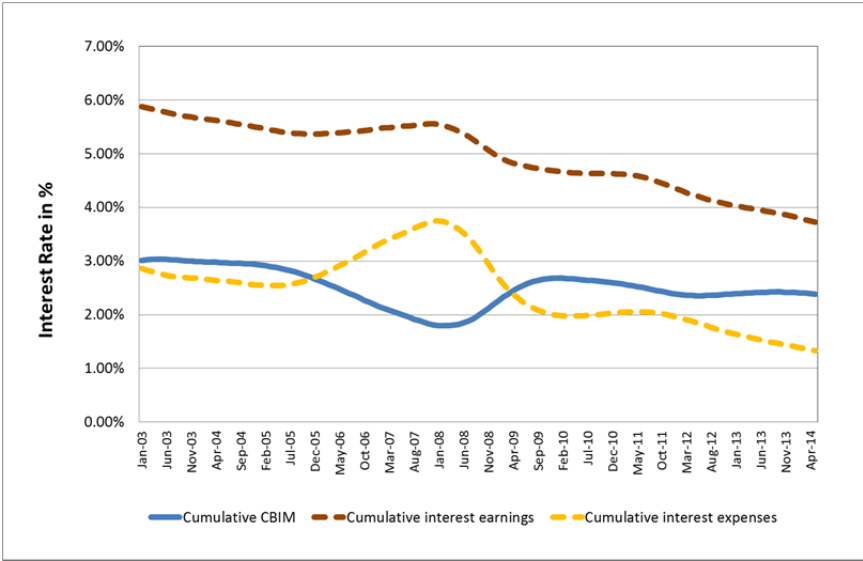
where  $r$  is the interest rate of the specific loan or deposit type  $i$  in month  $T$ . Figure 4 depicts the time series of these variables. The downward trend for the CBIM exhibited after 2010 is consistent with the findings in existing studies that concentrate on the net interest margin (NIM) of all interest-bearing instruments.<sup>9</sup>

The CBIM (Stock) of the period until April 2014 has a time series average of 2.50% with a standard error of 0.34%, which is in line with earlier studies on German interest rates (Table 2). Even without including (i) interest earned and paid to financial institutions through interbank operations, and (ii) interest on bonds issued or purchased, the average CBIM is close to the average values for the NIM derived from previous studies.

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<sup>9</sup> See Deutsche Bundesbank (2015), Monthly Report, September.

**Figure 4. Time series variation of the estimated CBIM (Stock) from outstanding amounts**



**Table 2. Comparison of average rates to the values that are found in the literature**

<i>Contribution</i>	<i>Period</i>	<i>Average IM (%)</i>	<i>Average interest income (%)</i>	<i>Average interest expense (%)</i>
This Paper - CBIM Stock (Outstanding Amounts)	2003-2015	2.501 (0.349)	4.961 (0.63)	2.459 (0.66)
Mommel (2011)	2005-2009	2.24		
Entrop et al. (2015)	2000-2009	2.360 (0.530)	5.509 (0.676)	2.859 (0.557)
Mommel and Schertler (2013)	1999-2010	2.46 (0.46)	4.96 (0.64)	2.50 (0.55)

**3.2.2 Estimation from New Incoming Volumes (Flow-level)**

To analyse the future development of the interest margin, we compute the CBIM from ‘flow’ information, which comprises the new business volumes and associated interest rates. Use of these new incoming volumes requires maturity assumptions, i.e. how many months these new businesses will receive or pay interest. For instance, deposits of households and non-financial corporations with a maturity of less than one year are assumed to require

interest payments for six months, whereas deposits with a maturity of more than two years are assumed to require interest payments for five years. Similarly, loans to households and non-financial corporations with a maturity of between one and five years are assumed to collect interest for three years, whereas household loans with a maturity of more than ten years are assumed to collect interest for 15 years.

Equations 2 to 5 provide an example of the calculation of the CBIM (Flow) if a three-month maturity is assumed, where the incoming new business in each month is taken into account for the weighted interest rate calculation only as a moving weighted-average for the next three months.<sup>10,11</sup>

$$r_{1i} = \frac{NewBusinessVolume(NBV)_{1i} * NewBusinessRate(NBR)_{1i}}{NewBusinessVolume(NBV)_{1i}} \quad (2)$$

$$r_{2i} = \frac{NBV_{1i} * NBR_{1i} + NBV_{2i} * NBR_{2i}}{NBV_{1i} + NBV_{2i}} \quad (3)$$

$$r_{3i} = \frac{NBV_{1i} * NBR_{1i} + NBV_{2i} * NBR_{2i} + NBV_{3i} * NBR_{3i}}{NBV_{1i} + NBV_{2i} + NBV_{3i}} \quad (4)$$

$$r_{4i} = \frac{NBV_{2i} * NBR_{2i} + NBV_{3i} * NBR_{3i} + NBV_{4i} * NBR_{4i}}{NBV_{2i} + NBV_{3i} + NBV_{4i}} \quad (5)$$

where  $r$  is the moving weighted-average interest rate composed of the individual interest rates  $NBR$  of the specific loan or deposit type  $i$  with volume  $NBV$  in month  $t$  (numbered). In short, following the illustrative three month maturity assumption where  $\tau = 2$ , the applicable deposit or loan rate for month  $T$  is

$$CBIM(Flow)_T = \frac{\sum_i \sum_{t=(T-\tau)}^T NBV_{ti} * NBR_{ti}}{\sum_i \sum_{t=(T-\tau)}^T NBV_{ti}} \quad (6)$$

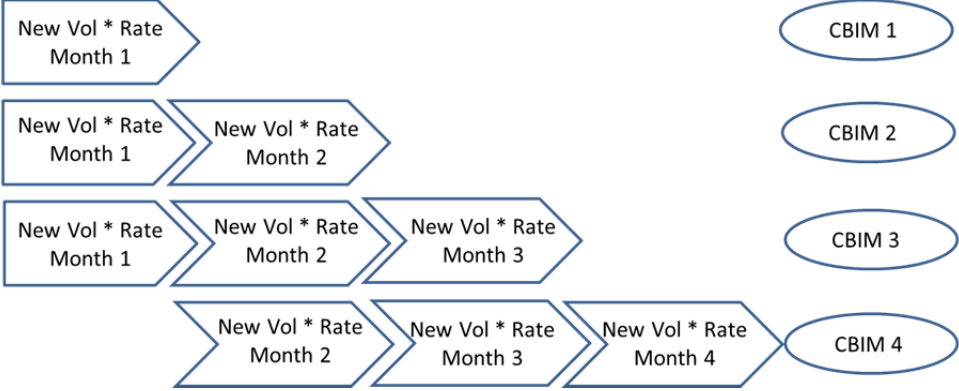
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<sup>10</sup> A three-month assumption is, for instance, required in order to assess the duration of the savings accounts of households and non-financial corporations, which are due daily. The literature assumes a breakdown similar to maturity buckets that are comparable to our assumption that 50% of the incoming new business matures in three months, and the rest persists for ten years (Memmel (2008)).

<sup>11</sup> One exception to this maturity persistence rule is savings accounts, since the applicable interest rate is allowed to vary in each month, that is, the former incoming business is multiplied by each new month's interest rate for the next three months, as well as for the next ten years.

Figure 5 provides an illustration of the monthly CBIM calculation in equations 2 to 6.

**Figure 5. Illustrative example of the calculation of the CBIM (Flow) from moving weighted averages for a bucket that has three months of maturity.**



**3.3 Scenario Projection with Core Business Interest Margin (Flow)**

The rolling cash flows in Section 3.2.2 allow us to undertake a scenario analysis by looking at the sensitivity of the CBIM (Flow). We make use of a constant April 2015 level of new business volume for the following four years, with an implicit assumption that banks’ new incoming deposit and loan volume will not contract despite the period of low interest rates. In particular, we consider three scenarios: (i) interest rates stay constant for the next four years, (ii) interest rates decrease by another 1% in the first two years and then stay constant in the next two years, (iii) interest rates stay constant in the first two years and rise by 1% in the last two years.<sup>12</sup> Moreover, we assume alternatives types of transmission of interest rates to deposits and loans in line with the pass-through analyses conducted by the European Central Bank (ECB) and the Federal Reserve Board (DeBondt, 2002; Driscoll and Judson, 2013), exhibited in Table 3. From this table, it can be inferred that, for instance, a 1% rise in interest rates would be reflected as a 0.8% rise in loan rates, and a 0.4% rise in deposit rates.

<sup>12</sup> These scenarios are quite close to the interest rate stress test assumptions used in the Deutsche Bundesbank’s 2015 survey.

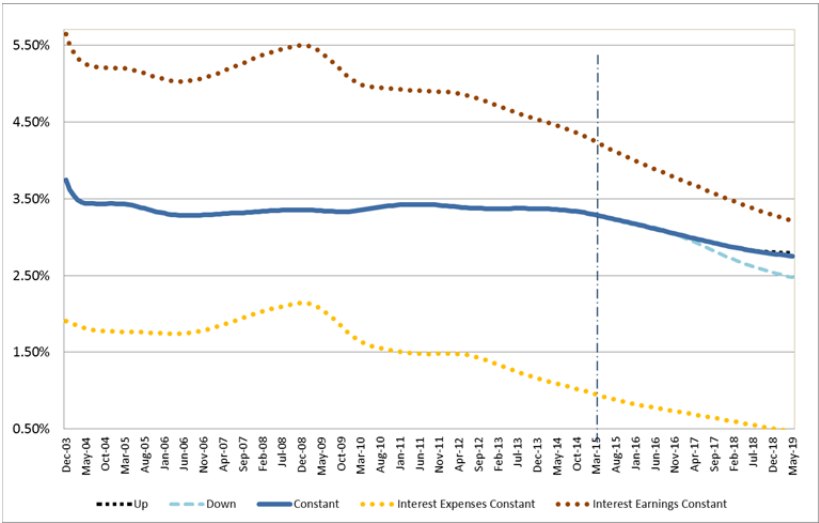


**Table 3. Pass-through values for increasing and declining values of deposits and loans**

<i>Scenario</i>	<i>Up</i>	<i>Down</i>
Loans	80%	100%
Deposits	40%	40%

Figure 6 shows how the CBIM would move in the next four years depending on these three scenarios. The thick dark blue line corresponds to scenario (i), the dashed light blue line to scenario (ii), and the dotted black line to scenario (iii). The figure indicates that a further decline in interest rates contracts the margin as in scenario (ii), however, the margin has only a very limited upside potential despite a potential rate hike two years from now in scenario (iii). The CBIM is therefore less sensitive in a slow rate hike versus a further decrease. If the interest rates stay low for in future years, the CBIM is expected to decline steadily, as shown in scenario (i).

**Figure 6. Time series variation and projection for CBIM from new business volumes of loans and deposits**



We find that the CBIM drops by around 16.15% for scenario (i), i.e. under constant interest rates. This analysis indicates that the core business interest margins of banks are significantly affected by the low-interest rate environment.

## 4 Profitability in the Presence of Hidden and Open Reserves

In this section, we use the results of the scenarios in Section 3.3 to gain a picture of the profitability of the German banking sector in 2019. The 16.15% fall in the CBIM in four years under the constant interest rate assumption corresponds to an average interest margin reduction of  $16.15\% / 4 = 4.0375\%$  per year. We conduct the following steps to analyse bank profitability in 2019:

1. To test the effects of this value on the profitability of German banks, we first retrieve the interest revenues and interest expenses for each of the 1,733 German banks at the end of 2014 from the monthly balance sheet statistics (BISTA) collected by the Deutsche Bundesbank. Subtracting the expenses from income yields a net interest margin (NIM) for each bank. We use the annual 4.0375% decline in the CBIM and transfer this decline to the full NIM, thus estimating how much the NIM would be reduced in the following four years after 2014. Therefore,

$$\widehat{NIM}_{b,2014+k} = NIM_{b,2014} * (1 - 4.0375\% * k) \quad (7)$$

where  $k$  is the count for the year after 2014, and  $b$  is an index for each of the 1,733 individual banks. Note that the annual average decline of 4.0375% in the CBIM is the same relative stress applied across all banks.

2. We retrieve the balances of hidden reserves “*Stille Vorsorgereserven*” and open reserves “*Fonds für allgemeine Bankrisiken*” (according to sections 340f and 340g of the German Commercial Code (HGB), respectively) from the prudential database (BAKIS) and monthly balance sheet statistics (BISTA) of the Deutsche Bundesbank.<sup>13</sup> Total reserves

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<sup>13</sup> For further information on open and hidden reserves of German banks, see Deutsche Bundesbank (2012), Monthly Report September. Bornemann et al. (2012) have recently shown how German banks use hidden

across all banks in Germany pursuant to sections 340f and 340g HGB amount to €119 billion. We calculate how much of the hidden and open reserves in 2014 must be utilized in order to compensate for the drop in the NIM in each of the years following 2014.

$$(\$340f + \$340g)_{b,2014+k} = (\$340f + \$340g)_{b,2014} - NIM_{b,2014} * (4.0375\% * k) \quad (8)$$

where  $(\$340f + \$340g)_{b,2014+k}$  are the reserves remaining in each of the k following years after 2014, after compensating for the drop in the NIM. The total reserves required in four years would be

$$\sum_{k=1}^4 NIM_{b,2014} * (4.0375\% * k) = NIM_{b,2014} * 40.375\% \quad (9)$$

for each bank b, where the value of 40.375% could be reached from the cumulative reduction in the CBIM in four years (4.0375% + 8.075% + 12.1125% + 16.15%).

3. Next, we identify the volume of reserves that would still be available in 2019 if the annual net income were to be kept constant over the next four years through the use of reserves. We calculate the value of the reserves  $(\$340f + \$340g)_{b,2018}$  for the end of 2018. Among our 1,733 banks, 1,558 banks would have a positive sum for open and hidden reserves, which accounted for 89.9% of the sample. The remaining 10.1% of the banks would have their reserves depleted by 2019 if they aimed to maintain the same levels of net income.
4. We then take the figures for annual net income after taxes from the balance sheet statements of the 1,733 banks for 2014. Assuming that annual net income remains constant over the next four years, we look at how the sum of the income and reserves reported in 2014 is depleted over these four years in an attempt to identify whether the

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reserves for income smoothing. Similarly, Bornemann et al. (2014) look at the determinants of creation and usage of open reserves.

annual income in 2018 is still positive even after the use of reserves. In doing so, we add (subtract) the 2014 inflow (outflow) of reserves from the annual net income of 2014, since the annual net income after taxes (ANiAT) value already incorporates these figures. The result should indicate whether the net income remains positive even after incorporating the depletion of reserves (“Remaining Profitability (RP)”). A negative reserve value in 2018 could then be offset by a positive annual income if the 2014 values are treated statically.

$$RP_{b,2018} = ANiAT_{b,2014} + \Delta (\$340f + \$340g)_{b,2014} + (\$340f + \$340g)_{b,2018} \quad (10)$$

Our results reveal that 1,617 of the 1,733 banks (93.3%) achieve positive profitability figures. While reserves are depleted for 10.1% of the banks, the assumed constant level of income of 2014 offsets the depleted reserves for 59 more banks, such that only 6.7% of the sample banks have negative profits *and* depleted reserves.

5. Finally, we calculate the return on equity of our 1,733 banks as of 2018. To do so, we need the value of annual net income in 2018 after incorporating the 16.15% shock on the NIM of 2014 and the book value of equity excluding any reserves pursuant to sections 340f or 340g HGB. We account once again for inflows and outflows of the reserves in 2014, and finally divide by the 2014 bank equity values from the balance sheet statements saved in the BAKIS database.

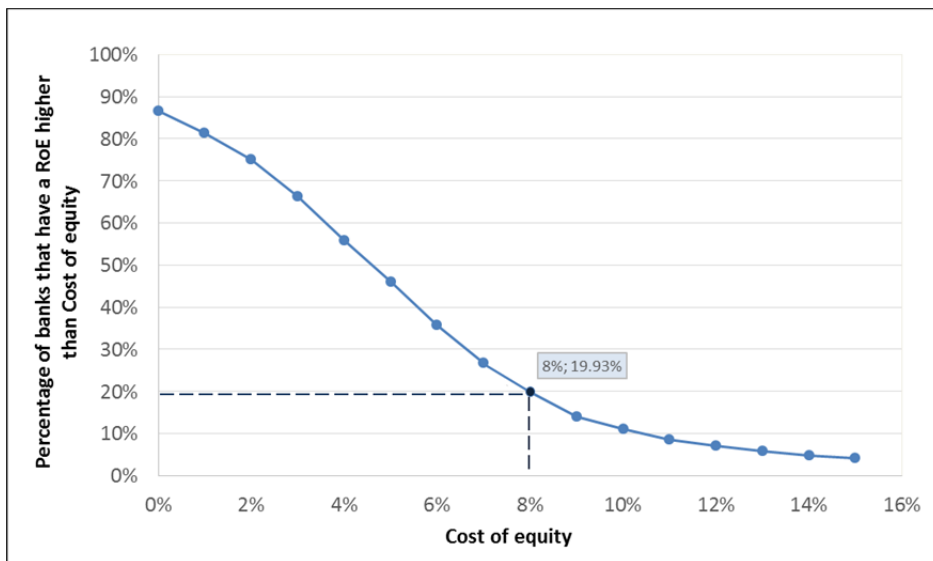
$$RoE_{2018} = \frac{ANiAT_{b,2014} + \Delta (\$340f + \$340g)_{b,2014} - NIM_{b,2014} * 16.15\%}{Book\ Value\ of\ Bank\ Equity_{b,2014}} \quad (11)$$

The results indicate that 1,500 banks (86.7%) have a positive RoE after incorporating the NIM shock for 2018. However, if the 8% cost of capital benchmark mentioned in IMF’s Global Financial Stability Report is taken into account, only 345 banks (19.9%) will earn

their capital costs in 2018 with the static figures of 2014. It should be noted that this figure applies under the assumption that no reserves are utilized. Figure 7 depicts the percentage of banks that have a higher RoE than an arbitrary cost of equity value without any utilization of reserves. It should also be noted that 13.2% of the banks will have negative earnings in 2018 if the balance sheet is assumed to be static. These banks would ultimately take actions that prevent them from making losses and exhaust their equity.

On the other hand, assuming that all the remaining reserves in 2018 are converted into the income statement as inflows in the same year, such that all the banks deplete all remaining reserves in 2018 (a one-off effect), then the RoE with reserves (RoR\_wR) would indicate that 1,542 banks (89.0%) would earn their cost of capital of 8% in 2018, where RoE\_wR would be:

**Figure 7. Percentage of banks that have a RoE higher than the cost of equity in 2018 without any utilization of reserves.**



$$RoE\_wR_{2018} = \frac{ANiAT_{b,2014} + \Delta (\$340f + \$340g)_{b,2014} + (\$340f + \$340g)_{b,2018}}{Book\ Value\ of\ Bank\ Equity_{b,2014}} \quad (12)$$

The results in this section show that reserves pursuant to sections 340f and 340g HGB are very important sources of additional capital for German banks, alleviating to some extent the necessity for immediate action in addressing the lack of profitability in the German banking system.

## **5 Policy implications**

Macroeconomic and regulatory challenges place added pressure on the German banking system. The results from the MFI interest rate statistics indicate that a sustained period of low interest rates will increase the pressure on the core business interest margin earned by German banks. However, through the depletion of hidden and open reserves, German banks can alleviate this pressure and continue to earn their cost of equity for the time being.

The findings of this study should be understood against the background of varying stakeholder expectations in the three pillars of the German banking system. Commercial banks follow profit maximization to a greater extent than savings banks and credit cooperatives, which have a special focus on serving the deposit and loan needs of the local communities. An 8% cost of equity might therefore be a realistic benchmark first and foremost for commercial banks that engage in international investment activities, and raise capital from global markets. As savings banks and cooperatives take part in less volatile core business activities, their risk-adjusted cost of equity would be relatively lower than some of their commercial peers.

As the low-interest rate environment places pressure on banks' margins, German banks will have even greater incentives to review their business activities. Our paper contributes to the debate on banks' profitability by showing that although banks may follow

different motives and pathways, the German banking system should, for the time being, be able to withstand the recent challenges posed by the low-interest rate environment.

Our results add to the lessons learned from the survey on the low-interest rate environment conducted in Germany in 2015 by the Bundesbank and the Federal Financial Supervisory Authority (BaFin). The insights gained from the survey among 1,459 small and medium-sized German banks (which could also be referred to as the set of “less significant institutions”, or LSIs in Germany) had already revealed that the projected pre-tax profitability may erode to historically low levels. When we applied similar interest rate scenarios to the interest income generation of the set of banks included in the Bundesbank’s Monetary Financial Institutions sample, a decline in the interest margin is likewise observed for the set of 230 financial institutions that also include the largest German commercial banks. Our paper extends the results of the survey by showing that these large institutions generate their core business interest margins in a similar way to small and medium-sized institutions, i.e., by replacing the maturing higher yielding exposures that were originated in the past with new incoming business that generates a lower rate of return. While interest rate sensitivities vary across banking groups, the fundamental challenge of the low-interest rate environment applies to all banks.

Is the worst yet to come? The 2016 figures for net interest income indicate a decline of €0.9 billion for income from traditional “core” interest business. However this was compensated for by the rise in current income from equities, variable-yield securities, interests and shares in affiliated enterprises, yielding a total increase of €2.5 billion. The general illusion of higher profits stems from three sources: (i) a relatively steeper yield curve (a) making maturity transformation more profitable, and (b) implicitly causing a higher volume effect on long maturity housing loans, (ii) the downward shift in levels of the yield curve, which enables a higher valuation for the present value of assets under fair value accounting, and of course, (iii) an additional €1.2 billion increase in commission income,

which comprised a 23.8% share of operating income, a figure that is 1.5% higher than the long-term average.

Whether these figures could be sustained in the long term, thus ensuring a stable banking industry, is yet unclear. Both cyclical and structural factors as well as competition will affect all three areas.

Cyclically, banks are threatened by the interest rate risk associated with the exit from the very low-interest rate environment. When an interest rate hike takes place, long-term assets such as housing loans that were initiated while rates were approaching the zero lower bound will provide only minimal income, while compensation for new incoming short term liabilities may rise quickly. At the current juncture, one additional aspect comes into play. With the prospect of rising US yields, the possible direction of long-term euro yields is not yet clear. Historically, long term DM and euro yields have moved in alignment with US rates. An analysis of structural risks reveals that the low loan-to-deposit ratio of the German banking system, traditionally a source of resilience, has turned into a weakness. Sight deposits with a zero lower bound are remunerated above market levels. The growth rates of sight deposits have recently outstripped those of loan growth, resulting in a three percent lower loan-to-deposit ratio of 95%.<sup>14</sup> As a result, margins depend on the ability of banks to originate sufficiently high yielding loans. Thus, banks need to seek a subsidy from creditors to debtors. However, the market outcome crucially depends on the degree of competition. The low concentration of the German banking system may render systematically higher credit margins unfeasible. The effect of competition on commission income is also yet to be established.

There is one further significant control variable. The German banking sector has not been able to significantly reduce operating costs in recent and not so recent history. Although there have been idiosyncratic attempts to reduce costs, these have only caused temporary effects. The development of information technologies is opening up new possibilities in the

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<sup>14</sup> ECB statistical data warehouse.



world of banking, including an increase in the number of online accounts, innovative FinTech solutions and robust alternatives to increasing P2P lending. Relative to the current potential for cost savings in traditional banking business, making use of this technological revolution seems to be more a promising way of bringing about a fundamental change in cost structure.

The Deutsche Bundesbank and the Federal Financial Supervisory Authority (BaFin) are planning a new low-interest rate environment survey and a stress test exercise for less significant institutions in Germany in 2017. The lessons learned from 2015 survey helped supervisors to understand possible drivers of interest income margins. The new survey will once again create room for analysing the effects of projected changes on P&L and balance sheet positions. Combining the survey results with a stress test will give a picture of the soundness of the German financial system, which contains a large number of less significant financial institutions. Our analysis paves the way for the 2017 exercise by showing that the whole German financial system is solidly backed through open and hidden reserves for the time being.

The analysis put forward in this study highlights one of the German banking system's most important safeguards against the "worst yet to come": open and hidden reserves will provide a cushion that supports short and medium-term adjustments through a buffer effect. All in all, the multifaceted implications described here in depth should be taken into account in order to accurately assess the appropriate level of cost of capital.

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