Banks' use of AT1 capital and its determinants

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Using data on a sample of European banks, we investigate what determines banks' use of Additional Tier 1 (AT1) instruments in their capital structure. Banks' capital structure can potentially influence their funding costs, especially during market stress. Banks' capital structure might therefore be crucial in shaping bank behaviour during a crisis, such as whether they would continue lending or resort to shrinking their balance sheets to maintain a safe distance from regulatory requirements. This analysis suggests that banks with low capital headroom in particular use more AT1 – both to meet increases in capital requirements and during periods of market stress.

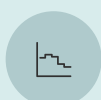**Larger banks and banks with a lower share of loans use more AT1 capital**

Due to their easier market access, large banks make more use of AT1 instruments to meet capital requirements. Banks with low loans-to-assets ratios that rely less on deposits for funding also tend to use more AT1 capital.

Banks with low capital headroom seem to use AT1 to adjust to higher requirements

The results suggest that banks in general adjust to higher capital requirements by using more AT1. The results are especially driven by banks with low capital headroom.

Banks continue to issue AT1 during market turmoil

On average, banks make less use of AT1 when yield spreads are higher, i.e. during periods of market stress. However, when capital requirements are increased, banks with low capital headroom make use of AT1 capital despite higher yield spreads.

Why is this important?

One important lesson from the global financial crisis was that banks needed both more loss-absorbing capital to fund their assets. Regulators introduced AT1 instruments as part of the Basel reform package to give banks greater flexibility in holding loss-absorbing capital.

Banks must comply with different requirements concerning both the size and composition of their capital and liabilities. While specific capital composition rules apply to risk-based capital requirements, banks have more leeway to decide the composition when it comes to the leverage ratio requirement. Banks' choice of capital structure might have an impact on their funding costs, especially during market stress. The capital structure can thus be crucial for bank behaviour during a crisis, e.g. for whether a bank decides to continue lending or to shrink its balance sheets to maintain distance to regulatory requirements.

This memo seeks to address two key questions: What determines the amount of AT1 banks use to fulfil capital requirements? And how do banks adjust their AT1 holdings to changes in capital requirements? The analysis suggests that banks with low capital headroom make more use of AT1 compared to banks with high capital headroom – both to meet increased capital requirements and during periods of market stress.

Main chart:
Banks with low capital headroom use more AT1 than banks with high capital headroom

AT1 to CET1 ratio, per cent

Banks with low capital headroom use more AT1 relative to CET1 compared to banks with high capital headroom

■ High capital headroom　■ Low capital headroom
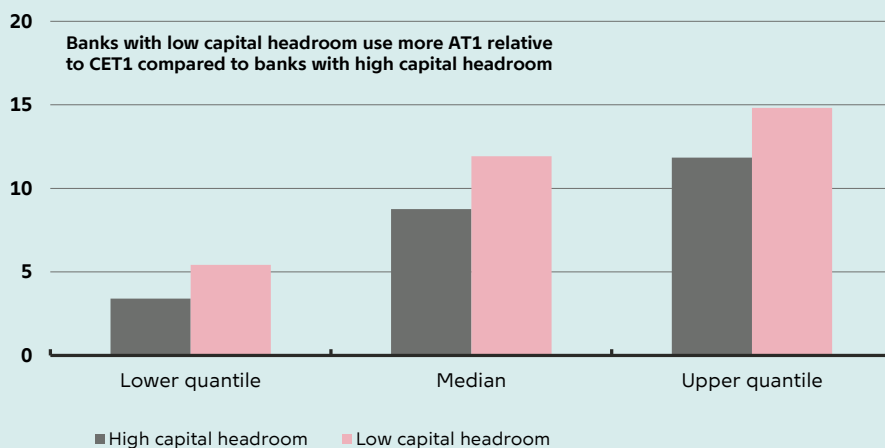
Note:　'Capital headroom' refers to the distance between a bank's capital ratio and capital requirements (including the combined buffer requirement). 'High capital headroom' refers to banks with capital headroom above the median, while 'low capital headroom' applies to those below the median. The lower quantile represents the 25th percentile, and the upper quantile represents the 75th percentile.

Source: Own calculations based on data from EBA Transparency Exercise

Keywords

Financial regulation   Financial stability and financial risks   Financial sector

01
Significant increase in use of AT1

A critical lesson from the 2007-08 financial crisis was that banks needed more capital, and capital that is more loss-absorbing, to fund their assets. To expand banks' possibilities of holding high-quality capital, the so-called Additional Tier 1 (AT1) instruments were introduced in regulation as a part of the Basel reform package.

AT1 instruments are hybrid instruments with no fixed maturity: they function like fixed-income instruments with coupon payments when the bank is well-functioning, but under certain conditions they can be converted into equity when the banks' CET1 ratio becomes too low; see also Box 1.[1] AT1 instruments are loss-absorbing when the bank is a going concern and provide an additional source of equity under distress conditions, i.e. when equity would be expensive to raise.

Today, banks are subject to several different regulatory requirements for their capital adequacy, and minimum requirements for own funds and eligible liabilities (MREL). While all requirements can be met with core equity tier 1 (CET1) instruments, banks can also use other types of capital instruments to fulfil the requirements.

Apart from CET1, banks can meet some of their capital requirements with AT1 or Tier 2 (T2). CET1 is the highest quality of regulatory capital, as it absorbs losses immediately when they occur. AT1 also provides loss absorption on a going-concern basis if triggers are breached, while Tier 2 capital is gone-concern capital.[2] The leverage ratio can be met with both CET1 and AT1, without any limits on the composition between the two. Banks can thus choose to adjust their capital structure to some extent. While banks' use of AT1 increases overall capitalisation and reduces the probability of a bankruptcy and the need for a public bailout, there might also be caveats associated with using AT1; see also Box 1.

Banks' choice of capital structure impacts the risk premium on their debt issuance, and thus their funding costs, especially during market stress.[3] This makes capital structure crucial during crises, as it can determine whether a bank continues lending or reduces its balance sheet to stay above regulatory requirements.

Banks' capital structure can also impact the effectiveness of different policy decisions. This applies not only to when capital requirements are tightened, but also when they are loosened, for example through adjustments to the size of capital buffers or buffer usability. Since banks can use the same CET1 instruments to meet buffer requirements in the risk-based framework and the minimum requirements in the leverage ratio framework simultaneously, there is a certain overlap between the two frameworks that may reduce the usability of capital

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[1] Basel III: A global regulatory framework for more resilient banks and banking systems, 12/2010 (bis.org)
[2] For example, some debt instruments, such as perpetual contingent convertible capital instruments, may be included in AT1 but not in CET1; see also BIS, Definition of capital in Basel III (Link)
[3] See also Andre Gimber and Rajan, Aniruddha (2019), *Bank Funding Costs and Capital Structure,* Bank of England Staff Working Paper No. 805, June.

buffers[4]. Thus, the composition of regulatory capital that banks use to comply with different requirements impacts the usability of capital buffers.
Further, several studies point out that banks that use more AT1 might be less willing to dip into capital buffers to avoid the cancellation of AT1 coupon payments.[5]

BOX 1

What are AT1 instruments and why do banks use them?

AT1 instruments are a form of hybrid debt with no fixed maturity. They are designed to be loss-absorbing for banks that remain a going concern, provided they satisfy certain requirements; see Article 52 of the European Capital Requirements Regulation for a comprehensive list. AT1 instruments have several distinct characteristics:

- **Loss-absorbing capabilities of the principal:** if the capitalisation of the issuer reaches a certain level (the "trigger level" of a CET ratio of at least 5.125 per cent of risk-weighted assets), the principal will either be converted into equity or written-down. Conversion or write-down can also take place when the regulator deems that the issuer has reached the "point of non-viability" (PONV), at which point AT1 instruments are subject to bail-in.

- **Coupon payments of AT1 instruments**: The coupon payments of AT1 instruments are fully discretionary, and issuers are only allowed to pay coupons if they have available distributable items (ADI) and surplus capital relative to the buffer requirements, referred to as maximum distributable amount (MDA).

- **Maturity**: AT1 instruments are required to be perpetual but, depending on regulatory approval, they can be called by the issuer from five years after issue. On the call date, the coupons are reset. In general, the market expectation is that the instrument is called on the first possible date. Issuers will only have an incentive to extend the AT1 if they would have to pay a higher coupon on a new issue than the one already outstanding, or if they are unable to attract new funding. In practice, the majority of banks have called their AT1 capital instruments at the first possible call date (see EBA, 2021).

Why do banks use AT1 instruments?
CRD/CRR allows for parts of the Pillar I and II capital requirements to be met with AT1. In total, banks are allowed to fulfil up to 44 per cent of their Pillar I and II requirements with AT1. The remaining parts of the Pillar I and II requirements must be fulfilled with CET1. AT1 instruments provide an additional source of equity under severe conditions of distress.

Unlike other types of debt, AT1 instruments can absorb losses while the bank is a going concern, as coupon payments can be suspended, and the principal can absorb losses before the issuer reaches the point of non-viability. Therefore, AT1 instruments are riskier than Tier 2 capital, and investors price them with a substantial premium compared to Tier 2 instruments. However, compared to CET1 capital, the prices of AT1 instruments are typically lower, providing a cheaper source of capital for the bank.

In the capital structure order, AT1 capital sits above equity, meaning that shareholders would absorb losses before they flow to AT1 capital holders. Funding costs associated with issuance of AT1 would therefore be lower than the compensation that market participants demand for investing in and holding banks' equity. If the bank already has ample CET1 or high profits, it might prefer to retain earnings to accumulate capital rather than increase AT1.

Since AT1 instruments act as fixed-income instruments in good times but equity-like instruments when the bank becomes financially distressed, they allow issuers to reap the benefits of both coupon tax deductibility and loss absorption. However, treatment of AT1 instruments can vary across jurisdictions and depend on specific contract terms.

Continues ...

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[4] See Ianna G. Yordanova (2022), *Regulatory adjustments are to contribute to more effective capital buffers*, Danmarks Nationalbank Analysis, No. 9, August (Link).
[5] For a discussion of buffer usability in a European context, see, e.g. How usable are capital buffers? (europa.eu). To increase the usability of buffers that are not releasable, the ECB for instance supports strengthening the features of AT1 instruments to reduce the stigma effects associated with banks cancelling AT1 coupon payments when they fall beneath the level of their combined buffer requirements (ECB, 2022).

... continued

At the same time, there might be some reputational risks for banks if they extend the AT1. Current evidence on the potential effects of coupon cancellations is relatively limited and mixed. Schmitz et al. (2021) find that potential yield increases in AT1 instruments due to AT1 extensions (non-call events) or coupon cancellations are relatively small and short-lived. However, José Abad and Antonio García Pascual point out that the sample is relatively small, and AT1 is a relatively new instrument, so it is difficult to draw firm conclusions. A study by BIS points out that there have been episodes where signs of contagion across banks have been observed following a single bank's extension of AT1 instruments.

Source: Kristiansen, Kristian Loft and Oliver Grinderslev (2017), *The information content in Contingent convertible bond prices*, Danmarks Nationalbank Working Paper, No. 122 (December).
José Abad, Pascual, Antonio García (2022), *Usability of Bank Capital Buffers: The Role of Market Expectations,* IMF Working Paper Series, WP/22/21, January. (Link)
Stefan W. Schmitz, Nellessen, Viola; Posch, Michaela; Strobl, Peter (2021), *Buffer usability and potential stigma effects,* SUERF Policy Note No. 219, January
BIS (2022), Evaluation of the impact and efficacy of the Basel III reforms (bis.org), December.
EBA (2021), AT1 Monitoring Report.

Two key questions are therefore:

- What determines banks' choice of AT1 capital?
- How do changes in regulatory requirements impact banks' use of AT1 capital?

The present memo investigates these questions to obtain a better understanding of banks' choices and to facilitate policy discussions, e.g., on the effect of higher capital requirements. Although it might be relevant to look at the entire capital structure of banks, this memo focuses on the use of AT1 relative to CET1.

Significant increase in AT1 volume with large variation across banks' use of AT1

Since their introduction in regulation, the use and issuance of AT1 has increased substantially. The current outstanding volume of AT1 amounts to about 170 billion euro; see Chart 1. This volume is significant compared to the outstanding volume of CET1 in Q2 2023, which was around 1,365 billion euro. Although AT1 can be used to fulfil part of the capital requirements, not all banks make use of the instrument and there is a significant variation in banks' reliance on this type of capital across countries. Chart 2 outlines the variation in the use of AT1 for banks covered in EBA's Transparency Exercise, i.e. the largest banks in Europe.

CHART 1

Large increase in volume of AT1 held by European banks
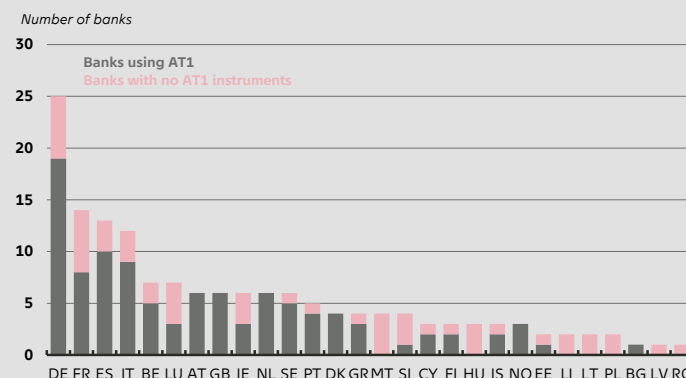
EUR bn

Outstanding volume of AT1
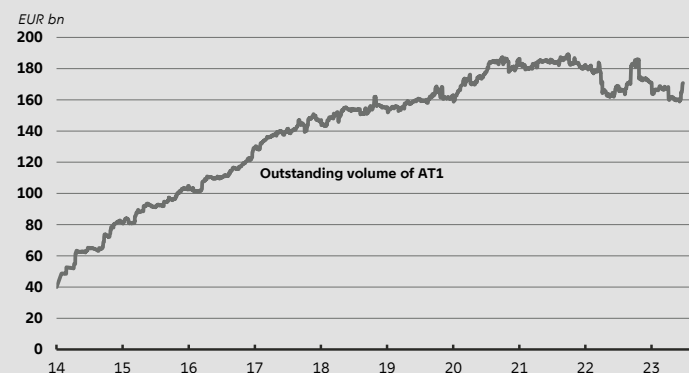
Note: This chart shows the development in outstanding volume of AT1 capital (given in euro billion) held by European banks.
Source: Bloomberg

CHART 2

Not all European banks make use of AT1 instruments

Number of banks

Banks using AT1
Banks with no AT1 instruments

Note: This chart illustrates the number of European banks that hold AT1 capital (grey bar) compared to those that do not (pink bar). The sample period spans from Q3 2018 to Q2 2023. Banks are classified as holding AT1 capital if they have held AT1 in one or more quarters during the sample period. The sample is based on banks included in the EBA's Transparency Exercise, i.e. the largest banks in Europe.
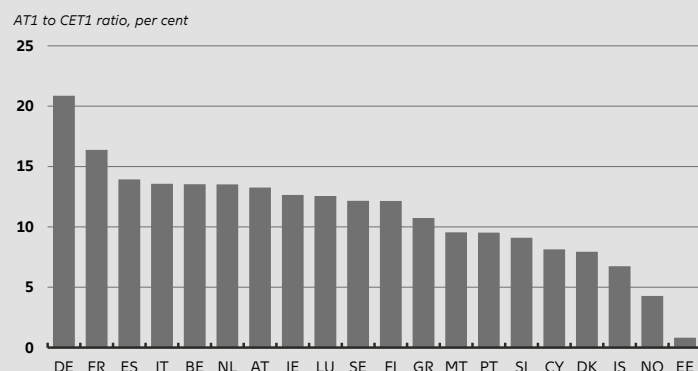Source: Own calculations based on data from EBA Transparency Exercise

There is also significant variation in the AT1-to-CET1 ratios across banks using AT1 in their funding; see Chart 3.

As outlined in Chart 4, banks that hold AT1 capital tend to hold less CET1 capital on average. That might suggest that these banks partly replace CET1 capital with AT1 capital. However, as the sum of CET1 and AT1 capital is lower than the CET1 capital holdings of non-AT1 banks, the chart further suggests that AT1 banks are less capitalised. In the next section we investigate the impact of capitalisation for banks' use of AT1 capital in the sample of AT1 banks.

CHART 3

Significant variation in European banks' share of AT1-to-CET1 ratio

AT1 to CET1 ratio, per cent

Note: This chart shows the mean AT1-to-CET1 ratio (given in percentages) for the sample of European banks. The sample period is Q3 2018 to Q2 2023.
Source: Own calculations based on EBA Transparency Exercise

CHART 4

The average AT1 bank holds less CET1 capital

CET1, per cent of REA

Non AT1 banks   AT1 Banks   AT1 Banks (AT1 + CET1)
■ Lower quantile ■ Median ■ Upper quantile
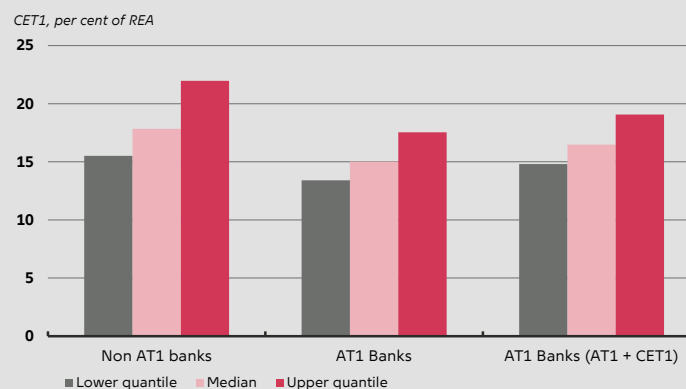
Note: This chart shows the CET1-to-REA ratio (given in percentages) for banks in the sample of "Non AT1 banks" (left bars), "AT1 banks" (middle bars), as well as the ratio of CET1 plus AT1 to REA in the sample of "AT1 banks" (right bars), respectively. The sample period is Q3 2018 to Q2 2023.
Source: Own calculations based on EBA Transparency Exercise.

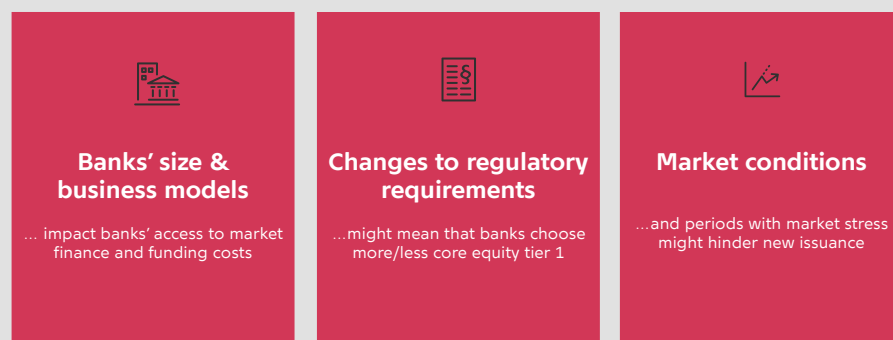# Multiple factors impact use of AT1

Several factors might determine banks' choice of AT1; see Chart 5.

First, banks' size and business models play key roles in their fundamental funding choices. Larger banks usually have easier market access and therefore could be expected to use AT1 instruments more in their capital planning. Additionally, funding costs associated with AT1 would typically be lower than the required return on equity associated with using more CET1.[6]

A bank's risk profile might influence the degree to which a bank is willing to use AT1 instruments to fulfil capital requirements. Investors and market participants' perception of a bank's risk profile is directly related to the price of a bank's issuances. If a bank is viewed as riskier than other banks, for example due to low capitalisation, this will be reflected in the price and risk premium demanded by investors to hold the bank's AT1. Other factors, such as viability of earnings and riskiness of the bank's portfolio, would also impact risk perception. A higher required price would mean higher funding costs and issuing AT1 might therefore be unattractive for the bank.

CHART 5

Multiple factors may influence banks' capital structure

Banks' size & business models	**Changes to regulatory requirements**	**Market conditions**
… impact banks' access to market finance and funding costs	…might mean that banks choose more/less core equity tier 1	…and periods with market stress might hinder new issuance

Second, changes in regulatory requirements and interactions between different requirements might play a role in whether banks choose to use less or more AT1 instruments. There might be two opposing effects:

1. **An increase in CET1 requirements leads to less use of AT1.**
   An increase in the risk-based CET1 requirement, e.g. increasing capital buffers, would mean that a bank needs more CET1. The same instruments can also be used to meet parallel requirements such as the leverage ratio. If the bank is already required to hold more CET1, it might have less incentive to use AT1 to fulfil the leverage ratio.

2. **An increase in CET1 requirements leads to more use of AT1.**
   If a bank has low headroom to meet the existing capital requirements, it might decide to issue AT1 to fulfil some of its obligations, thereby freeing up CET1 capital. This capital can then be used to cover the higher buffer requirements.

[6] However, it should be noted that the cost of capital depends on the bank's overall CET1 level as well as profits. For example, Gimber and Rajan (2019) find that an increase in the amount of equity on a bank's balance sheet by one percentage point of total assets and a corresponding decrease in junior debt is associated with a 24 basis point decrease in the risk premium on the bank's equity.

Finally, market conditions and periods of market stress might strain banks' funding costs. AT1 instruments are typically associated with higher funding costs during periods of market turmoil. Spreads on AT1 instruments would typically increase faster than credit spreads on other debt instruments, which might discourage banks from issuing additional AT1 during periods of market stress (see also Chapter 4 for a discussion on pricing of AT1 during periods of market stress).

02

Large banks with diversified assets hold more AT1 capital

Overall, a bank's business model affects its financial structure, as market access and the price of using market instruments are correlated with the bank's size, risk profile and business focus; see Chart 6.[7]

First, according to the empirical results, large banks make more use of AT1 instruments to meet capital requirements. Larger banks have easier market access, which means that it is easier for them to issue AT1 instruments.

Second, a bank's risk profile, such as its leverage ratio, might affect its decision to use AT1, as issuing AT1 can be a good option to obtain more capital when the leverage ratio becomes binding.

Third, there is some variation in banks' business models, e.g. the degree to which they are active in providing loans and take deposits. Banks with high loans-to-assets ratios are typically banks funded primarily by deposits. The empirical results suggest that these banks use more CET1 to meet capital requirements. This is also in line with the size effect, as smaller banks typically have high loans-to-assets and deposits-to-assets ratios.

CHART 6

Larger banks and leveraged banks make more use of AT1 instruments compared to peers

AT1-to-CET1 ratio, per cent
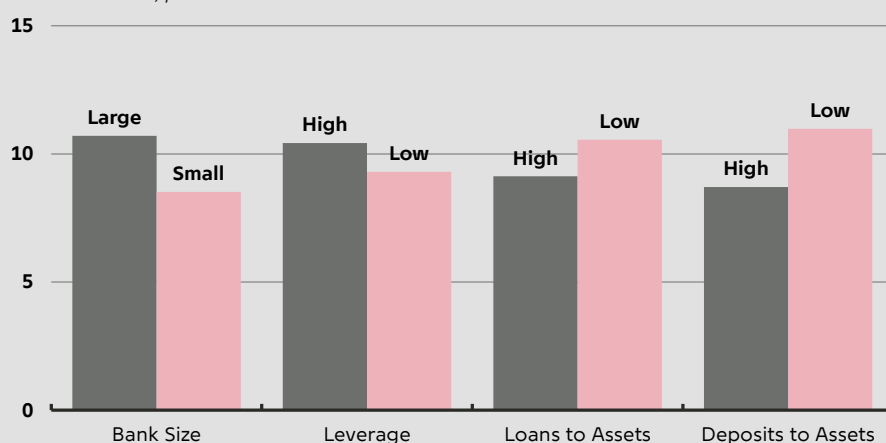
Note: This chart shows the average AT1-to-CET1 ratio (given in percentages) in the sample of (A) "Large banks" and "Small banks", (B) "High leverage" and "Low leverage", (C) "High loans to assets" and "Low loans to assets", and (D) "High deposits to assets" and "Low deposits to assets". Banks are grouped in the sample of "high" ("low") when the given variable is above (below) the median. The sample period is Q3 2018 to Q2 2023. Appendix Table 1 confirms the results in panel regression analyses.
Source: Own calculations based on EBA Transparency Exercise and data from Danmarks Nationalbank

[7] In this part of the analysis we investigate differences in AT1 ratios *across* banks. Thus, a higher AT1 implies that the respective type of bank has a higher AT1 ratio *compared* to other type of banks.

In the sample of European banks, larger banks, as well as banks that are relatively highly leveraged, have a higher share of AT1 capital than smaller or less leveraged banks. On the other hand, banks with high loan or deposit shares are using less AT1 capital. In regression analyses we confirm these results (see Appendix Table 1). [8] Overall, that means that market access, as well as banks' risk profile and business models, are highly correlated with the use of AT1 instruments.

Banks with higher ratings use more AT1

To investigate the role of banks' risk profile and market access in more detail, we next look into the role of bank ratings.

According to the results based on the sample of European banks in the present study, the average AT1-to-CET1 capital ratio is highest in the group of highly rated banks (Rating AAA) while the ratio is lowest in the group of low-rated banks (Rating C); see also Chart 7. Banks with a low rating would typically face higher funding costs or might have less or no access to market financing. This suggests that low-rated banks may pay a higher price for AT1 and, accordingly, hold relatively less. Further, the results indicate that banks with no rating seem on average to hold less AT1 capital than rated banks.

CHART 7

Banks with higher ratings make more use of AT1 instruments compared to peers

AT1-to-CET1 ratio, per cent
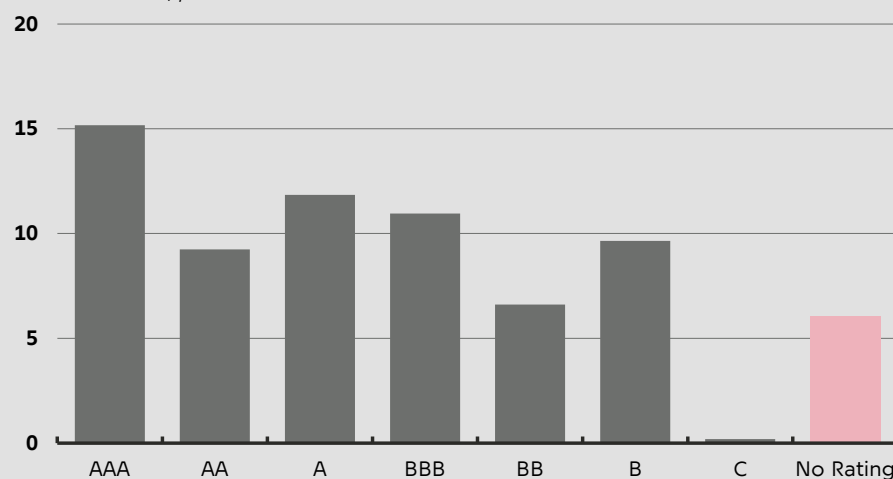
Note: This chart shows the average AT1-to-CET1 ratio in the sample of banks across ratings. Long-term debt ratings from S&P, Moody's and Fitch are used to cover the sample of banks. Banks in the "No rating" sample are banks with no rating. The sample period is Q3 2018 to Q2 2023.
In Appendix Table 2 we confirm the sample differences in a panel regression analysis
Source: Bloomberg

Regression analyses investigating the role of banks' rating confirm these results and thus suggest that ratings are correlated with banks' use of AT1 capital (see Appendix Table 1, Model 2 and Model 3).

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[8] The results in Appendix Table 1 also suggest that the effects of banks' size, leverage and business models are robust with respect to using other AT1 ratios, such as banks' AT1-to-assets and AT1-to-REA ratios.

However, the data in Chart 7 also indicate that the relationship is not linear, and that the average AT1-to-CET1 ratio varies across the different rating categories. For example, banks with a category A rating have higher AT1-to-CET1 ratios on average compared to banks with a category AA rating.

The relationship between a bank's credit rating and its capital structure is not necessarily straightforward.[9] Several different factors might influence the credit rating of a bank, such as the bank's profitability, governance and asset composition.

According to credit rating agencies methodologies, banks' capitalisation seems to be central for determining a bank's credit rating.[10] Specifically, the distance between a bank's capital ratio and a its Maximum Distributable Amount (MDA) trigger[11] appears to be crucial for the rating.

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[9] For a discussion on the relationship between bank credit ratings and capital structure see also Wojewodzki et al. (2020). The study finds that banks approaching a credit rating upgrade have a higher capital-to-assets ratio compared to those not approaching a rating upgrade. According to the authors, this suggests that the benefits of a credit rating upgrade (lower debt financing costs) outweigh the costs of holding more capital. However, most systemically important "too-big-to-fail" banks approaching a credit rating upgrade tend to have lower capital relative to assets than the rest of the banks. The authors interpret this as evidence that these banks use the positive signal of an impending upgrade to further reduce their already low capital ratios.
[10] See for example Moody's Investor Service Rating Methodology for Banks (https://bankratings.moodys.io/)
[11] An MDA trigger is the capital ratio of a bank which, when breached, automatically results in suspension of payouts, such as dividends.
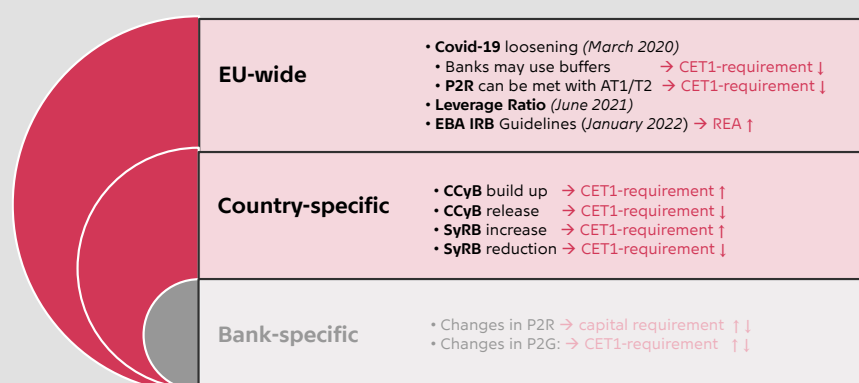
03

Banks with low capital headroom seem to use AT1 to adjust to higher capital requirements

Changes in regulatory capital requirements, as well as, the interaction between different requirements, might also play a role in banks' use of AT1. Several major policy changes have occurred during the sample period; see Chart 8.

CHART 8

A number of EU-wide and country-specific regulatory changes are included in the analysis

EU-wide	• **Covid-19** loosening *(March 2020)*
	  • Banks may use buffers → CET1-requirement ↓
	  • **P2R** can be met with AT1/T2 → CET1-requirement ↓
	• **Leverage Ratio** *(June 2021)*
	• **EBA IRB** Guidelines *(January 2022)* → REA ↑

Country-specific	• **CCyB** build up → CET1-requirement ↑ • **CCyB** release → CET1-requirement ↓ • **SyRB** increase → CET1-requirement ↑ • **SyRB** reduction → CET1-requirement ↓
Bank-specific	• Changes in P2R → capital requirement ↑ ↓ • Changes in P2G: → CET1-requirement ↑ ↓

Note: CCyB: countercyclical capital buffer; SyRB: systemic risk buffer; P2R: pillar 2 requirement; P2G: pillar 2 guidance. Only EU-wide and country-specific policies are included in the analysis. Measures listed under "Covid-19" in March 2020 refer to measures for SSM countries.

A part of the regulatory changes can be classified as EU-wide changes, affecting all banks at the same time. The introduction of the leverage ratio, as well as the EU-wide loosening of requirements at the onset of Covid-19 in March 2020 are two examples of EU-wide changes.

Another part of the requirements included in the analysis are country-specific, meaning they only affect banks in specific countries. The introduction of a countercyclical capital buffer (CCyB) or a systemic risk buffer (SyRB) are examples of such changes. As the changes in these types of requirements occur simultaneously across different banks, it is possible to investigate bank behaviour in different subsets of banks. Banks might choose to react differently to the different types of requirements, depending in part on their capital headroom relative to those requirements.

In general, capital headroom for the sample of European banks seems t increase when requirements are loosened and decrease when they are tightened; see Chart 9. This development holds true regardless of the type of requirements:

1. Requirements relative to the risk-exposure amount, e.g. CCyB or SyRB

2. Requirements relative to total assets, i.e. the leverage ratio

3. Requirements that impact the level of the risk-exposure amount.

However, there is some variation across the banks in the sample. The banks with the highest capital headroom, represented by the sample's 75th quantile, have experienced a larger increase in capital headroom since 2022 compared to the median bank.

CHART 9

Variation across banks' capital headroom when capital requirements change

Capital Headroom, CET1 in per cent of REA
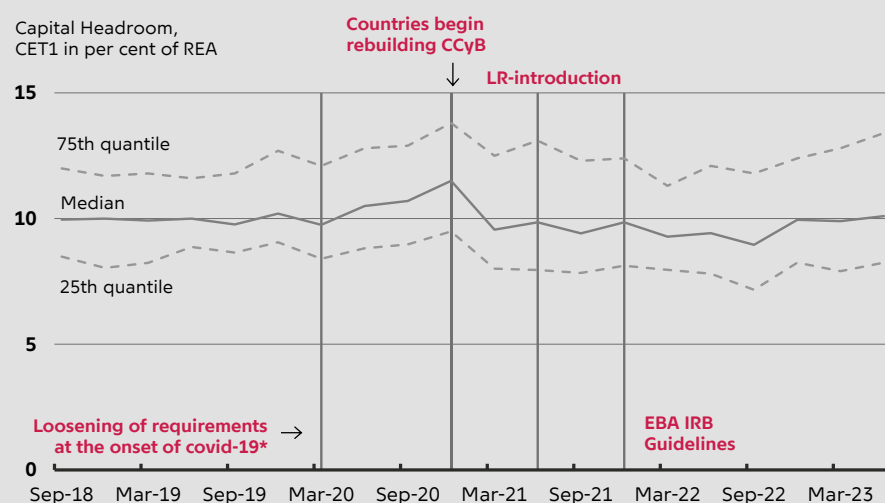
Note: This chart outlines the average CET1 capital headroom (given in percentages of REA) and highlights major regulatory changes during the period. During Covid-19, in March 2020, capital requirements were loosened, e.g. CCyBs were released or reduced in several countries, and banks were allowed to operate below P2G and dip into buffers. From December 2020 on, countries started to reintroduce CCyB requirements so that banks had to increase their capital buffer holdings. Increases in the CCyB have a 12-month phase-in period. In June 2021, leverage ratio requirements were implemented. Then, in January 2022, the EBA IRB guidelines entered into force affecting banks' REA, and accordingly, the required amount of capital that banks must hold. *Loosening of requirements happened at the discretion of national authorities; SSM banks were allowed to dip into buffers.
Source: Own calculations based on the EBA Transparency Exercise.

In order to investigate how banks react to changes in capital requirements, an analysis of banks' CET1-to-AT1 ratio is carried out. This analysis, unlike previous ones, focuses specifically on regulatory changes. More structural bank characteristics, such as bank size, loans-to-assets ratios, etc. are controlled for using bank fixed effects. This approach allows for an emphasis on factors that vary over time and may influence banks' use of AT1 capital.

The analysis could potentially capture two effects for banks when requirements increase[12]:

1. <u>Banks use more CET1</u>. As CET1 can be used to meet parallel requirements such as the leverage ratio, it might also mean a lesser incentive to use AT1 to fulfil the leverage ratio.

2. <u>Banks use more AT1.</u> A bank with low capital headroom uses more AT1 to free up CET1 to meet the higher requirement.

The results of the regression analysis confirm that banks in general adjust to higher CET1 requirements, such as increasing the systemic risk buffer (SyRB), by using more AT1; see Table 1, Model 1. Specifically, the results suggest that banks with low capital headroom make more use of AT1 when capital requirements are increased; see Table 1, Model 2.

According to the analysis, the impact of a SyRB is similar to the impact of a CCyB on the AT1-to-CET1 ratio. However, the effect is not exacerbated by banks with low capital headroom. This might be because SyRB is primarily used to address structural systemic risks, while the CCyB is used to address cyclical systemic risks. Activation and build-up (increases) of the CCyB would generally reflect changes in the macroeconomic environment and buildup of cyclical systemic risks, which would typically occur during periods of favourable macroeconomic conditions and relatively high bank profitability. Consequently, banks are more likely to retain earnings and build up capital during such times.

TABLE 1

Banks use AT1 to adjust to higher requirements, in particular those with low capital headroom

Variable	AT1-to-CET1		AT1-to-CET1	
	Model 1		**Model 2**	
CCyB rate	0.21		-0.48	
SyRB rate	**1.31**	*******	**1.28**	*******
D (Covid release, 2020)	0.72		-0.62	
D (Leverage ratio intro, 2021)	-0.55		-0.75	
D (EBA IRB guidelines, 2022)	**0.75**	*****	0.26	
D (Low capital headroom)	**1.11**	*******	**0.64**	*****
CCyB rate x D (Low capital headroom)			**3.40**	*******
SyRB rate x D (Low capital headroom)			-0.27	
D (Covid release, 2020) x D (Low capital headroom)			0.34	
D (Leverage ratio intro, 2021) x D (Low capital headroom)			0.37	
D (EBA IRB guidelines, 2022) x D (Low capital headroom)			**0.93**	******

Note: *p<0.1; **p<0.05; ***p<0.01. The dependent variable is AT1-to-CET1 capital ratio (per cent) and both models include time, bank and country fixed effects. The sample period is Q3 2018 to Q2 2023. For details, see Appendix Table 2. Changes to capital requirements are typically announced prior to a change taking effect, giving banks time to adjust to a higher requirement. Releases/reductions in capital requirements on the other hand would typically take effect immediately. The present analysis uses the *effective* capital requirements for CCyB and SyRB rates (given in natural logarithm) to ensure comparability for results of increasing/decreasing requirements. For the leverage ratio introduction (June 2021) and EBA's IRB guidelines (January 2022), we use a dummy set to 1 four quarters before the effective date to allow for a phase-in period between the announcement and the effective date

Source: Own calculations based on EBA Transparency Exercise

It should be noted that the results might also partly reflect a change in the use of the two buffers prior to Covid-19. Before Covid-19 the systemic risk buffer was generally used to address structural systemic risks, but also to set individual

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[12] Banks could also choose to adjust to increasing capital requirements by deleveraging, i.e. reducing risk in their portfolio (leading to lower risk weights) or reducing their portfolio or total assets. This type of effect is not captured in the model.

capital requirements to the largest banks. Relatively few countries had activated or built up the CCyB. Based on the experiences of Covid-19, authorities shifted focus to increasing the macroprudential space and the amount of releasable capital buffers. Therefore, many authorities changed their macroprudential strategies and started using the CCyB more actively.

Banks use AT1 to meet discretionary increases in REA

The effect is similar when capital requirements increase due to discretionary increases in the risk-exposure amounts (REA); see Table 1. The EBA's guidelines on IRB models implied that overall REA increased for some banks at the beginning of 2022. An increase in REA means an increase in the nominal amount of all risk-based capital requirements, including the minimum solvency requirement and capital buffers. That means that banks face both higher CET1 requirements and higher overall requirements. As banks with higher REA, all else equal, face higher overall capital requirements in nominal terms, they make more use of AT1 instruments.

As with changes in CET1 requirements, banks with low capital headroom in particular react to discretionary increases in REA by using more AT1; see also Table 1.

Asymmetric effects when requirements decrease during the sample period

The analysis reveals an asymmetric effect on AT1 usage when capital requirements are loosened. When requirements are loosened, as was the case during the onset of Covid-19, it does not necessarily mean that banks use less AT1. This might be due to the fact that early redemption of AT1 requires approval from relevant authorities. Therefore, the adjustment in the capital structure is expected to be very sluggish, even though requirements are relaxed.

The asymmetry may also reflect the varied nature of policy changes implemented at that time, which could have had opposing effects. First, different capital buffers were released, reducing the overall CET1 requirements for banks. Banks might have perceived the release of buffers as temporary, and therefore not reacted to the release.

Additionally, a large amount of fiscal support to affected business segments and households might have also meant that banks in effect did not need to dip into the buffers.

Finally, SSM banks were allowed to use both AT1 and T2 capital to fulfil their individual Pillar II requirements.[13] While this meant a loosening of the CET1 requirements, the overall capital requirements remained unchanged. Because banks could use AT1 to fulfil the Pillar II requirements, this might have increased banks' use of AT1.

Banks with more capital headroom use less AT1

Apart from changes in capital requirements, banks' capital headroom and capitalisation in general play a role in their funding decisions. According to the empirical results, banks with more capital headroom use less AT1. In general, banks have an incentive to hold excess capital on top of regulatory requirements, i.e. to meet supervisory, market and investor expectations regarding the amount of CET1 above the regulatory requirements or the capital headroom. As a result, banks with more CET1 headroom typically use AT1 instruments less frequently; see Chart 10.

There could be three types of factors driving this result:

[13] See also press release from ECB Banking Supervision, 12 March, 2020 (Link). This brought forward a measure that was initially scheduled to come into effect in January 2021, as part of the latest revision of the Capital Requirements Directive (CRD V).

- Banks with higher capital headroom have sufficient capital even if requirements increase, and thus in general have a lower demand for additional capital.

- Banks plan their capital positions based on their risk-based requirements. As they can use CET1 to fulfil parallel requirements, higher CET1 ratios reduce the need for other types of instruments to fulfil parallel requirements, such as the leverage ratio.

- Banks must comply with supervisory expectations regarding the size of their capital headroom, the so-called Pillar 2 Guidance, and internal capital targets (as part of their longer-term capital planning). As P2G can be converted to an add-on in the individual capital requirements, if breached, the P2G might be perceived as a requirement on top of the risk-based capital requirements.

CHART 10

Banks with low capital headroom use more AT1 capital

AT1-to-CET1, per cent
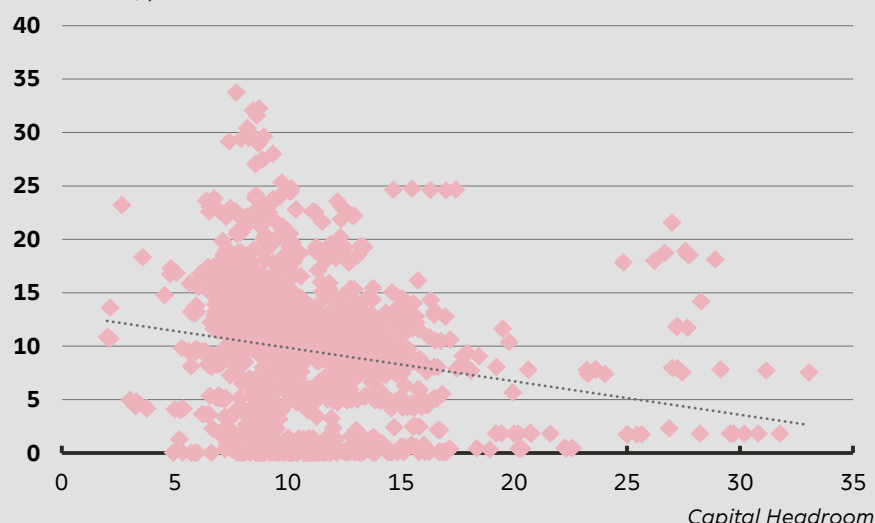
Capital Headroom

Note: This chart outlines the correlation between banks' capital headroom (per cent) and AT1-to-CET1 ratio (per cent). Each dot represents a bank-quarter specific observation.

Source: Own calculations based on EBA Transparency Exercise

Sample of Danish banks reveals similar results

An analysis performed on a sample of all Danish banks reveals that systemically important institutions ("O-SII banks") use significantly more AT1 than other banks; see Box 2. At the same time, we also find in this sample that banks with low capital headroom make more use of AT1 capital.

Contrary to the results for the EU sample of banks, higher capital requirements, such as increasing the CCyB, do not seem to have a significant effect on banks' AT1-to-CET1 ratios.

BOX 2

Danish banks' use of AT1

In this box we investigate the use of AT1 capital in a sample of Danish banks. In contrast to the European sample, the Danish sample contains both the larger O-SII banks, as well as medium-sized and smaller banks. The group of Danish O-SII banks is quite heterogenous, with total assets ranging from approximately 16 EUR billion to 440 EUR billion.

AT1 ratios of non-O-SII banks have declined in recent years
As outlined in Box Chart 1, both O-SII and non-O-SII banks make use of AT1 capital. While both groups of banks had similar AT1-to-CET1 ratios in 2016, use of AT1 by the smaller, non-O-SII banks has steadily declined compared to use of CET1.

The period between 2016 and 2023 saw the introduction and phasing-in of several regulatory requirements. The capital conservation buffer and O-SII buffers were phased-in in the period up to 2019. Increases in capital buffers means higher CET1 requirements for banks, all else being equal. As CET1 increases along with requirements, banks' AT1-to-CET1-ratios declined.

The relatively high AT1-to-CET1 ratio for the non-O-SII banks at the beginning of the sample might also reflect grandfathering of instruments, i.e. subordinated capital instruments that could count towards AT1 capital in a transitional period.[1]

Moreover, in 2017, the Danish FSA announced the introduction and phasing in of additional minimum requirements for banks' eligible liabilities (MREL). In Denmark, the requirement was introduced for both the O-SIIs and non-O-SIIs. Unlike O-SIIs, the smaller banks did not initially issue senior non-preferred debt to meet the new requirement. Instead, they used CET1, which was accumulated by retaining a share of earnings during the period.

Increase in requirements coincides with lower use of AT1
To maintain comparability, the analysis for Danish banks covers the same sample period as for the European banks, i.e. from Q3 2018 to Q2 2023. This allows the focus to remain on policy changes affecting capital requirements during this time.

The analysis suggests that Danish banks do not use AT1 to adjust to changes in capital requirements in the same manner as banks in the EU sample. The impact of changes to the CCyB during the sample period are not significant (and negative).

The results might reflect the relatively higher capital headroom of banks compared to the European sample. The supervisory expectations in terms of capital targets in the institutions' capital planning might also play a role. As part of the capital planning, financial institutions set a capital target. The capital target is based on the losses during severe stress, where it is assumed that the CCyB is released. As the CCyB is already accounted for in the capital target, credit institutions would not need to adjust their capitalisation when the CCyB is increased.

**Banks with low capital headroom make more use of AT1**
Similarly to the results in the EU-wide sample, a regression analysis on Danish banks reveals that banks with low capital headroom make more use of AT1 instruments in general; see Table 2, Model 3. This result suggests that Danish banks with ample capital headroom, and thus higher CET1 ratios, use CET1 to meet the parallel requirements, such as the leverage ratio.

Controlling for banks' capital headroom together with regulatory changes does not produce results similar to the results in the EU sample either (Model 3). Unlike EU banks, Danish banks with low capital headroom do not seem to use AT1 to adjust to higher capital requirements.

[1]See also Danmarks Nationalbank, Financial Stability Analysis, 1st Half 2014 (Link)

CHART 1

For non-O-SII banks, the AT1-to-CET1 ratio has declined during recent years

AT1-to-CET1 ratio, per cent
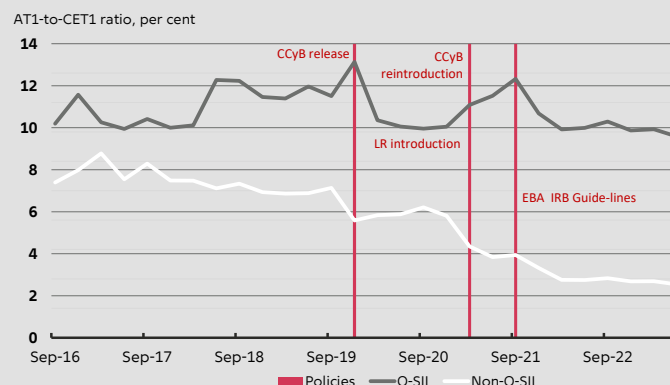
Note: This chart outlines the AT1-to-CET1 ratio (per cent) for O-SII and non-O-SII banks, respectively. The sample covers Danish large- and medium-sized banks between Q3 2016 and Q2 2023. Chart 1 highlights major regulatory changes that occurred during this period. CCyB was released in March 2020, during Covid-19. The CCyB at that point was one per cent effective, and two per cent in announced increases. In June 2021, the reactivation of the CCyB was announced. A CCyB of 2.5 per cent was effective as of March 2023. In June 2021, the leverage ratio requirements were introduced. Then, in January 2022, the EBA IRB guidelines were implemented for IRB banks, affecting their REA and, consequently, the required amount of capital these banks needed to hold. Only some of the O-SII banks use the IRB approach.

Source: Danish Financial Supervisory Authority and own calculations

TABLE 2

O-SII banks as well as banks with low capital headroom use more AT1

	AT1-to-CET1 (per cent)	AT1-to-CET1 (per cent)
	Model 1	Model 2
D (O-SII bank)	7.39***	7.52***
CCyB rate	-1.64	-1.75
D (Leverage ratio intro, 2021)	-1.64	-2.17
D (Low capital headroom)	1.94***	1.71**
CCyB rate x D (Low capital headroom)		-0.29
D (Leverage ratio introduction) x D (Low capital headroom)		1.21

Note: *p<0.1; **p<0.05; ***p<0.01. The dependent variable is AT1-to-CET1 capital ratio (per cent) and all models include bank, time and country fixed effects. For details, see Appendix Table 3.

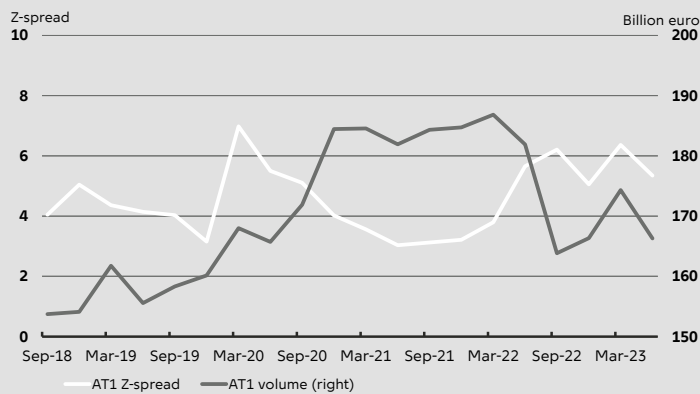Source: Own calculations based on data from Danish FSA

04

Banks continue to issue AT1 during market turmoil

Apart from banks' business models and regulatory requirements, market conditions might also play a role when it comes to banks' use of AT1. During periods of market stress and risk aversion, bond yields and, consequently, credit spreads would typically increase. Historical data suggest that AT1 instruments would experience a larger increase in yields during periods of market stress compared to other bonds. [14] A repricing of maturing bonds would cause banks' bond funding costs to increase and might discourage banks from issuing or refinancing AT1 instruments.[15]

The sharp increase in yields/credit spreads for AT1 instruments is evident in two periods of stress in European financial markets relevant to the sample we use: the onset of the Covid-19 pandemic in March 2020 and the Russian invasion of Ukraine; see Chart 11. AT1 spreads also correlate strongly with the measure for implicit volatility in European stocks, VIXX (0.83) and other volatility measures.

CHART 11
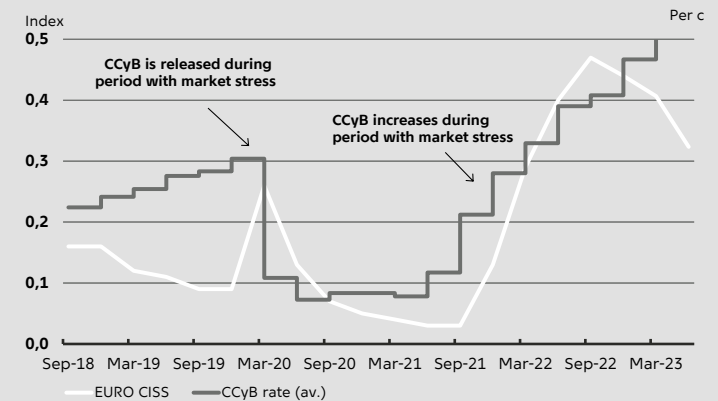
AT1 prices correlate with banks' AT1 holdings

Note: This chart outlines the AT1 Z-spread (bps, left axis) and the sum of European banks' AT1 holdings (billion Euro, right axis) between Q3 2018 and Q2 2023.
Source: Own calculations based on the EBA Transparency Exercise and Bloomberg

CHART 12

Capital requirements can change during both calm and stressed market periods

Note: This chart outlines the average European CISS Index (GDP-weighted, left axis) and average country CCyB rate (per cent, right axis) between Q3 2018 and Q2 2023.
Source: Own calculations based on ESRB and ECB Statistical Datawarehouse data

[14] See also Financial Stability Review, November 2023 (europa.eu) and Financial Stability Review, May 2023 (europa.eu).
[15] Since AT1 instruments are perpetual, banks do not necessarily have to exercise the call option. The interest rate reset mechanism allows instruments to switch from a fixed coupon to a floating interest rate based on a benchmark rate established by the contract, plus a margin (or credit spread) at a determined reset date (which usually coincides with the first ordinary call date) if the instrument is not called. The mere reset from a fixed to a floating rate does not in itself provide an incentive to redeem. See also Report on merged AT1 and MREL (europa.eu)

Although AT1 spreads increased during these two periods of market stress, the two periods are also distinctly different; see Chart 12.

The first episode, during the onset of the Covid-19 pandemic in March 2020, was relatively short-lived and characterised by an external shock and uncertainty about implications for the economy and financial sector. Both monetary and macroprudential policy were loosened to support the economy and the financial sector in the face of an unexpected shock. Capital requirements such as the countercyclical capital buffer were released or reduced in this period.

The second episode was also characterised by an external shock and uncertainty about the future course of the economy. However, the market turmoil was more persistent. Unlike the first episode, both monetary and macroprudential policies were tightened at the same time.

Regarding banks' choice of capital structure during the two episodes, it is therefore relevant to investigate whether:

- Market stress plays a role in banks' choice of AT1

- Banks' reactions to changes in capital requirements vary depending on market conditions.

To investigate whether market stress has any influence on banks' use of AT1 instruments, we use several measures, such as the Common Indicator of Systemic Stress (CISS).[16]

The results in Table 3 suggest that, on average, banks make less use of AT1 instruments when AT1 yield spreads are higher. At the same time, the results suggest that periods of market stress in general are also characterised by more use of AT1.

TABLE 2

Banks use AT1 to adjust to higher requirements, in particular those with low capital headroom

Variable	AT1-to-CET1	AT1-to-CET1	
	Model 1	Model 2	
AT1 (Z-spread)	-0.76	-0.30	
EURO CISS (GDP wght.)	0.13	0.07	
AT1 (Z-spread) x D (Low capital headroom)		-0.11	
AT1 (Z-spread) x D (Low capital headroom) x CCyB rate		0.38	*
EURO CISS (GDP wght.) x D (Low capital headroom)		0.02	*
D (Low capital headroom)		1.09	*
CCyB rate		0.12	
		-0.30	

Note: *p<0.1; **p<0.05; ***p<0.01. The dependent variable is AT1-to-CET1 capital ratio (per cent) and both models include time, bank and country fixed effects. The sample period is Q3 2018 to Q2 2023. CISS refers to "composite indicator of systemic stress". It includes 15 raw, mainly market-based financial stress measures that are split equally into five categories, namely the financial intermediaries' sector, money markets, equity markets, bond markets and foreign exchange markets. See also Holló, D., Kremer, M. and Lo Duca, M. (2012), CISS - A Composite Indicator of Systemic Stress in the Financial System, ECB Working Paper Series, No. 1426, (March). For details, please see Appendix Table 4.
Source: Own calculations based on EBA Transparency Exercise, Bloomberg and ECB Statistical Data Warehouse

Controlling for banks' capital headroom reveals that banks with low capital headroom are particularly price-sensitive, implying that they use significantly less AT1 capital when prices are high. However, when capital requirements such as

[16] In robustness tests, we also investigate the impact of VIXX market volatility measures. However, since the VIX measure is strongly correlated with the AT1 Z-spread, we exclude it from the analyses presented.

CCyBs are increased, the results suggest that banks with low capital headroom will make use of AT1 capital despite higher prices. Therefore, the results suggest that banks that need to raise capital might still choose to go to markets irrespective of market conditions, even though it might mean they incur higher funding costs. Banks with higher capital headroom naturally have more flexibility with regard to capital requirements and are in a better position to "wait and see".

Since the analysis is conducted using quarterly data, not all fluctuations in measures of market stress may be captured. This means that the analysis disregards banks' reactions to shorter periods of fluctuations in AT1 prices or market conditions. Even though shorter periods of market stress might be a factor in banks' decisions on issuance and refinancing operations, they are not expected to impact medium-term decisions on capital structure.

05
Business models and capital headroom are key determinants of AT1 use

Overall, the results suggest that banks' business models and market access, as well as regulatory decisions all influence how banks choose to meet capital requirements. A joint analysis of all the different factors reveals that leverage and bank size are among the most significant determinants of banks' use of AT1, but also that a large share of banks' use of AT1 is correlated with a banks' capital headroom; see Chart 13. Meanwhile, the impact of changes in regulatory requirements, such as CCyB rates, depends on the banks' capital headroom and may also reflect changes in banks' use of AT1 relative to the baseline.

Variation in leverage and bank size contributes positively to the variation in AT1-to-CET1 ratios in the sample of European banks. Variation in leverage accounts for around 14 per cent of the variation in AT1-to-CET1 ratios, while variation in bank size accounts for 9 per cent.

The results also confirm that capital headroom is important to consider in relation to banks' AT1-to-CET1 ratios, as it accounts for around 28 per cent of the variation, with lower capital headroom being correlated with higher use of AT1.

CHART 13

Large banks with higher leverage use more AT1 to meet capital requirements

Share of variation in AT1-to-CET1 ratio

■ All Banks ■ Low Capital Headroom Banks
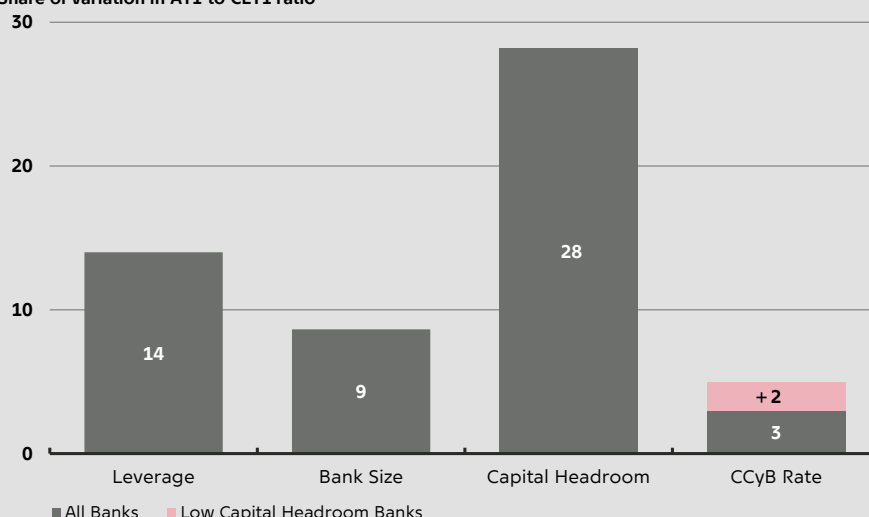
Note: This chart outlines the share of the variation in banks AT1 to CET1 capital ratio (given in percentages) that can be explained by the variation in the respective factors.
The factor contributions are based on a joint regression model, as outlined in Appendix Table 5, Model 3. The relative contribution of each factor is calculated following Nielsen, Feldhütter and Lando (2012) as: $\frac{\text{Factor contribution}_{j,t} - \text{Factor contribution}^{5\%}}{\text{AT1 to CET1 ratio}}$ where j is the j'th bank and t is the quarter. Finally, we form the distribution of this ratio and look at the median of the distribution.
Source: Own calculations based on the EBA Transparency Exercise and Danmarks Nationalbank data

The level of capital headroom on top of the regulatory risk-based capital requirements might reflect investor expectations, regulatory expectations concerning capital levels (such as the Pillar 2 Guidance), as well as internal capital targets and management buffers. The results confirm that the level of CET1 required to meet the risk-based requirements is a strong determinant of the amount of AT1 a bank has, and hence the amount of AT1 used to meet parallel requirements. This might have implications for the interaction between the different parallel requirements and ultimately the usability of banks' capital buffers.[17]

At the same time, policy decisions such as changes in capital requirements like the CCyB, are relatively less significant compared to other factors. Variation in CCyB rates accounts for around 3 per cent of the variation. At the same time, the effect of CCyB changes is more significant (+2 per cent) for banks with low capital headroom.

Since banks can use various instruments to meet their capital requirements, they have multiple options for adapting to regulatory changes. Increases in capital requirements are primarily aimed at increasing banks' robustness by increasing the level of capital. For example, the aim of increasing capital buffers is to increase the amount of CET1 a bank has available to absorb losses during times of distress.

However, the analysis suggests that this is not always the case. In particular, banks with low capital headroom tend to increase their use of AT1 relative to CET1 when capital requirements increase.

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[17] For a discussion of interaction between capital requirements and banks' incentives, see also analysis-no-9-regulatory-adjustments-are-to-contribute-to-more-effective-capital-buffers-uk (1).pdf

06
Appendix

Data sample and empirical methodology

In the main analysis of this study, we investigate all banks covered by the EBA Transparency Exercise between Q3 2018 and Q2 2022. The sample covers quarterly data for the largest banks in 25 European countries. In addition, we add annual report data from SNL, rating data from S&P Capital IQ, CCyB data from ESRB, as well as market data from the ECB Statistical Data Warehouse and Bloomberg.

For the main analysis, we use a panel regression framework where we regress banks' AT1 ratio on measures for banks' business models, capital requirements and policy events, as well as market measures. Specifically, we use the following model as our baseline model:

$$\text{AT1 Ratio}_{j,t} = \alpha + \beta_1 * \text{Bank size}_{j,t} + \beta_2 * D(\text{O-SII})_{j,t} + \beta_3 * \text{Leverage}_{j,t} + \beta_4 * \text{Loans to assets}_{j,t} + \beta_5 * \text{Deposits to assets}_{j,t} + \beta_6 * \text{Rating}_{j,t} + \text{Time FE} + \text{Country FE}$$

where j refers to bank j and t refers to quarter t.

As the primary variable of interest, we use banks' AT1-to-CET1 ratio. However, we also run robustness with banks' AT1 to REA ratio and AT1 to total assets ratio, respectively.

In the baseline specification we use measures for banks' business model, including "Bank size" (banks' total assets, given in natural logarithm), "D(O-SII)" (a dummy equal to one for banks that have to meet O-SII requirements), "Leverage" (total debt to total assets ratio), "Loans to assets" (volume of outstanding loans to total assets), "Deposits to assets" (ratio of total deposits to total assets) as well as "Rating" (S&P rating).

To investigate the effect of policy measure we use several measures:
- "Bank CCyB" is the bank-time specific CCyB rate the respective bank must fulfil, given in natural logarithm.

- "Systemic risk buffer" is the bank-time specific systemic risk buffer rate the respective bank must fulfil, given in natural logarithm.

- "D(Covid)" is a dummy equal to one after capital requirements were loosened during Covid-19, in March 2020.

- "D(LR Introduction)" is a dummy equal to one for the period Q1 2021 to Q4 2021, e.g. two quarters before and two quarters after the leverage ratio requirements were introduced in June 2021.

- "D(EBA IRB Guidelines)" is a dummy equal to one for the period Q3 2021 to Q2 2022, e.g. two quarters before and two quarters after the EBA introduced IRB guidelines in January 2022 that affected banks' REA and thereby the required amount of capital that banks must hold.

- As market measures, we use "AT1 Z-spread" (zero-volatility spread over the yield of a maturity-matched euro swap) as well as "CISS - GDP weighted" (average of European Composite Indicator of Systemic Stress index, weighted by the countries' GDP).

APPENDIX TABLE 1:
BANKS' AT1 RATIO AND BUSINESS MODEL EFFECTS

	AT1-to-CET1, per cent				AT1-to-assets, per cent			AT1-to-REA, per cent		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Bank size	0.491***	0.450***	0.465***	0.056***	0.046***	0.043***	0.037***	0.030**	0.032**
	(0.090)	(0.088)	(0.088)	(0.008)	(0.008)	(0.008)	(0.014)	(0.013)	(0.013)
D(O-SII bank)	1.990***	1.432***	1.271***	0.049***	0.037**	0.033*	0.326***	0.236***	0.203***
	(0.329)	(0.324)	(0.327)	(0.017)	(0.017)	(0.017)	(0.051)	(0.050)	(0.050)
Leverage	0.159***	0.108***	0.104***	-0.005***	-0.007***	-0.008***	0.025***	0.017***	0.016***
	(0.035)	(0.034)	(0.035)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Loans to assets	-0.120***	-0.110***	-0.107***	-0.004***	-0.004***	-0.004***	-0.017***	-0.015***	-0.014***
	(0.013)	(0.012)	(0.012)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Deposits to assets	-0.023**	-0.010	-0.005	-0.001**	-0.0005	-0.0002	-0.005***	-0.003*	-0.002
	(0.009)	(0.009)	(0.009)	(0.0004)	(0.0004)	(0.0004)	(0.001)	(0.001)	(0.001)
D(Rating)		3.287***			0.134***			0.526***	
		(0.340)			(0.016)			(0.052)	
Rating			0.600***			0.025***			0.102***
			(0.062)			(0.003)			(0.009)
Time and country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,518	1,518	1,518	1,488	1,488	1,488	1,518	1,518	1,518
R2	0.389	0.425	0.426	0.528	0.549	0.550	0.424	0.461	0.466
Adjusted R2	0.370	0.408	0.408	0.514	0.535	0.536	0.407	0.445	0.450

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Own calculations based on EBA transparency Exercise, SNL and S&P Capital IQ data

APPENDIX TABLE 2:
BANKS' AT1 RATIO AND REGULATORY REQUIREMENTS

	AT1-to-CET1, per cent	
	Model 1	Model 2
CCyB rate	0.208	-0.566
	(0.431)	(0.464)
SyRB rate	1.305***	1.255***
	(0.388)	(0.443)
D(Covid release, 2020)	0.724	0.623
	(0.585)	(0.611)
D(Leverage ratio Intro, 2021)	-0.552	-0.751
	(0.423)	(0.474)
D(EBA IRB guidance, 2022)	0.753*	0.261
	(0.418)	(0.468)
D(Low capital headroom)	1.106***	0.637**
	(0.252)	(0.283)
CCyB rate x D(Low capital headroom)		3.406***
		(0.982)
SyRB Rate x D(Low capital headroom)		-0.272
		(0.719)
D(Covid release, 2020) x D(Low capital headroom)		0.343
		(0.380)
D(Leverage ratio intro, 2021) x D(Low capital headroom)		0.368
		(0.417)
D(EBA IRB Guidance, 2022) x D(Low capital headroom)		0.926**
		(0.414)
Bank and country FE	YES	YES
Observations	1,477	1,477
R2	0.863	0.865
Adjusted R2	0.850	0.852

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Own calculations based on EBA transparency Exercise, SNL and S&P Capital IQ data

APPENDIX TABLE 3:
DANISH BANKS' AT1 RATIO AND REGULATORY REQUIREMENTS

	AT1-to-CET1, per cent		
	Model 1	Model 2	Model 3
D(O-SII bank)	7.386***	7.520***	5.159**
	(1.952)	(1.957)	(2.269)
CCyB rate	-1.644	-1.754	-2.531**
	(1.032)	(1.087)	(1.152)
D(Leverage ratio intro)	-1.639	-2.167	-2.031
	(1.221)	(1.346)	(1.350)
D(Low capital headroom)	1.939***	1.711**	1.941***
	(0.609)	(0.777)	(0.610)
CCyB rate x D(Low capital headroom)		-0.294	
		(1.324)	
D(Leverage ratio intro) x D(Low capital headroom)		1.214	
		(1.118)	
D(Small bank)			-2.644**
			(1.228)
CCyB rate x D(Small bank)			1.257
			(0.945)
D(Leverage ratio intro) x D(Small bank)			-0.496
			(1.036)
Bank and time FE	YES	YES	YES
Observations	1,046	1,046	1,042
R2	0.666	0.666	0.668
Adjusted R2	0.640	0.640	0.641

APPENDIX TABLE 4:
BANKS' AT1 RATIO AND MARKET MEASURE EFFECTS

	AT1-to-CET1, per cent		
	Model 1	Model 2	Model 3
AT1 (Z-spread)	-0.761	-0.836	-0.306
	(1.541)	(1.531)	(1.559)
EURO CISS (GDP wght.)	0.132	0.135	0.078
	(0.142)	(0.141)	(0.145)
AT1 (Z-spread) x D(Low capital headroom)		-0.098	-0.111
		(0.159)	(0.159)
EURO CISS (GDP wght.) x D(Low capital headroom)		0.025*	0.023*
		(0.014)	(0.014)
D(Low capital headroom)		1.089*	1.097*
		(0.642)	(0.641)
AT1 (Z-spread) x D(Low capital headroom) x CCyB rate			0.387*
			(0.198)
CCyB rate			0.128
			(0.265)
Bank, time and country FE	YES	YES	YES
Observations	1,518	1,477	1,477
R2	0.852	0.862	0.862
Adjusted R2	0.839	0.849	0.849

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Own calculations based on EBA transparency Exercise, SNL and S&P Capital IQ data

APPENDIX TABLE 5:
JOINED REGRESSION ANALYSIS

	AT1-to-CET1, per cent		
	Model 1	Model 2	Model 3
Bank size	0.367***	0.372***	0.290***
	(0.090)	(0.090)	(0.090)
D(O-SII bank)	1.017***	1.015***	0.900***
	(0.321)	(0.320)	(0.318)
Leverage	0.039	0.034	0.134***
	(0.034)	(0.034)	(0.033)
Loans to assets	-0.099***	-0.099***	-0.101***
	(0.012)	(0.012)	(0.012)
Deposits to assets	0.005	0.004	-0.006
	(0.009)	(0.009)	(0.009)
Rating	0.628***	0.614***	0.624***
	(0.060)	(0.060)	(0.059)
D(Low capital headroom)	3.731***	3.467***	
	(0.303)	(0.317)	
Capital headroom			-0.456***
			(0.038)
CCyB rate	0.488	-0.295	-0.654
	(0.760)	(0.808)	(0.797)
D(Low capital headroom) x CCyB rate		4.486***	6.212***
		(1.602)	(1.544)
AT1 (Z-spread)	-10.668***	-10.449***	-9.398***
	(3.101)	(3.095)	(3.070)
EURO CISS (GDP wght.)	1.332***	1.313***	1.164***
	(0.300)	(0.300)	(0.298)
Time and country FE	YES	YES	YES
Observations	1,477	1,477	1,477
R2	0.488	0.491	0.500
Adjusted R2	0.471	0.474	0.483

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Own calculations based on EBA transparency Exercise, SNL and S&P Capital IQ data

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