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Interest rates, resilience and return

A scenario-analysis of the profitability of Dutch banks

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Interest rates, resilience and return: a scenario analysis of the profitability of Dutch banks

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Summary

In this study we examine the profitability of the Dutch banking sector. Against the backdrop of the financial and European debt crises, profits of the Dutch banking sector were under pressure for some time. Between 2015 and 2019 profitability recovered and Dutch banks performed relatively well. That was due in part to the favourable economy, which meant that banks had to make relatively few provisions for non-performing loans, and to the banks' success in driving down operating costs over the past decade. The outbreak of the COVID crisis caused a sharp fall in profits in 2020. Although profitability recovered in 2021, interest income, which is by far the main source of income, is under pressure.

We present scenarios for the future profitability of four major Dutch banks.[1] Two key factors in these scenarios are the interest rate environment and the banks' adaptability. Having regard to recent developments, we consider two interest rates paths: one in which interest rates remain low for longer and one in which interest rates rise. Banks' adaptability is taken to mean in particular their ability to: 1) cut costs further, for example through further digitisation, 2) increase their non-interest income, such as commissions, and 3) pass on negative interest rates to their customers. The adaptation variants are intended to illustrate how banks may adjust to future circumstances rather than to indicate what is most realistic or desirable. Our scenarios are therefore not predictions, but a long-term mechanical exercise. We have disregarded a number of other factors, such as the economic business cycle.

1 ABN Amro, ING, Rabobank and De Volksbank. In 2020, these four banks accounted for around 80 percent of the total assets of the Dutch banking sector.

Banks operate in a challenging environment, especially when interest rates remain low for a protracted period. A persistently low interest rate scenario will cause banks' interest margins to decline further. They will then have to take far-reaching measures to maintain their profitability and meet investors' return requirements. In our most pessimistic scenario the average Return on Equity (RoE) falls by several percentage points from the pre-coronavirus level (7.8 percent) to below 5 percent . In a rising interest rates scenario the picture is more optimistic. In that case, banks' interest margin may increase again, depending on the extent to which they pass on the higher market rates to their customers. In our most optimistic scenario the average RoE rises to more than 10 percent. Although a higher interest rate environment is beneficial, an *abrupt rise* in interest rates could have adverse effects. Loan losses may rise if borrowers cannot bear the higher interest charges. We nevertheless disregard such effects in this study. We also disregard the impact of some important factors, such as changing business models due to digitisation, the rise of Big Tech, climate change and possible long-term effects of the COVID crisis. These factors may squeeze profitability further, especially if banks are unable to respond appropriately.

Some banks will fare better, and others worse, depending on their adaptability and business model. In a persistently low interest rate scenario, banks that rely heavily on interest income will face a greater challenge than those that can readily tap other income sources. Outcomes may also vary between banks, for example due to differences in their cost-to-income ratios and market and geographic orientation.

It is important that banks set profit targets that are achievable without taking excessive risks. Our scenarios suggest that bank profit targets of 5 to 10 percent RoE are plausible, although they will pose a challenge for some banks, especially if interest rates remain low for a protracted period. At the

same time, we note that a commonly used measure of market participants' required return on own funds, the Cost of Equity (CoE), is higher in some cases (between 8 and 11 percent). It should be borne in mind, however, that the CoE is calculated on the basis of share prices and may therefore be less representative for unlisted banks. It is also conceivable that the CoE will fall if very low interest rates persist.

1 Introduction

A stable and healthy banking sector contributes to financial stability and supports the economy. A healthy banking sector can continue to fulfil its intermediation function, even when the economy is not performing well. Healthy banks have sufficient buffers to absorb any losses. Banks' profitability plays an important role in this regard. Profits are the first line of defence against negative shocks, so any such shocks are less likely to have a negative impact on own funds. Moreover, profitable banks have more scope to restore their own funds if negative shocks have impaired their capital position. Because of banks' pivotal role, this also contributes to stabilisation of the economy. European banking supervisors therefore see low profitability of the euro area banking sector as a major challenge. Profitability is thus one of the target variables that banks focus on, alongside solvency and liquidity.

Although profitability is determined primarily by risk-return considerations, it cannot be viewed separately from banks' role in society. Tension can arise between these two aspects. On the one hand, banks are commercial organisations that seek to maximise profits for their shareholders, given their risk profile. On the other hand, banks fulfil an important function in society, particularly by providing payment services and credit intermediation. This function gives banks opportunities that are not available to other institutions, such as the ability to obtain deposit funding and access to the Eurosystem's funding facilities. Banks also face regulatory and supervisory constraints, however. These include capital and liquidity requirements, as well as other cost-generating obligations, such as anti-money laundering systems.

In this study we examine the profitability of the Dutch banking sector. Our aim is to contribute to the debate on banks' ability to remain sufficiently profitable while at the same time fulfilling their role in society. In Section 2

we discuss the main drivers of the recent profit trends and make a comparison with banks abroad. In Section 3 we then look ahead on the basis of various scenarios, focusing on the impact of different interest rate paths and banks' adaptability. In Section 4 we compare the profitability of Dutch banks with the wCost of Equity, as a measure of the return required by investors.

2 Developments in profitability

2.1 Profitability in a historical and international perspective

Return on equity (RoE) is a measure widely used in the analysis of bank profitability. It expresses the ratio of a bank's net income to own funds in a given period. In addition to the RoE, we consider the return on assets (RoA). This indicator is not sensitive to changes in banks' funding leverage and is therefore a useful addition.[2,3] The net result can be further broken down into:

- Net interest income, i.e. the interest income that banks receive on their assets, such as loans to businesses and households, less the interest that banks pay on deposits and other liabilities.
- Net non-interest income, including net fee and commission income, income from financial assets (i.e. trading income) and other operating income.
- Operating costs, consisting mainly of personnel and ICT costs, but also, for example, payments to the Deposit Guarantee Fund and the Resolution Fund and taxes.
- Provisions for non-performing loans (a loan loss reserve).[4]

The profitability of the Dutch banking sector has been structurally lower since the financial crisis. In the decade before the financial crisis the RoE fluctuated between 10 and 15 percent (Figure 1). In 2008, the Dutch banking sector made a loss and the RoE and the RoA both fell sharply. Profitability recovered in the subsequent years, but the RoE and the RoA remained relatively low for some time, partly due to the relatively high loan loss provisions (see Section 2.4). Profitability continued to recover from

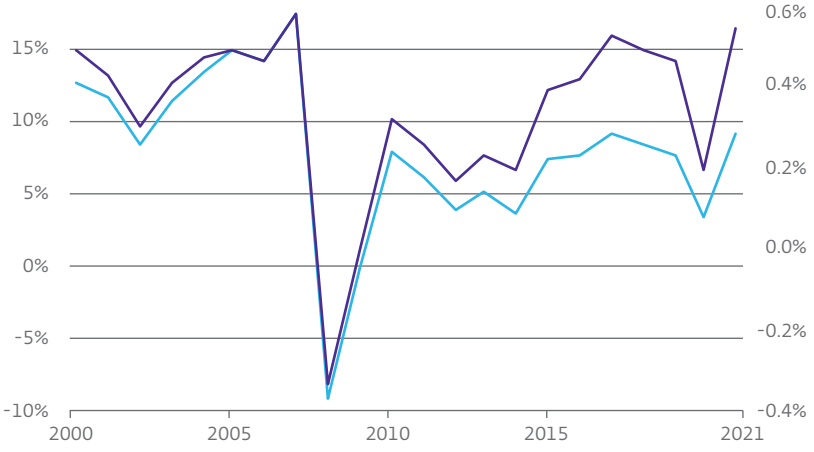
2 The advantage of these indicators is that they are publicly available and easy to compare over time and between banks and countries. A disadvantage is that they do not take direct account of the risk incurred by the bank (e.g. the credit risk on loans). That said, risk-weighted assets, and hence capital requirements, will increase as banks engage in higher-risk activities.

3 For net profit we use the net profit or loss in the relevant year (after tax). Own funds and total assets are calculated as four-quarter averages where possible.

4 New accounting standards have been in force since 2018 (IFRS 9). These are expected to result in provisions that fluctuate less and are slightly higher on average.

around 2015, buoyed by the favourable economic climate. At this point, the two indicators began to diverge. The RoE did not return to pre-crisis levels, whereas the RoA did. This was because, in contrast to the pre-crisis years, the rise in profit was driven not by an increase in leverage but by an increase in the return on assets. Rather, banks significantly increased their capital buffers in response to the financial crisis.[5] The higher buffers have made banks safer, which in principle should also translate into lower return requirements on the part of investors (Section 4).

Figure 1 Profitability of Dutch banks lower following crisis



Source: DNB website (data on consolidated Dutch banking) and DNB calculations

Notes: Own funds and total assets are calculated as four-quarter averages. Data for 2021 are extrapolated based on data up to and including Q3 2021.

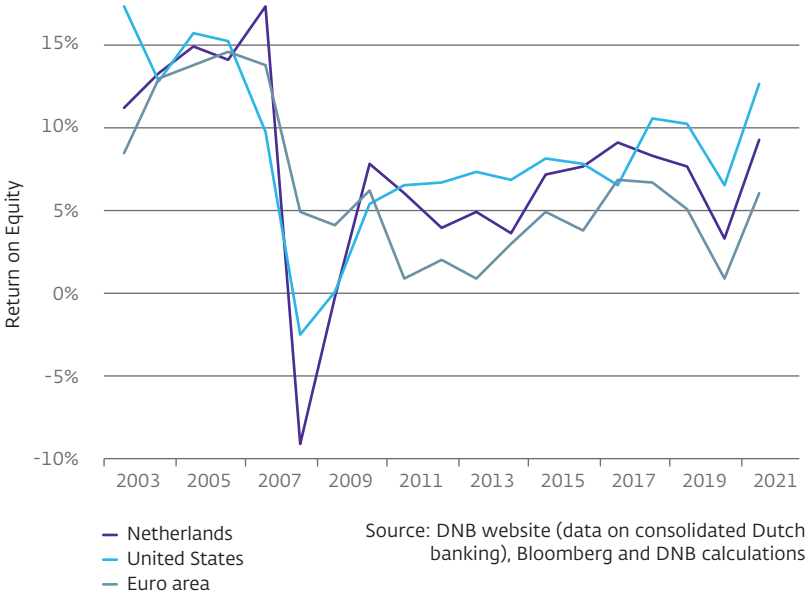
5 See Daniëls and Kamalodin (2016).

Dutch banks have on average underperformed banks in the United States (US) but outperformed other euro area banks since the financial crisis (see Figure 2). The difference in profitability between European and US banks is largely due to the European debt crisis and the subsequent slow economic recovery in the euro area. Credit growth in Europe consequently lagged behind and European banks had to make more provisions for non-performing loans than US banks. US commercial banks operated with higher capital ratios than European banks before the crisis, so they had less need to recapitalise – or to divest business units.[6] Finally, there are various structural factors behind the difference in bank profits. European banks have to contend with cost inefficiencies and a fragmented banking landscape, for example.[7] Dutch banks performed relatively well compared to other euro area banks, partly due to cost-cutting (see Section 2.2) and greater consolidation.

6 European banks withdrew from international (including US) markets and US banks were able to take advantage of this withdrawal. This was the case, for example, in the field of investment banking (which generates commission income).

7 See Andreeva et al. (2019) for the impact of 'overcapacity' in the European banking sector on profitability. See also the speech by Enria (2021).

Figure 2 European banks show lower post-crisis profitability than US banks



Source: DNB website (data on consolidated Dutch banking), Bloomberg and DNB calculations

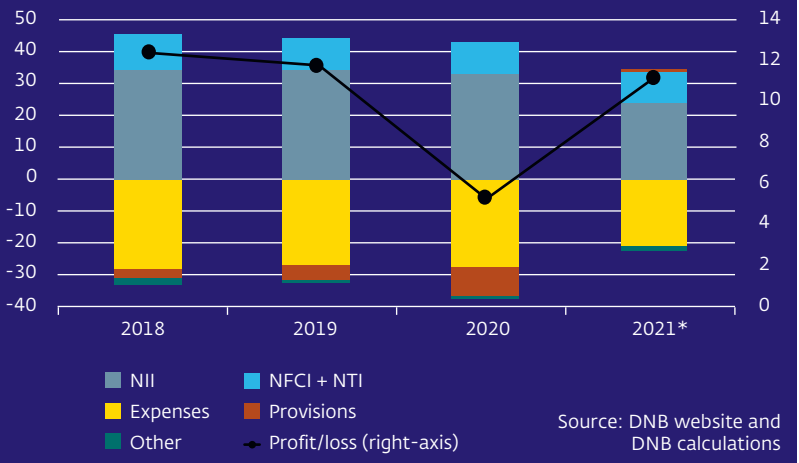
Notes: Euro area and US data obtained from indices of listed banks in both jurisdictions (euro area: SX7E Index: 22 banks and US KBW Bank Index: 24 banks). Data for 2021 are extrapolated based on data up to and including Q3 2021.

Box 1 Impact of the COVID crisis

The COVID crisis triggered a sharp fall in banks' profits in 2020. The RoE fell from over 7.5 percent in 2019 to less than 3.5 percent in 2020. The main driver of this fall (accounting for more than two percentage points) was a sharp increase in provisions, which more than doubled compared to 2019 (Figure A). Net interest income and trading income also fell. Non-interest income, by contrast, showed a slight rise. This is consistent with banks' ambition to reduce their dependence on interest income by generating more non-interest income, although temporary effects also played a role, such as higher stock market trading volumes and rising share prices.

Figure A Development of income and expenses

(EUR billion)



Source: DNB website and DNB calculations

NII stands for net interest income, NFCI for net fee and commission income and NTI for net trading income.
* 2021 includes only the first three quarters.

Profitability returned to pre-COVID levels in the first nine months of 2021. This was due in particular to a release of previous provisions. Partly as a result of government and central bank support programmes, expected loan losses due to the COVID crisis are now estimated to be lower than at the start of the crisis. The ultimate impact of the crisis nevertheless remains highly uncertain. In the coming years, as the effects of the coronavirus crisis subside, provisions are expected to return to a normal, slightly positive level. This factor will consequently weigh on profit in the years ahead compared to 2021. Non-interest income also continued to rise and measures taken by the ECB, including Targeted Longer Term Refinancing Operations (TLTROs), contributed to the recovery of profitability. In order to stimulate lending and thus promote economic recovery, banks were temporarily able to obtain funding from the ECB at very favourable rates – provided they maintained their lending levels.[8] Despite this positive contribution to interest income, total net interest income declined further in 2021 (see also Section 2.2.1).

8 For more information, see: What are TLTROs? (ECB website).

2.2 Operating income

2.2.1 Interest is an important source of income

Net interest income has made a significant contribution to Dutch banks' profitability over the past decade. In 2019, interest income accounted for approximately 75 percent of total operating income. Despite the fall in interest rates, banks' net interest income has been growing for a long time (Figure 3). Banks make money from the fact that the interest on their assets (the lending rate, for example on loans to businesses and households) is usually higher than the interest on their liabilities (the funding rate, such as interest on deposits). A fall in interest rates in principle leads to both a lower lending rate and a lower funding rate. The difference between the two – the interest margin – consequently remains the same. A fall in interest rates can also have positive effects on total interest income, for example because it stimulates demand for credit.

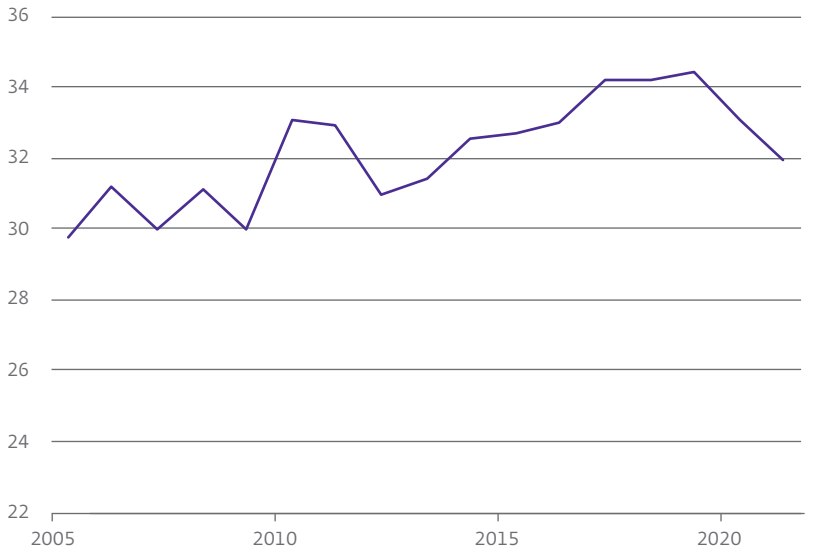
Although a fall in interest rates is not necessarily bad for banks, a persistently low interest rate environment may gradually impair their interest margins. This can be illustrated by breaking the interest margin down into three components:

- The funding margin: the difference between the market interest rate and the interest that banks pay on their liabilities, particularly deposits.
- The lending margin: the difference between the interest that banks earn on their assets, such as mortgages, and market interest rates for similar maturities.
- Income from maturity transformation: when banks obtain funding with relatively short maturities, while their assets have relatively long maturities, they earn interest income from maturity transformation. If long-term interest rates are higher than short-term interest rates, banks can take

advantage of this maturity mismatch between their assets and liabilities. In the case of Dutch banks this is a relatively minor factor, partly because they largely hedge their interest rate risk.[9]

Figure 3 Development of Dutch banks' net interest income

(EUR billion)



Source: DNB website and DNB calculations

Notes: Data for 2021 are extrapolated based on data for Q3 2021.

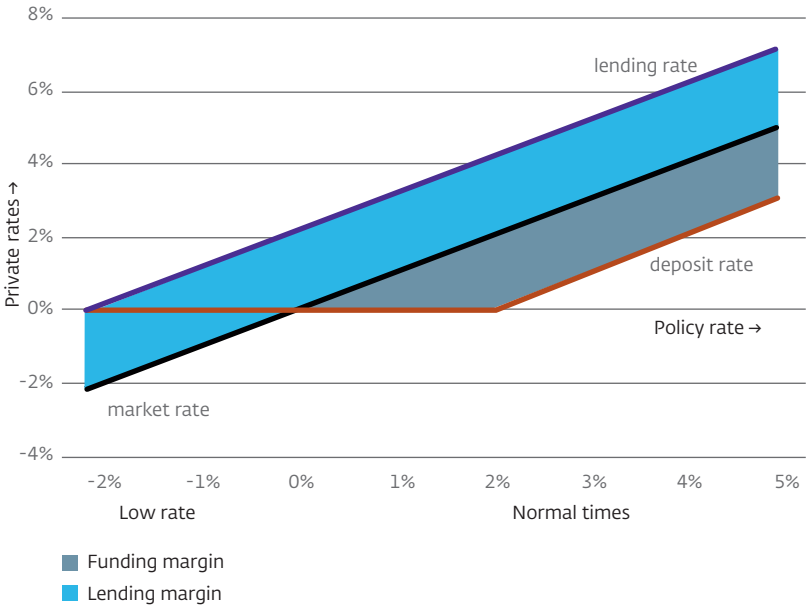
9 Chaudron (2018).

The funding margin shrinks in a persistently low interest rate environment. In normal times, the deposit rate is usually lower than the market rate for similar maturities, so the funding margin is positive. This margin dwindles in a negative interest rate environment, because the interest rate on a part of the deposits often does not go below zero percent in practice.[10] The negative effect of falling interest rates on profitability is non-linear and only appears when interest rates are close to zero. This mechanism is illustrated in Figure 4: the deposit rate (red line) is stuck at zero, while market rates (black line) continue to fall along with the policy rate, reducing the difference between the market rate and the deposit rate (the funding margin). The funding margin may even turn negative. The interest rate environment may change in the years ahead, of course, turning interest rates positive again and easing pressure on the funding margin. It is quite possible that when interest rates rise, banks will not need to raise deposit rates much, if at all, until the margin turns positive again. Whether banks are able to do so will depend among other things on the competition they encounter in the savings market. The extent of interest rate adjustment in a rising interest rates scenario is part of the scenario analysis in the next section.

Banks' lending margins have also come under pressure. After the financial crisis, banks were able to take advantage of relatively high lending margins for some time, particularly on mortgages.[11] Competition has increased since then, partly because non-bank operators, such as insurers and pension funds, are playing a more prominent role in the mortgage market.[12] This has put lending margins under pressure.

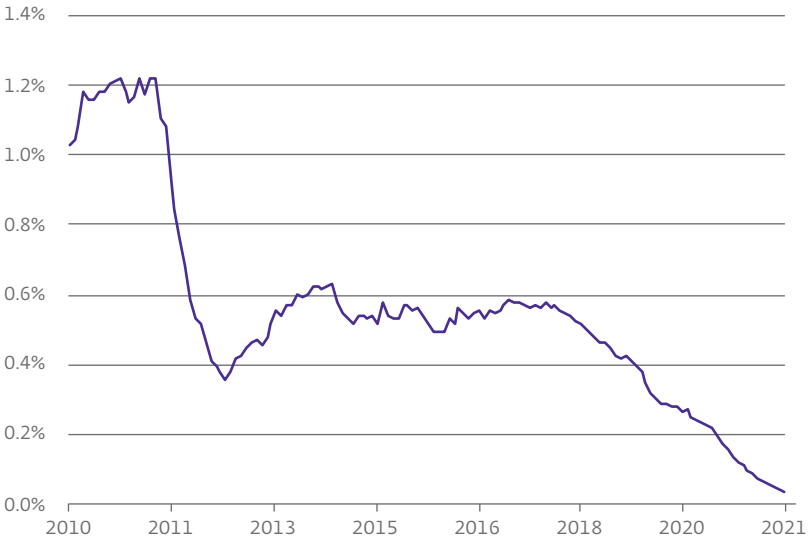
10 See for example Freriks and Kakes (2021).
11 Jansen et al. (2013).
12 DNB (2016) and DNB (2021a).

Figure 4 How do negative interest rates affect banks' interest margins?



It takes some time for the impact of low interest rates to become apparent. A fall in interest rates has a delayed effect on banks' interest income. Outstanding loans and other financial contracts, for example to hedge interest rate risk, were often concluded at higher interest rates and are only gradually replaced by new contracts with less favourable interest rates. This can also be seen in Figure 5, which shows the development of the estimated funding margin. The pressure on the interest margin is likely to continue if interest rates remain low for longer. We will consider this in more detail in the next section.

Figure 5 Steady decrease in funding margin



Source: DNB website, Bloomberg and DNB calculations

Notes: The funding margin is defined as the difference between the relevant market interest rate and the weighted average interest rate on payment and savings accounts of Dutch households and non-financial corporations.

The impact of low interest rates is not the same for all banks and depends on the bank's business model. Banks that rely heavily on household deposits for their funding are particularly sensitive to negative interest rates because of the general reluctance to apply negative interest rates to them. Banks that rely heavily on interest income and have difficulty adapting their business models are also vulnerable, as they have fewer alternative income sources to fall back on when the interest margin falls. Another relevant factor is where the bank's activities take place. Some banks have part of their operations outside the euro area, where interest rates are higher.

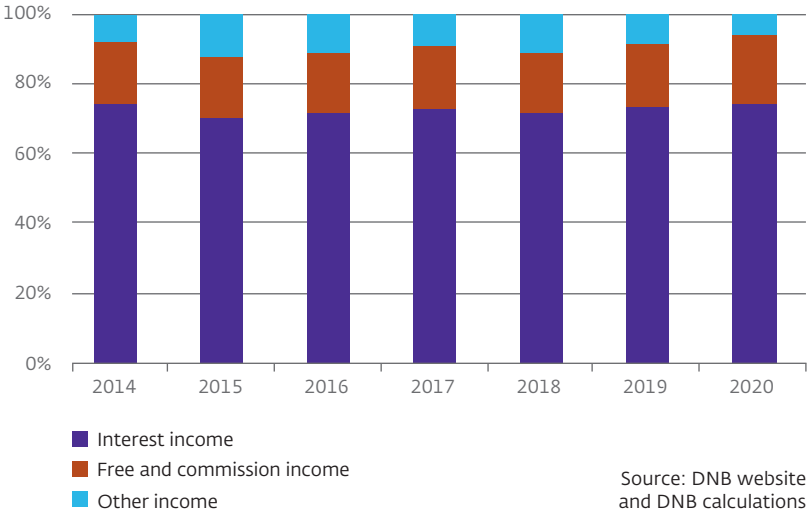
2.2.2 Other operating income

Dutch banks have relatively little non-interest income. In 2019, non-interest income made up around 26 percent of Dutch banks' total income (Figure 6), whereas for large euro area banks the share was almost 42 percent.[13] Since the 2008 crisis, Dutch banks have focused more on traditional credit intermediation and have scaled back their investment banking activities.[14]

Fee and commissions are an important source of non-interest income. They can be divided into a cyclical component (related, for example, to retail investment products or investment banking activities) and a more structural component (such as payment charges and fees for credit cards or payment and savings accounts).[15] As in the case of other European banks, the cyclical component shrank after the financial crisis, mainly due to a fall in income from investment banking.[16] Total fee and commission income has remained fairly stable in recent years, although Dutch banks have recently been trying to increase it, partly by raising the cost of payment accounts and increasing sales of investment products.[17] Growth of non-interest income is one of the possible adjustments that we include in our scenario analysis in the next section.

13 For the major Dutch large banks alone, it was 22 percent. Major banks are defined here on the basis of criteria for determining 'significance'. For an explanation see the article "Criteria for determining significance" (link to ECB website).
14 See for example DNB (2016).
15 See Kok et al. (2017).
16 See S&P Global (2020) for a view of long-term developments in investment banking for European banks. DNB (2020) discusses competition in the payment market in more detail. In EBA (2018), 60 percent of a group of European banks state that FinTech companies pose a threat to income from payment services, among others.
17 Interest income on demand deposits has fallen sharply due to the low interest rates. Since typically hardly any interest is paid on demand deposits, the funding margin on such balances was relatively high in the past when interest rates were higher. This interest income was one of the factors enabling Dutch banks to keep payment fees relatively low.

Figure 6 Breakdown of operating income



Source: DNB website and DNB calculations

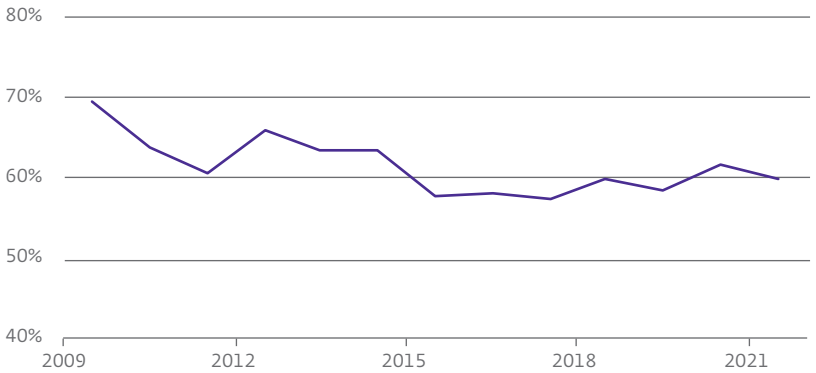
Higher fee and commission income can ease the pressure on profitability in a low interest rate environment. Particularly for banks that rely heavily on interest income, fee and commission income can provide a diversification benefit and, depending on the type of activity, contribute to income stability.[18] The type of underlying activity is important: for example, income from payments is less volatile than fee and commission income earned from investment banking.[19] Banks' success in increasing their commission income will depend on their specific business model. Certain activities (e.g. those related to investment banking) also require specific knowledge and scale.

18 See inter alia Altunbas et al. (2011), Demirgüç-Kunt, A. and Huizinga, H (2010).
19 See ECB (2000): EU Banks' income structure.

2.3 Reduction in operating expenses

Dutch banks have significantly reduced their operating costs over the past decade. In the years following the financial crisis, operating costs initially fell in absolute terms and in subsequent years the rise in costs was outpaced by the rise in income. Dutch banks' cost-to-income ratio (costs relative to operating income, a measure of cost efficiency) consequently fell from almost 70 percent before the financial crisis to around 58 percent in 2019 (Figure 7). This is well below the European average of 65 percent.[20] The decrease is related in part to the reduction in the number of physical bank branches and employees (see Figure 8) as a result of the digitisation of bank services. In this respect Dutch banks are more efficient than other euro area banks, where the average number of bank branches (per 100,000 inhabitants) was around 35 in 2020 compared to five in the Netherlands.

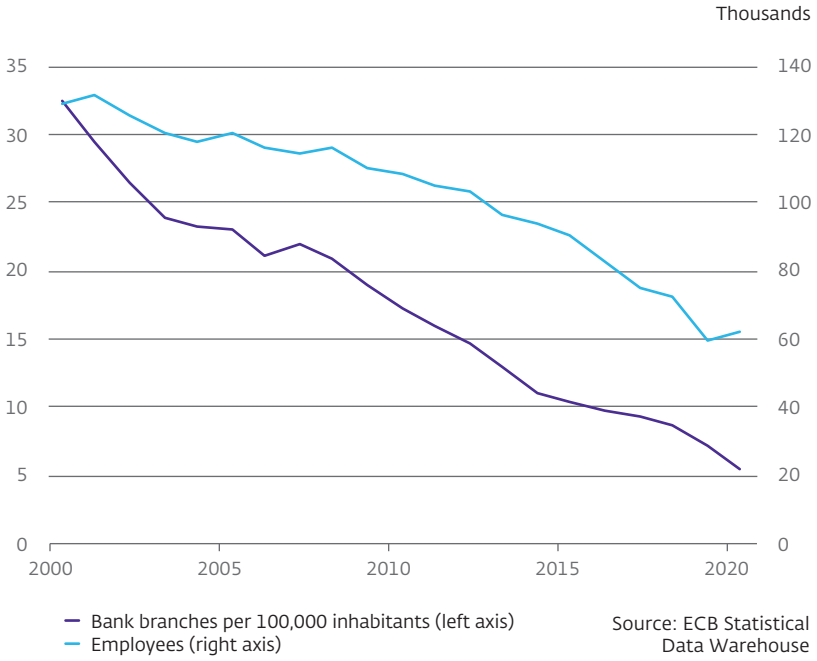
Figure 7 Stabilisation of Dutch cost-to-income ratio



Source: DNB website and DNB calculations

20 See EBA (2020). During the COVID crisis, the cost-to-income ratio increased somewhat, but this was mainly due to the – largely temporary – fall in income.

Figure 8 Steady fall in numbers of bank branches and employees



Source: ECB Statistical Data Warehouse

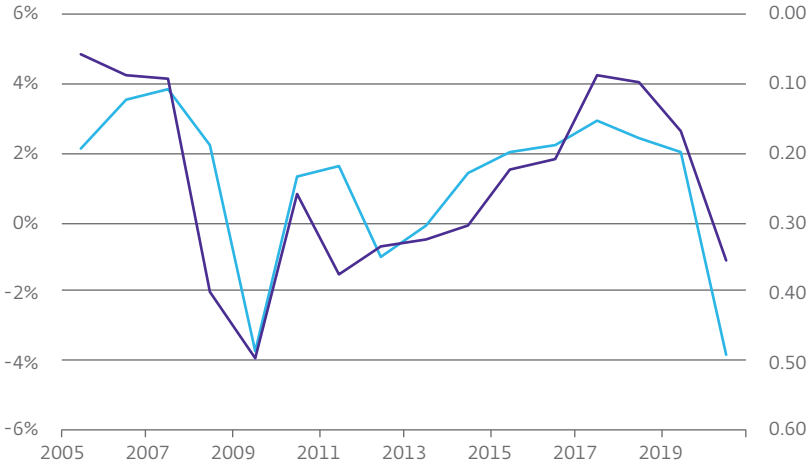
The cost-to-income ratio has stabilised over the past few years. Some bank costs have actually increased, such as those resulting from regulation. Examples include banks' contributions to the Deposit Guarantee Fund and the Resolution Fund, the bank tax and the increased role that banks are required to play in preventing money laundering and terrorist financing. And although further digitisation of financial services may reduce costs in the long run, investments in ICT systems can actually increase costs in the short term.

Further cost-cutting may help to ease the pressure on profitability. Like other European banks, Dutch banks aim to cut costs further in the years ahead. The extent to which they succeed in doing so is one of the factors we include in the scenario analysis in Section 3.

2.4 Provisions driven by economic environment

In the period after the financial crisis, banks made relatively large additions to loan loss provisions, which depressed profitability (Figure 9). Particularly between 2008 and 2013, when the Dutch economy was hit by the financial crisis and the European debt crisis, banks took relatively large provisions for bad loans. Additions to provisions were relatively low in the years before the financial crisis. A relatively low level of provisions also contributed to profitability in the years before the outbreak of the COVID crisis, between 2017 and 2019. The economy performed relatively well in those years and provisions taken during the crisis years were released. Banks had to make many provisions again in 2020 due to the COVID crisis (see Box 1).

Figure 9 Dutch GDP growth and loan loss provisions



Source: DNB website and Statistics Netherlands

Notes: Provisions as a percentage of total assets (inverse axis).

3 Profitability scenarios

3.1 Scenarios

This section presents two RoE scenarios that build on developments in recent years. The key elements in the scenarios are interest rate movements and banks' adaptability. By the latter we mean banks' ability to (i) reduce costs further, (ii) increase non-interest income and (iii) pass costs on to their customers, for example in the form of negative deposit rates. In the first scenario (**Low for longer**), the low interest rate environment persists, putting sustained pressure on banks' interest margins. In the second scenario (**Rising interest rates**), the entire yield curve turns positive again, allowing the interest margin to recover. In both scenarios, the important factor is banks' ability to adapt to conditions by further reducing their costs and generating more non-interest income. In the low for longer scenario, another relevant factor is the extent to which banks can pass on negative interest rates to their customers by means of negative deposit rates. In the rising interest rates scenario, the speed at which banks pass on the *rise* in interest rates to customers is a key factor. We apply these scenarios to four major Dutch banks (ABN Amro, ING, Rabobank and de Volksbank). The baseline is the average RoE of 7.5 percent in 2019, just before the COVID crisis struck and negatively impacted profitability. Annex A contains a detailed explanation of the scenarios.

The scenarios only concern the ultimate RoE after a number of years and not the adaptation process that leads to it. These are mechanical calculations of the conditions defined in the scenarios and the baseline situation in 2019. For example, in the rising interest rates scenario it will make a difference in practice whether an interest rate rise is fast or slow. Some banks will also be able to adapt more easily than others.

The scenarios disregard a number of factors. An omission relating to the shorter term is the economic business cycle. For example, in the rising interest rates scenario it makes a difference whether the rise is driven primarily by inflation, an economic upturn or a combination of both (see Box 3). An economic upturn is more favourable for banks' profitability, as losses on existing loans can then stay low, while demand for new loans grows. Structural factors such as substantial changes in banks' business models, e.g. due to the entry of new players such as BigTech operators, may also be important for profitability in the longer term (see Box 2). For the sake of simplicity, we disregard these factors. We also entirely disregard the effects of the COVID crisis. As indicated in the previous section, this crisis has had a major impact on banks' recent profits, but the longer-term impact of the pandemic on profitability remains unclear. We have therefore adopted the 2019 bank data as the baseline for our calculations. On similar grounds we also disregard the favourable terms applying to the Eurosystem's Targeted Long-Term Refinancing Operations (TLTROs), as these are temporary and associated with the COVID crisis (see Annex A).

Box 2 Digitisation of bank services

The digitisation of financial services has been under way for a considerable time. The coronavirus crisis has reinforced this trend. The digitisation of financial services provides opportunities, for example, to further improve cost efficiency by closing branches and ATMs and reducing the flow of paper payment orders. However, digitisation also has an impact on the market structure and the competition that banks encounter.[21, 22] Consumers are increasingly prepared to buy financial products online and hence more willing to source part of their financial activities from new players, such as digital banks and non-bank payment service providers, including FinTech and BigTech operators.[23]

The entry of new players may put further pressure on the traditional banks' earning capacity. For example, it may curb banks' ambition to increase their fee and commission income. FinTech and BigTech players have significantly increased the competition in the payment market.[24] Banks' lending margins may also shrink as competition in the credit market increases. Finally, competition for deposit funding may increase as technological developments make it easier to switch providers. We have not included these risks in our scenarios. The impact of these trends also depends on banks' strategic choices and innovative strength. A scenario is also conceivable in which banks are the drivers of innovation in the sector. More information on the changes resulting from the growing role of BigTechs in the financial sector can be found in a recently published DNB report.[25]

21 See Hakkarainen's (2021) speech on digitisation and the European banking sector.
22 European legislation, such as the Payment Services Directive (PSD2), has had a major impact on this in recent years.
23 See the speech by Hakkarainen (2020) on technological developments in banks.
24 See DNB (2020).
25 See DNB (2021b).

The baseline is banks' financial position and profitability in 2019. All our projections are based on the size and composition of the 2019 balance sheet. We have nevertheless made two adjustments to banks' expenses to make the baseline situation more realistic for the future. First, we have made an upward adjustment to the annual additions to the provisions, as they were relatively low in 2019. In both scenarios this item has therefore been increased to the median level over the period since 2000. This median level is consistent with our longer-term approach in which we disregard cyclical developments.[26] Secondly, the banks' annual contribution to the Deposit Guarantee Fund and the Resolution Fund has been adjusted downwards. These funds are expected to reach their target size within a few years. Both adjustments are explained in more detail in Annex A.

Banks' own funds remain constant in all scenarios.[27] The four banks are almost fully compliant with future capital requirements, such as those resulting from the implementation of the final Basel III Accord in European regulations, the future increase in the countercyclical capital buffer (CCyB) and the reintroduction of the Pillar 2 Guidance.[28,29] We therefore disregard banks' ability to adjust their RoE by further increasing their own funds or, if they currently have sufficient capital, reducing own funds (within the regulatory parameters). The latter may result, for example, from the distribution of additional dividends to shareholders, which several European banks intend to do in the forthcoming period. It is important that banks maintain an adequate management buffer in addition to the capital requirements. Since we assume that banks' leverage ratio will remain

26 Our implicit assumption is that, whereas lower interest rates may have a short-term impact on credit risk (i.e. a fall in interest rates may reduce the probability of default on outstanding loans), they will not lead to a structural reduction in loan losses. We have therefore also disregarded a possible negative impact of low interest rates on credit quality and lending criteria.
27 In a previous RoE study by DNB (Daniëls and Kamalodin, 2016), Dutch banks had to strengthen their capital further to meet the new requirements, which had the effect of lowering RoE projections.
28 See DNB (2021c).
29 See ECB (2020).

unchanged, we only analyse the RoE. An analysis of the RoA would present the same picture.

Interest income differs widely in the scenarios; in the low for longer scenario it falls sharply. In this scenario we assume that interest rates remain at the same level as at the end of 2019 (light blue line in Figure 10). This further erodes the interest margin and reduces interest income, as described in Section 2 and in more detail in Annex A. This is a gradual process that is still under way. This interest erosion particularly affects the funding margin; we have assumed that the lending margin only comes under slight pressure. We have disregarded two factors that could potentially put further pressure on interest income. First, the deposit volume has continued to grow since 2019, increasing the impact of the zero lower bound on deposits. Secondly, mortgage interest rates have continued to fall since 2019. This means that the lending margin on mortgages currently provided by banks is substantially below the level assumed in the scenarios. If these low lending margins persist, interest income will come under further pressure.

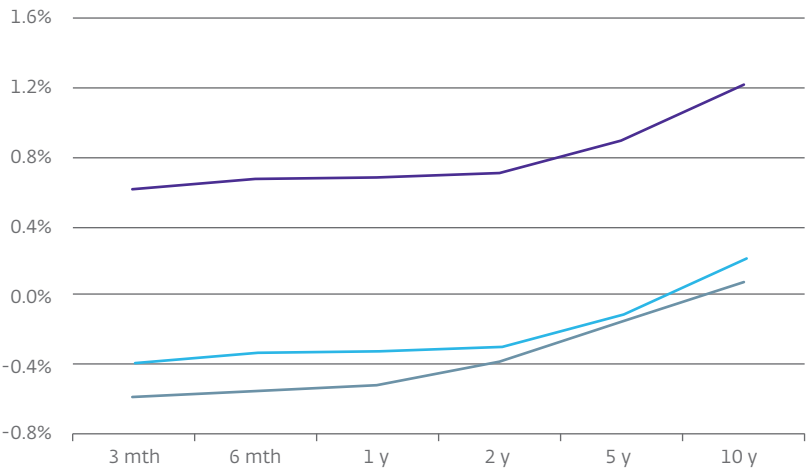
In the rising interest rates scenario, interest income may rise, depending on movements in deposit rates. In this scenario, we assume a parallel upward shift in interest rates of 100 basis points relative to the yield curve of the end of December 2019 (purple line in Figure 10). This will allow the funding margin to recover. The extent of this recovery will depend greatly on movements in deposit rates. We know from the empirical literature that the transmission of market interest rates to deposit rates is typically slow and incomplete.[30] Empirical evidence on recent tightening cycles is scarce, but there are indications that the transmission to deposit rates in a persistently low interest rate environment is weaker than in normal times, as banks

30 See for example Driscoll and Judson (2013) and De Bondt (2002).

restore their funding margin first.[31] Since the transmission to deposit rates is uncertain, we have defined two variants in this scenario with different degrees of transmission:[32]

- Rising interest rates A: in this variant the transmission is very limited. Negative deposit rates are no longer applied, but banks are able to keep deposit rates low. This allows the funding margin and profitability to recover. The implicit assumption is that competitive pressure is limited. This variant can be considered optimistic from the banks' point of view.

Figure 10 Development of yield curve in scenarios



Source: Bloomberg.
Concerns the EUR swap curve

31 See Saunders (2019); the most recent Bank of England tightening cycle saw transmission to deposit rates of around 35 percent.

32 Since we assume that the size and composition of balance sheets will remain constant at the 2019 level, the amount of deposits is the same in both scenarios. In other words, we assume that price differences (deposit rates) have no impact on the saving behaviour of households and businesses.

32

- Rising interest rates B: in this variant banks allow the deposit rate to rise with the market rate, so the interest margin remains constant at the end-of-2019 level. This amounts to a transmission of market interest rates to deposit rates of approximately 50 percent. Since banks pass on part of the higher interest rate to their customers, they only obtain limited benefit from the interest rate rise.[33] More extreme scenarios are conceivable, such as one in which the rise in market interest rates is passed on fully in deposit rates. In that case the interest margin may even deteriorate further.

Banks can adapt by (1) reducing costs, (2) increasing non-interest income and (3) passing on negative interest on to customers. With regard to the first possibility, banks have indicated that they aim to cut costs further in the years ahead. In the scenario analysis we use these targets reported by the banks for the cost-to-income ratios. The average decrease in the cost-to-income ratio is more than 4.5 percentage points. For the second possibility, non-interest income, we use euro area banks' projections of fee and commission income in the years ahead; this implies an increase in non-interest income of 13 percent.[34] Finally, with regard to the third possibility, we assume that banks will pass on negative interest rates to customers in full, in the form of negative interest rates of -0.50 percent on all demand and savings deposits. This is, of course, an extreme scenario.[35]

33 In this variant we assume that banks allow their deposit rates to rise in line with market rates, so the funding margin only recovers to a limited extent. Another possibility, with a similar impact on the interest margin, is that banks are able to keep their deposit rates low and thus restore their funding margin, but that because of competitive pressure on the lending side they pass this advantage on to the borrowers (thereby reducing the lending margin).

34 See speech by Enria (2021).

35 In Denmark, where negative interest rates are most common, many banks apply a threshold equivalent to around EUR 13,500.

Banks' actual adaptability is uncertain, so we present three variants: low (0 percent adaptation), medium (50 percent adaptation) and high (full adaptation).[36] This also allows for the fact that our assumptions, especially about passing on negative interest rates, are at the upper end of the range of possibilities. The variants are intended to illustrate the implications of banks' adaptability rather than to indicate what is realistic or desirable. Banks are, of course, free to set their own deposit rates and pursue other adjustments. We assume that in the low for longer scenario banks will seek to make all three adjustments. In the rising interest rates scenario, passing on negative interest rates is no longer relevant and banks will focus only on cutting costs and increasing non-interest income. Annex A explains the quantification of the adjustment options in more detail.

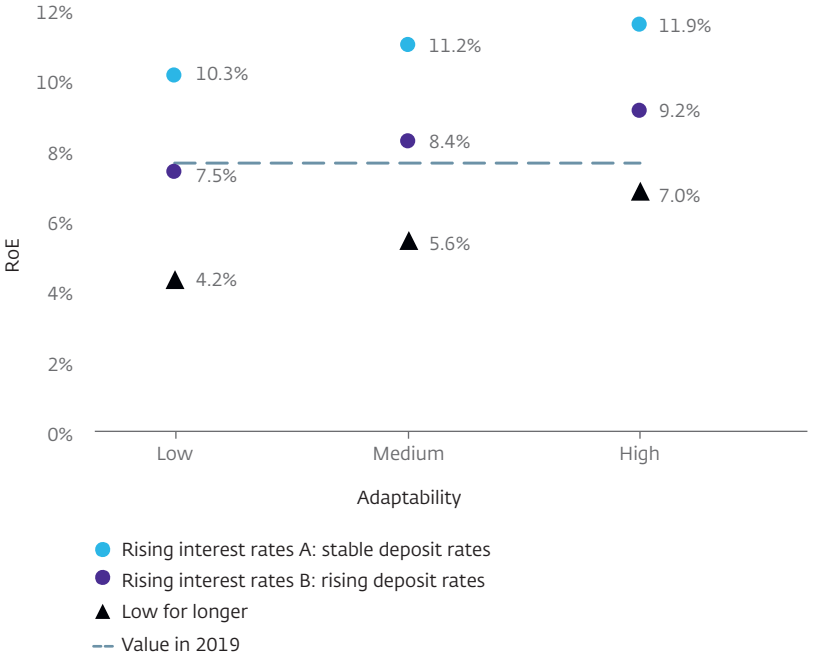
3.2 Results

In the low for longer scenario, profitability is substantially impaired and banks have to take extensive measures to maintain their RoE.[37] Figure 11 presents an overview of the RoE values in the various scenarios; see Annex A for the underlying figures. As might be expected, the erosion of the interest margin has a substantial impact on the RoE, which, without adjustment measures, is more than three and a half percentage points lower than in 2019. Banks can counter this decline in profit by implementing the intended cost savings, increasing their non-interest income and continuing to pass on the negative interest rates in deposits. If half of the possible adjustments in these three areas is achieved, the decline in RoE is limited to just over two percentage points. In that case banks would be less vulnerable to the negative interest

36 The different variants can also be interpreted differently. The 50 percent cost-cutting variant, for example, can also be seen as a variant in which part of the benefit of the cost savings accrues not to the bank but to the customer.

37 In this section we only show the impact on the RoE. Since we assume that the size and composition of balance sheets will remain unchanged, the scenarios for the RoE and RoA turn out to be similar.

Figure 11 Impact of scenarios on RoE



rates and at the same time would benefit from windfalls that are part of our baseline assumptions, such as the lower payment to the Deposit Guarantee Fund and the Resolution Fund. As stated above, we focus on the long-term impact; in the short term banks can also take advantage of the fall in interest rates, because this leads, for example, to an improvement in borrowers' repayment capacity and stimulates demand for credit. The scenario also may turn out better or worse for individual banks. For example, if a bank relies heavily on household deposits and has limited scope to adapt, the consequences for the RoE may be more unfavourable than the outcomes shown.

In the rising interest rates scenario the picture is more favourable but depends greatly on the extent to which the deposit rate also rises. When interest rates are positive, the erosion of the interest margin will ultimately cease. At the same time banks can take advantage of windfalls referred to earlier, and, depending on the options they pursue, further cost reductions and growth of non-interest income.[38] The impact of this scenario depends greatly on banks' success in keeping their funding costs, particularly deposit rates, low. If there is only limited transmission to deposit interest rates, the funding margin can be restored and the RoE rises to more than 10 percent. If deposit rates rise in line with market rates, however, the RoE is several percentage points lower. In a more extreme scenario, in which the rise in market interest rates is passed on fully (not shown), the interest margin may even deteriorate further.

A higher interest rate environment is favourable in the long term, but progress towards it will be uncertain and may be bumpy. Just as a fall in interest rates can temporarily have a positive effect on banks' profitability, rapid short-term rises can cause problems, particularly if they occur suddenly (Box 3). For example, loan losses may rise if borrowers cannot bear the higher interest rates and demand for credit may fall. If this leads to a deterioration in the banks' risk profile, market funding costs may also rise. And an interest rate rise could make borrowers less inclined to repay debt early, which would delay the recovery in the interest margin. Since we only look at the structural impact of scenarios on profit, we disregard such temporary effects.

38 The growth of non-interest income may be higher in a low interest environment, for example because it encourages households to start investing in securities.

Box 3 Rising interest rates – possible backgrounds and impact

The impact of a rise in interest rates on banks' profitability is determined in part by underlying economic conditions. According to our mechanical calculations, the rising interest rates scenario is beneficial for banks' profitability. Higher interest rates make the zero lower bound on deposit interest less of a constraint, which is an improvement compared to the current baseline position in which very low interest rates erode banks' interest margin (see Section 2). In the short term in particular, a rise in interest rates may nevertheless be accompanied by wider effects, which we disregard in our rising interest rates scenario and which depend on the circumstances. If the interest rate rise is driven by an upturn in economic growth, spending will increase and investments will become more profitable. That has beneficial effects for banks because it allows growth in credit volumes while credit risks generally decrease. On the other hand, if the interest rate rise is driven primarily by rising inflation amid disappointing economic growth (stagflation) and occurs suddenly, banks' profitability may come under pressure. An interest rate rise in such circumstances may lead to payment problems among customers, causing banks to incur loan losses. Furthermore, a deterioration of the banks' risk profile may increase the cost of market funding, squeezing profit further.

Another relevant factor is how sensitive banks are to rising interest rates and to what extent they hedge this sensitivity. The Dutch banks' traditional business model makes them sensitive to interest rate changes because their exposures (for example long-term mortgages) on average have longer fixed-interest periods than their funding sources (such as deposits). However, banks make extensive use of financial instruments

such as interest rate swaps to hedge their interest rate risk.[39] Changes in net interest income are then offset by the hedging result. Banks do not entirely eliminate their exposure to interest rate changes, as the hedging is based on an estimate of expected cash flows that differs from contractual periods, for example because banks have to take into account the possibility of early repayment of mortgage loans. If the outcome turns out to be different in practice, for example because an interest rate rise leads to a reduction in early repayments, banks will still bear an interest rate risk.

In a low for longer interest rate environment, a rise in interest rates will ultimately be expected to have a favourable effect. The erosion of the funding margin as a result of a negative interest rate, as described in Section 2, may be reversed if interest rates rise. This is an important positive factor in the rising interest rates scenario. It will particularly benefit banks that rely on interest income or attract more deposit funding (especially from households).

3.3 Conclusion

Bank RoE targets of 5 to 10 percent look plausible, although they may pose a challenge for some banks, especially if interest rates remain low for a protracted period. This is in line with recent ECB statements setting a target range of 6 to 10 percent for euro area banks.[40] In our most pessimistic scenario, in which Dutch banks are unable to adapt to a persistently low interest rate environment, the average RoE will be below that level. In our most optimistic scenario, the RoE is above the stated range, but that is only

39 See Chaudron (2018) for Dutch banks and Hoffmann et al. (2019) for European banks.
40 See Andersson et al. (2018).

achievable if the interest rate environment for banks improves and all other adjustments turn out favourably. Even in such a scenario the RoE will not be close to pre-financial crisis levels. Banks have become safer since then, so lower return targets are appropriate. An important point is that outcomes may also vary between banks, for example due to differences in their cost-to-income ratios and market and geographic orientation. In addition to external factors and adaptability, profitability will also be dependent on the business model and risk appetite. For less risky banks, 5 percent may be a challenge, while riskier banks may be able to generate higher profit. However, this will also be reflected in higher return requirements on the part of investors. This is dealt with in the next section.

A number of structural developments, which we have not included, may squeeze earning capacity further or actually provide opportunities. Our study is focused particularly on banks' 'traditional' adaptability, such as cost savings or adjustments in existing products. In addition to factors such as digitisation and competition or cooperation with BigTech (see Box 2), sustainability challenges, such as climate change and biodiversity loss, may ultimately have a major impact on existing business models and profitability.[41] Climate change and biodiversity loss also pose risks for banks and it is important that they respond appropriately.[42,43] On the other hand, the financing of the new sustainable economy and the energy transition also offers opportunities for banks, particularly if they act in time.[44]

41 See for example "Opkomst BigTechs zorgt voor gebruiksgemak, maar er zijn ook risico's" (dnb.nl)
42 See for example "Klimaatverandering: Overstromingen kunnen ook de financiële sector raken" (dnb.nl); "Indebted to nature" (dnb.nl).
43 See for example DNB (2020c).
44 See for example ECB(2021).

4 Return targets and required return

In this section we discuss how the RoE relates to banks' return targets and the investors' required returns. The major Dutch banks currently have an average return target of around 8 percent with a range of 6 to 12 percent.[45] This is in line with the results of the Risk Assessment Questionnaire issued by the European Banking Authority (EBA) in April 2021, in which one-third of the euro area banks surveyed believed an RoE of 8-10 percent to be necessary.[46]

4.1 Estimates of the Cost of Equity

The cost of equity (CoE) is a relevant profitability benchmark particularly for shareholders.[47] The costs of debt financing are directly observable, but the same is not true of shares. An estimate of the 'costs' of equity financing can be based on investors' minimum return requirements, the so-called CoE. The CoE consists of two components: the risk-free interest rate and a mark-up for risks, known as the equity risk premium. The latter component is not directly observable. The CoE is a theoretical concept and not a genuine cost item, since banks are not obliged to pay it. They nevertheless have to take investors' required return into account in practice, since the CoE has a significant impact on the average funding costs on which the rates of various bank assets are based.

45 As stated in the latest analyst presentations of ING, ABN Amro, de Volksbank and Rabobank.
46 A further 22 percent of respondents state that an RoE of 6 percent to 8 percent is necessary, while 27 percent of those surveyed refer to a minimum RoE of 10 to 12 percent. See EBA (2021).
47 The relevance of this measure may differ depending on the ownership model (i.e. listed, cooperative or state-owned banks).

The CoE can be modelled on the basis of profit forecasts and share prices. For that purpose we use a range of discounted cash flow models, in which the current share price P_0 is equal to the discounted future cash flows CF_t. The discount rate in this case represents the CoE:[48]

$$P_0 = \sum_{t=1}^{\infty} \frac{CF_t}{(1+COE)^t} \qquad (1)$$

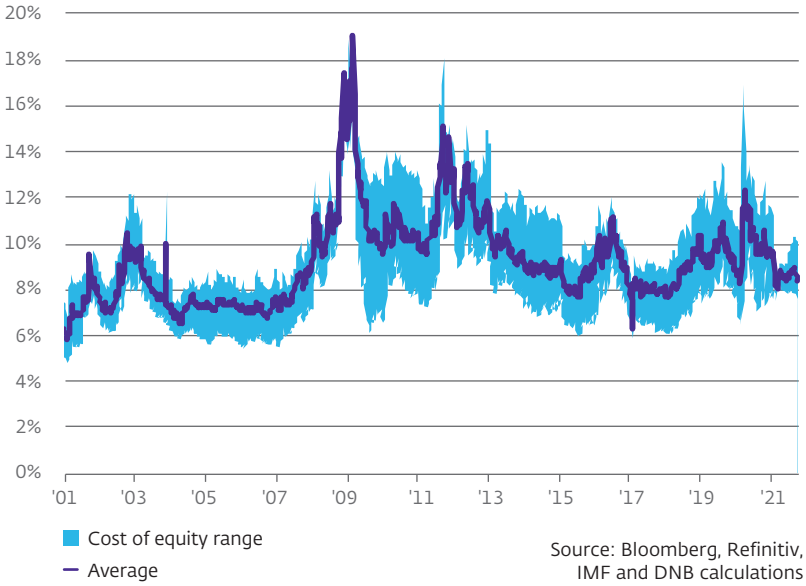
The fact that the current cash flows and the share price are observable means it is possible to trace back the CoE, which makes P_0 equal to the current value of future cash flows. Estimating the CoE involves uncertainty, because of model uncertainty and the fact that future cash flows are not observable. To address this uncertainty we use three models, which differ particularly with regard to cash flow assumptions (see Annex B).
We calculate the CoE on the basis of data from European listed banks; we refrain from making estimates for the Netherlands as only two Dutch banks are listed.

According to our estimates the average CoE of euro area banks was 9-10 percent, with a dispersion of around two percentage points (see Figure 12). The calculated CoE largely corresponds to banks' and market participants' own estimates, as can also be seen from the EBA's Risk Assessment Questionnaire.[49] Despite the decrease in the risk-free interest rate and the fact that banks have become safer since the crisis, we see no clear indication that the estimated CoE has decreased. This may be due to the relatively high uncertainty surrounding future bank profits relative to the period before the financial crisis. To this end, we performed a regression analysis which shows that variation in profit expectations is a significant determinant of the CoE.

48 See also Altavilla et al. (2021).
49 See EBA (2021).

Figure 12 Estimated cost of equity of euro area banks

Weighted by market capitalisation



Source: Bloomberg, Refinitiv, IMF and DNB calculations

Notes: The figure shows the average, minimum and maximum cost of equity, weighted by market capitalisation, of 30 listed euro area banks, based on three different models (see Annex B for the methodology).

4.2 The RoE in relation to the CoE

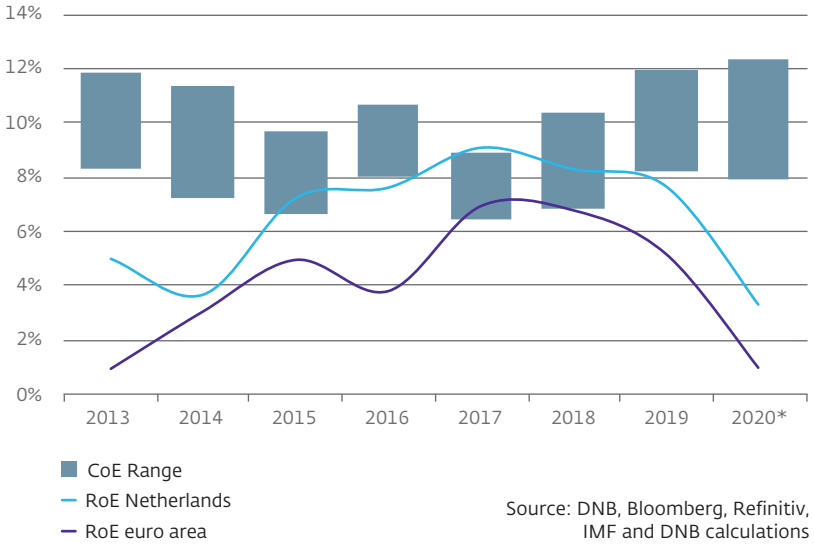
The RoE of the Dutch banking sector in 2019 was just below the range of the CoE estimates (8-11 percent) and fell further as a result of the COVID crisis (see Figure 13).[50], [51] The gap between the CoE and the RoE is narrower for Dutch banks than for other euro area banks; in the latter case the RoE is below the estimated CoE range for almost the entire period taken into consideration. It must also be borne in mind that the CoE estimates relate to listed euro area banks, whereas the RoE figures also include unlisted banks. The CoE of unlisted or state-owned banks may be somewhat lower compared to listed banks.[52] Figure 13 may therefore overstate the actual gap between the RoE and the CoE.

Particularly in a low-for-longer interest rate scenario, banks will have to adapt substantially to raise their RoE towards the investors' return requirements. In the low for longer scenario in Section 3 banks can only close the gap with the CoE if they adapt substantially by means of further cost savings, growth in non-interest income and passing on negative interest rates to depositors. In the rising interest rates scenario, by contrast, the RoE moves towards the investors' required return even without extensive adjustments by banks. It should be noted, however, that although a high interest rate environment is favourable, a *rise* in interest rates may also have adverse effects, as also described in Section 3. The outlook may also come under pressure from a number of structural developments, such as the energy transition, digitisation and BigTech (see Section 3.3), which are disregarded in this study.

50 As stated, the CoE estimates relate to the euro area banking sector. An SSM Survey at the end of 2019 shows that Dutch banks themselves assume a cost of equity of around 8 percent.
51 The gap between the RoE and the CoE is partly due to the retrospective nature of the RoE (based on the book value of own funds), while the CoE is a forward-looking measure (i.e. based on current share prices and forecast cash flows).
52 Altavilla et al. (2021).

Figure 13 Dutch banks' profitability at lower end of CoE range in 2019

The final observation relates to the coronavirus year 2020.



Source: DNB, Bloomberg, Refinitiv, IMF and DNB calculations

Notes: The figure shows the range of cost of equity estimates for euro area banks (annual average based on weekly data). The RoE data for the Netherlands relate to the four major Dutch banks. Data cover the period up to end-2020.

Bank profits (RoE) that remain below investors' required returns (CoE) for an extended period may make it less attractive for banks to raise capital. In such cases a bank is unable to create added value for shareholders with its current assets. This is also reflected in price-to-book ratios (the market value of a company divided by the 'book value' or net assets); normally – and according to the model – this is below 1 if the CoE is higher than the RoE. The average price-to-book ratio of euro area banks is

currently around 0.7 (it is 1.3 for US banks; it is 0.6 for ABN and 0.9 for ING).[53] Low market valuations make it less attractive for banks to raise capital through share issues when necessary, for example during a crisis. This is because banks with low valuations generally have to offer a price discount on new shares, leading to greater dilution of existing shareholdings.[54]

The identified adjustments by banks can also lead to a lower CoE. Closing the gap between the RoE and the CoE therefore does not necessarily have to be entirely at the expense of the RoE. A study by the ECB, for example, shows that cost efficiency is associated with lower return requirements on the part of investors.[55] Initiatives aimed at closing the RoE-CoE gap by taking more risk – in part by entering into riskier activities and investments – may not be sustainable, since higher risks usually lead to more volatile profits and hence may result in a rise in the CoE. Finally, less regulatory uncertainty, for example due to the implementation of the final Basel III Accord, may contribute to lower return requirements.

53 The observations were made on 3 January 2022.
54 Market participants state that low market valuations can also make banks prone to acquisitions, for example by private equity firms. A shift of the investor base towards more speculative investors may also occur, leading to growing pressure to create shareholder value, for example through higher leverage.
55 Altavilla et al. (2021), pp. 27-28 More equity financing, a stronger liquidity position and better asset quality can also be associated with a lower CoE.

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Annex A – Background information on scenarios

This annex presents more detailed information on the data and underlying information sources used to develop the scenarios. As far as possible we have used public sources. In some cases, estimates have been used based on internal and to some extent confidential data. As stated in the main text, the balance sheet and income statement in 2019, just before the COVID crisis, have been adopted as the baseline. The results of the analysis can therefore be compared to the size and composition of the 2019 balance sheet. We look at the ultimate impact (stationary state) over a number of years and thus do not consider the path leading to it. We use data from four major banks (ING, ABN Amro, Rabobank and de Volksbank). The data from these banks have been aggregated. Table A1 shows a summary of the results.[56]

56 We assume a corporate tax rate of 25 percent on the profit.

Table A1 Calculation of scenarios relative to 2019 baseline

EUR million

		Rising interest rates	
	Low for longer	Rising deposit rates	Stable deposit rates
Net profit 2019	**9,403**	**9,403**	**9,403**
Interest margin	-4,007	3,349	-16
Structural windfalls and setbacks	-295	-295	-295
payment to DGS/RF	425	425	425
provisions	-720	-720	-720
Adjustments	3,367	2,050	2,050
cost savings	1,427	1,427	1,427
non-interest income	624	624	624
passing on interest	1,317	0	0
0% adaption	0	0	0
50% adaption	1,684	1,025	1,025
100% adaption	3,367	2,050	2,050
Net profit per variant			
0% adaption	5,101	12,457	9093
50% adaption	6,785	13,483	1,0118
100% adaption	8,468	14,508	1,1143

Structural windfalls and setbacks relative to 2019

- Payments to Deposit Guarantee Fund (DGS) and Resolution Fund (RF). These funds will be accumulated until they reach their target size, which is expected to be in 2024.[57] The annual payments will then decrease to a level necessary to adapt the size of the funds to movements in the guarantees they are intended to cover. Compared to 2019, this results in an estimated net saving – i.e. after tax – of EUR 425 million per year.
- Provisions. The provisions were relatively low in 2019, so are unlikely to be representative of the future level. We adjust the level of provisions on the basis of the median value for the Dutch banking sector over the period 2000-2020. The use of the median limits the influence of large outliers, such as observations in times of crisis. This leads to an increase in provisions and hence reduces net profit by EUR 720 million.

Development of the interest margin

We estimate the impact of the various interest rate scenarios on banks' interest income, using the breakdown of the interest margin as described in Section 2:

- Funding margin: Banks' funding margin may shrink if they do not pass on all of an interest rate decrease in the interest paid to depositors (including small account holders). Conversely, banks' funding margin may increase if banks do not raise deposit rates fully in line with rises in market rates. We only calculate changes in the funding margin on deposit funding. We therefore implicitly assume that the funding margin (positive or negative) on other funding in the various interest rate scenarios will remain at the 2019 level. The calculated funding margin on deposit funding is the difference between the weighted average interest rate on demand and savings deposits and the weighted average of a portfolio

57 The target size of the Deposit Guarantee Fund is 0.8 percent of covered deposits.

of market interest rates with the same duration (a measure of interest rate sensitivity related, among other things, to maturity).[58] Banks base this on the behavioural maturity of deposits, which is longer than the contractual maturity. The idea of the market interest rate portfolio is that it matches the duration of the savings interest rate as closely as possible and therefore serves as a reference point for the hedging of interest rate risk. The funding margin on demand and savings deposits can be calculated in this way. In the low for longer scenario, the zero lower bound on deposits further erodes the interest margin by almost 25 basis points. In the rising interest rates scenario, the development of the funding margin depends greatly on the assumed movements in deposit rates (i.e. the transmission of market rates to deposit rates). In the first variant, A, transmission is very limited and banks keep deposit rates low (although negative savings rates disappear). This allows the interest margin to recover and the funding margin rises by 24 basis points (and net profit by EUR 3,349 million). In the second variant, B, banks allow the deposit rate to rise somewhat in line with the market rate, so the funding margin remains constant relative to 2019. Consequently the funding margin neither improves nor deteriorates.

- Lending margin: The low for longer scenario is based on a limited deterioration in the lending margin, as we assume that the current portfolio, which still includes past loans with a higher lending margin, is supplemented with new loans with the slightly lower margin from 2019. This reduces the interest margin by just under two basis points. In the rising interest rates scenarios we assume zero impact on the lending margin. Implicitly, therefore, we assume that the lending margin on

58 The interest on demand and savings deposits is only considered for deposits held by households and non-financial corporations in the Netherlands. For this we use the monetary interest rate statistics for the aggregate banking sector. Specifically, we look at overnight deposits, deposits redeemable at notice and deposits with a maturity of up to two years.

new loans will be the same in the years ahead as the lending margin on the existing 2019 portfolio (see also the sensitivity analysis below).

- Interest income from maturity transformation: the interest income that banks earn by allowing a certain interest mismatch to remain has been calculated in conjunction with the interest income on own funds. This is based on a portfolio of market interest rates with representative maturities. This portfolio is equivalent in size to the own funds of the major banks. The interest income that banks earn on this portfolio moves in line with market interest rates, albeit with a time lag because market interest rates have a specific maturity.

Other effects of interest income

- Passing on interest on deposits above EUR 100,000. The low for longer scenario assumes that banks will charge a negative interest rate of -50 basis points on corporate and household deposits above EUR 100,000. For households in particular, this is a recent development that has not yet been reflected in the 2019 earnings data. In the rising interest rates scenario, the passing on of negative interest is no longer relevant.
- Monetary measures: higher remuneration of reserves by the Eurosystem & TLTRO. Since the end of 2019, the Eurosystem has been partially compensating banks for the burden of negative interest rates in order to support the transmission of monetary policy. This compensation (which is called the two-tier system for remunerating excess reserves) is linked to banks' minimum reserve requirements, i.e. the minimum amount that banks are required to hold on their account with the Eurosystem. Banks receive higher interest on up to six times these minimum reserve requirements. They receive 0 percent instead of the deposit facility rate

(DFR, currently -50 basis points).[59] As this scheme was only introduced in November 2019, the effect on profits in that year was limited. In the low for longer scenario we therefore increase the additional remuneration by calculating it for a full year as part of the interest margin. By contrast, in the rising interest rates scenario we assume that it is phased out, so the limited benefit that banks received in 2019 is deducted. In addition, from 2020 banks were able to obtain long-term funding from the Eurosystem on favourable terms in the form of *Targeted Long-Term Refinancing Operations* (TLTROs). These favourable terms are associated with the coronavirus pandemic in 2020 and were therefore not applicable in 2019. Given the temporary nature of these favourable TLTRO terms, we assume that they will not apply in the years ahead.

Adjustment options

- Cost savings. Banks aim to reduce their operating costs in the years ahead. We use the targets for cost-to-income ratios announced by the banks for the years ahead and apply them to both the low for longer scenario and the rising interest rates scenario. To express the cost benefit in EUR, we multiply the difference between the target and the current cost-to-income ratios by the operating profit. This results in a net amount of EUR 1,427 million. We use this amount in absolute terms for both scenarios; we thus assume that the intended cost savings do not depend on the actual movements in operating profit in the scenarios.
- Growth in non-interest income. For this we use euro area banks' projections of fee and commission income in the coming years.[60]

59 Banks were already receiving the MRO rate (currently 0 percent) on their minimum reserve requirement anyway, so the two-tier system supplements it to a maximum of seven times the minimum reserve.
60 See speech by Andrea Enria (2021), The many roads to return on equity and the profitability challenge facing euro area banks, chart 3.

We apply the increase compared to the 2019 level to Dutch banks, resulting in a net amount of EUR 624 million.

- Passing on more negative interest to customers. Based on internal data, we have estimated the impact of passing on the full -50 basis points of negative interest. We deduct from this the interest passed on to deposits above EUR 100,000 that has already been included in the baseline. We allow for a certain outflow and dispersion and arrive at a net maximum amount of EUR 1,317 million. The estimate is very uncertain, however, as households' behaviour in response to negative interest rates is hard to predict. We apply this adjustment option only to the low for longer scenario; negative interest rates are no longer relevant in the rising interest rates scenario.

Sensitivity analyses

We address the uncertainty surrounding the main determinants of profitability by presenting different scenarios containing a number of adaptation variants. We have also examined some other uncertain factors. For example, it is not yet clear to what extent banks will continue to hedge their interest rate risk in the various scenarios in the manner in which they do so at present. Banks may decide to bear more interest rate risk, or to hedge the interest rate risk in a different way. The inclusion of interest rate hedging in our scenarios is based on internal data reflecting banks' current practices. We have also examined some alternatives in which the financial instruments that banks use to hedge their duration exposure have a more concentrated or wider spread of maturities. This leads to slightly higher profit figures on average, especially in the rising interest rates scenario.

Another important assumption we make is that the banks' lending margin remains at the same level as in 2019. The lending margin on mortgages that banks currently provide is lower due to the decline in mortgage interest

rates. If these low lending margins persist, interest income will come under additional pressure. Moreover, margins may come under further pressure if non-banks seek to expand their market share in the mortgage market, particularly in the low for longer scenario.

Our scenarios are based on the yield curve at the end of 2019. Interest rates subsequently fell somewhat further and could in principle also be lower in the future. The use of end-of-2019 interest rates is nevertheless supported by the coincidence of the timing with the banks' financial data adopted as our baseline. Moreover, the end-of-2019 interest rate can still be viewed as extremely low from a historical perspective. If we were to base our calculations on the end-of-2021 yield curve, which is slightly lower than that of 2019, the estimated RoE outcomes would be slightly lower. The conclusions remain intact, however.

Annex B - Calculation of cost of equity

For the calculations we use three different 'implied' cost of equity models: the H model based on Fuller and Hasia (1984) (a dividend discount model) and the generic and simplified models based on Ohlson and Juettner-Nauroth (2005).

(i) H model

The H model is an application of the dividend discount model in which it is assumed that short-term dividends grow rapidly (g_s) and gradually move towards the long-term growth rate (g_l). The transition period from g_s to g_l is represented in the model by the value H (where dividends from a period of 2H grow by g_l). The notation is as follows:

$$COE = \frac{D_0}{P_0}[(1 + g_s) + H(g_s - g_l)] + g_l$$

Where D_0 is the most recently paid dividend. To calculate the g_s we use the same methodology as Altavilla et al. (2021), using I/B/E/S forecasts of earnings per share (EPS) data one year and four years ahead. g_s is measured as the (geometric mean) y-o-y growth rate of these forecasts. In the absence of EPS (4y) forecasts, we use the most recent available forecast:

$$g_s = \left(\frac{EPS_K}{EPS_1}\right)^{\frac{1}{K-1}} - 1$$

The long-term growth rate (g_l) is equal to the IMF forecast for euro area real economic growth.

(ii) Ohlson and Juettner Nauroth models

A variation of the H model is the method described in Ohlson and Juettner-Nauroth (2005), where the CoE is estimated using a combination of EPS and dividend per share (DPS) forecasts (1 year ahead), the current share price and the short-term (g_s) and long-term (g_l) growth rate. For the latter we use the same data as in the H model.

$$COE = A + \sqrt{A^2 + \frac{EPS_1}{P_0}[g_s - (g_l - 1)]},$$

$$A = \frac{1}{2}\left[(g_l - 1) + \frac{DPS_1}{P_0}\right]$$

The simplified method of this model sets the long-term growth rate at 1 and disregards dividends:

$$COE = \sqrt{\frac{EPS_1}{P_0} * g_s}$$

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