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Interest rate risk of non-financial firms: who hedges and does it help?

Key takeaways

- *Natural language text analysis of 80,000 company financial statements published by 14,000 non-financial firms in the euro area, United Kingdom and United States shows that around 50% of firms with variable rate debt hedge their interest rate risk.*
- *Firms that hedge interest rate risk tend to be larger and have smaller cash buffers and lower equity valuations.*
- *When interest rates rise, firms that hedge their interest rate risk experience a smaller negative impact on their interest coverage ratios and market valuations. They are also better able to maintain the size of their workforce.*
- *Our analysis highlights the importance of, and the challenges in, getting a comprehensive overview of hedging activity among non-financial firms.*

The speed and magnitude of interest rate increases over the past 18 months has raised concerns about the potential adverse effects on borrowers, particularly for those with variable rate debt. Variable rate debt remains important for a significant fraction of non-financial firms, even though many large firms took advantage of low interest rates to borrow at fixed rates in previous years (Ampudia et al (2023)). For example, for most firms in Italy and the United Kingdom, variable rate debt still accounts for more than 50% of total debt (Graph 1.A).[1] For 30% of firms in the United States and Germany, it still accounts for more than half.

Having variable rate debt does not necessarily mean that these firms are exposed to interest rate risk. This is because firms can hedge this risk, for example by purchasing financial instruments such as interest rate derivatives.

It is difficult to obtain a comprehensive overview of the hedging activities of non-financial firms.[2] Unlike standard financial statement items, such as total assets, revenues or profits, the detailed information needed to accurately assess whether a firm is hedging interest rate risk is only provided in the written notes to the financial statements. While an analyst can read these notes to determine whether a company is hedging interest rate risk, there are clear challenges in scaling this up to examine hedging across thousands of firms.

[1] These figures are based on firms which have reporting requirements to publish financial statements. The smallest 5% of firms in our sample have annual revenues of around $3.5 million, which is well under the threshold below which firms are commonly regarded as small enterprises in the US and EU. Nevertheless, 80% of the firms in our sample are classified as large because these firms are more likely to publish financial statements.

[2] See Caballero et al (2023) for an analysis of interest rate hedging by banks.

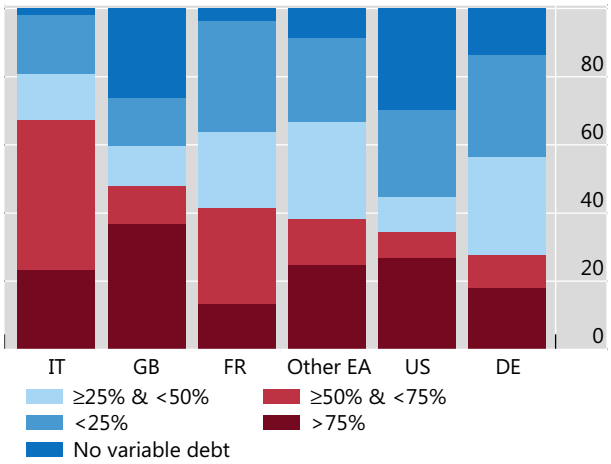
To overcome this challenge, we apply natural language text analysis techniques to "read" the notes of company financial statements. With this methodology, we can comprehensively assess the hedging activity of non-financial corporations, covering over 85,000 individual financial statements from over 14,000 firms in the euro area, the UK and the US between 2007 and 2022. We first examine the extent to which firms hedge interest rate risk and how this has changed over time. We then exploit the richness of our data set to shed light on the characteristics of firms that tend to hedge interest rate risk. Finally, we examine the extent to which interest rate hedging protects firms from interest rate increases.

Many firms have variable rate debt; some hedge this risk, but many do not

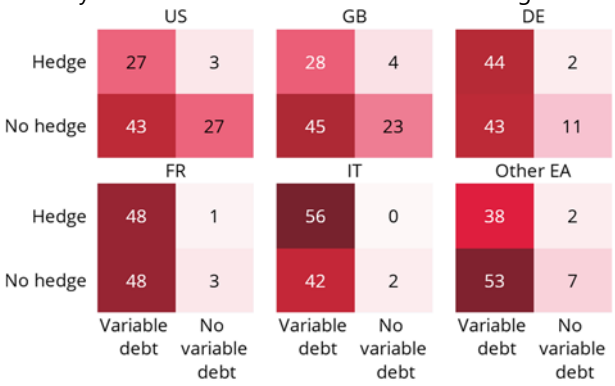
In per cent

Graph 1

A. Share of firms with variable rate debt (2021–22)



B. Many firms with variable rate debt do not hedge[1]



[1] Based on financial statements from 2021 and 2022. Horizontal axis splits firms into those with variable rate debt and those with no variable rate debt. Vertical axis splits firms that hedge interest rate risk and those that do not. Each entry in the grid is the share of firms with the corresponding indicator variables for hedging and variable rate debt. Hence, the total for each jurisdiction sums to 100. [2] Based on financial statements from 2021 and 2022.

Sources: Capital IQ; BIS.

Measuring interest rate hedging activity in non-financial firms

Assessing whether a firm is actively hedging interest rate risk is not straightforward. Because derivatives can be entered into with little or no upfront cost, the initial transaction cannot be gleaned from the balance sheet, income statement or cash flow statement. Although changes in the fair value of derivatives that occur during the life of a derivatives contract do show up in earnings, the line items in which this can appear provide only a very noisy signal about interest rate hedging. First, the published figures typically include the fair value changes of other derivatives including foreign currency and commodity derivatives. Second, the item may appear in different places in a firm's financial statements depending on the specific type of hedge. Finally, it also includes changes in the fair value of derivatives held for speculative purposes.

Accounting standards do, however, require disclosure of hedging activity that would be material to the firm in the notes to the financial statements. These notes provide qualitative (and, more recently, quantitative) information to help analysts understand whether the derivatives position relates to hedging specific risks. This information is contained in sentences such as, "We use interest rate swaps, forward-starting interest rate swaps, and treasury locks to hedge our exposure to interest rate changes…".[3] This allows an investor to read the notes to see if the company is specifically hedging interest rate risk. But the free-form nature of these notes makes it difficult to assess hedging activity across thousands of firms.

[3] Example taken from General Mills, INC 10-K filing for 2023.

To provide a comprehensive view of interest rate hedging across non-financial firms, we turn to natural language text analysis to scale up the "reading" of the notes to the financial statements. There are technical challenges to doing this efficiently. Given the sheer size of the text-based data, parsing the notes, line by line, with natural language techniques is extremely slow, even for a powerful computer. For this reason, existing studies using these techniques have focused on a relatively small set of firms such as those in the S&P 500 (eg Gürkaynak et al (2022)).

The natural language analysis itself is conducted in several steps. We first take machine-readable financial statements in English covering over 80,000 financial statements published between 2007 and 2022 by non-financial firms in the euro area, the UK and the US. These financial statements are pre-processed, which makes the subsequent natural language analysis much faster.[4] We then look for the occurrence of 20 key phrases related to interest rate hedging activities, such as "hedge interest rate", "hedge against interest rate" or "interest rate swap". From these 20 key phrases, we also look at all the forms of inflection, ie searching also for phrases which include "hedge" would also identify "hedging", "hedges", "hedged" etc.

We further look for phrases that indicate false positives in the corresponding financial statements. Examples include "not hedging against any interest rate", "not used an interest rate" or "fixed rate to variable rate". For the false positives, we look for the occurrence of more than 60 key phrases as these are somewhat more complicated to filter out.

We finally classify a firm as having an interest rate hedge in a given year if we find at least one positive match with our keywords and no false positives in the corresponding financial statements. To check the accuracy of our algorithm, we filter out the sentences surrounding the keywords in over 300 documents and then manually check these sentences to verify that the approach works well.

Trends in hedging

Our data processing shows that a significant proportion of firms hedge interest rate risk. Across countries, this ranges from just under 30% in the United States to almost 60% in Italy (Graph 1.B). Interest rate hedging activity appears to be concentrated among firms with variable rate debt liabilities. However, many firms holding variable rate debt do not hedge; based on the data for 2021 and 2022, around half do not. Conversely, very few firms that have no variable debt are identified as hedging.[5]

In several countries, the propensity to hedge interest rate risk appears to have been on a secular decline (Graph 2.A). For example, in the UK and Germany (as well as in smaller euro area economies), the frequency with which a firm hedges interest rate risk has fallen by about 10 percentage points over the past decade.

In other countries, changes in interest rate uncertainty appear to explain the ups and downs in hedging activity (Graph 2.B). During the euro area sovereign debt crisis, firms' propensity to hedge interest rate risk increased in Italy and France. It then declined as conditions stabilised. In the US, the propensity to hedge interest rate risk increased alongside higher interest rate volatility during the Great Financial Crisis. It then declined as interest rates remained pinned to the effective lower bound but increased again from 2016 alongside the rise in policy rates. However, surprisingly perhaps, the latest data from 2022 do not suggest there has been a significant additional increase in interest rate hedging, with the possible exception of France.

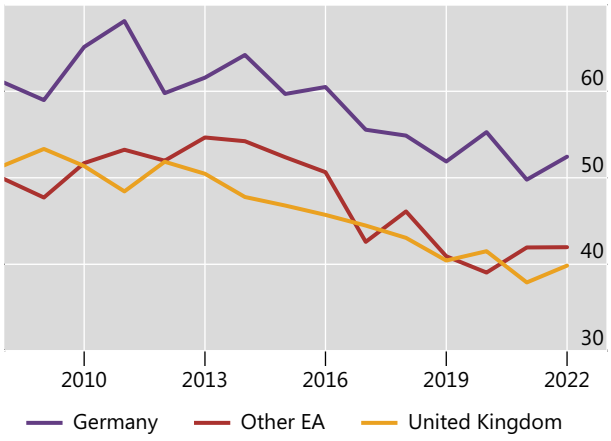
[4] Our sample is over 14 times larger than the sample of Gürkaynak et al (2022), which was limited to S&P 500 firms.

[5] We take the fact that less than 5% of firms in our sample are classified as hedging but have no variable rate debt as evidence that our methodology is relatively immune to measurement error.

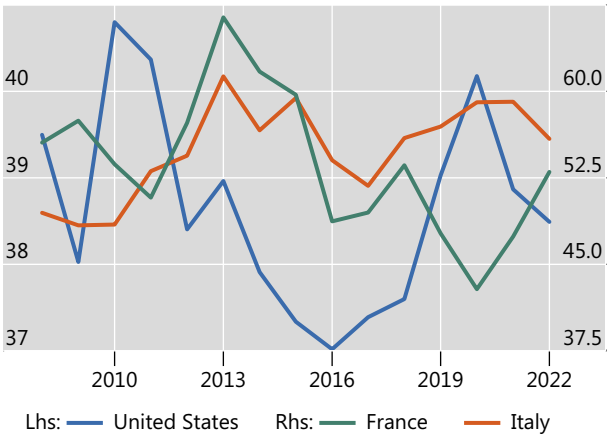
Interest rate risk hedging has changed over time

Percentage of firms hedging interest rate risk[1] Graph 2

A. Propensity to hedge has declined in some economies…



B. …while being driven by interest rate uncertainty in others



Other EA = other euro area.

[1] As a share of firms with positive variable rate debt only.

Sources: Capital IQ; BIS.

Our natural language text analysis identifies *if* a firm hedges interest rate risk, but it does not say by *how much*. We consider two scenarios to get a sense of how much variable rate debt might be hedged at the country level. First, we consider the upper bound where firms that hedge, hedge all their variable rate debt risk. Under this assumption, the aggregate hedging ratio, ie the ratio of hedged variable rate debt to total variable rate debt in the economy, could range from 50% in smaller euro area countries to as much as 75% in Germany at the end of 2022. However, this upper bound is likely to overstate the true extent of hedging. For example, lending terms for syndicated loans often only require borrowers to hedge as little as 30% of their interest rate exposure.[6] Using the 30% hedging rate as a lower bound, this would imply that as little as 15–25% of the interest rate risk associated with variable rate debt is hedged in aggregate.

Who hedges and who does not?

Firms that hedge interest rate risk tend to differ from those that do not along four key dimensions. First, they tend to be larger (Graph 3.A). Estimates based on a linear probability model suggest that a one standard deviation increase in log total assets (an increase in total assets from the mean of $630 million to $6.9 billion) is associated with a 15 percentage point increase in the likelihood of hedging. This suggests that there are fixed costs associated with hedging, such as the need to have a sophisticated treasury department that can manage the accounting infrastructure.

Second, and somewhat unsurprisingly, hedgers hold more variable rate debt. A one standard deviation increase in the variable rate debt-to-asset ratio (14 percentage points) is associated with a 7.5 percentage point increase in the likelihood of hedging.

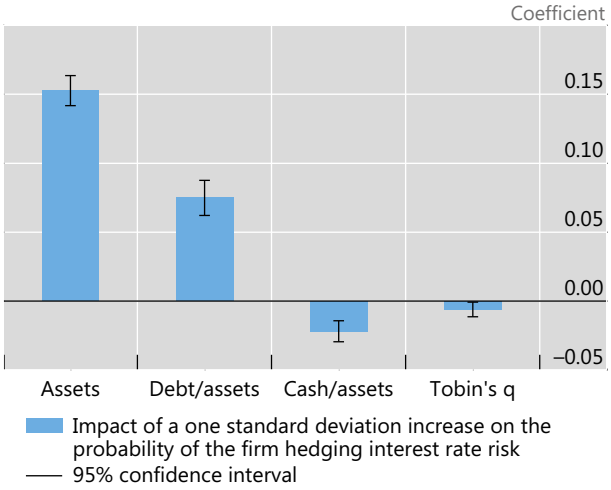
Third, hedgers tend to have smaller liquidity buffers. A one standard deviation decrease in the cash-to-assets ratio (15 percentage points) raises the probability of hedging by around 2.5 percentage points. This may reflect the fact that an interest rate hedge is more valuable when a firm has smaller cash buffers

[6] Although the context is somewhat different, airline companies tend to hedge only 30–60% of their exposure to jet fuel price risk.

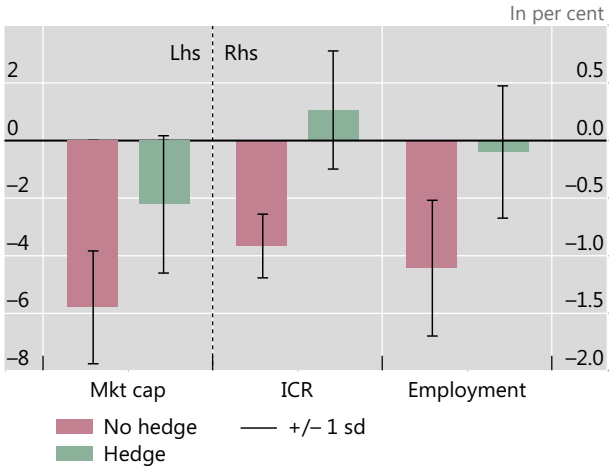
to draw on in the event of a sudden increase in interest costs. Last, firms with lower equity valuations, as measured by Tobin's q, are more likely to hedge interest rate risk. However, because the differences in Tobin's q between hedgers and non-hedgers are small, the economic importance of market valuations for hedging activity is somewhat less relevant.

Who hedges interest rate risk, and does it shield them from rising interest rates? Graph 3

A. Firms that are larger and have more variable rate debt and smaller cash buffers tend to hedge[1]



B. Hedging variable rate debt shields firms from interest rate hikes[2]



[1] Impact of a one standard deviation increase in the respective variable on the probability of the firm hedging interest rate risk estimated with a linear probability model estimates with the following specification: $D(hedge)_{icst} = \beta_1 \log(total\ assets)_{icst-1} + \beta_2 total\ debt/assets_{icst-1} + \beta_3 variable\ debt/assets_{icst-1} + \beta_4 bank\ debt/assets_{icst-1} + \beta_5 bond\ debt/assets_{icst-1} + \beta_6 capex/netPPE_{icst-1} + \beta_7 cash/assets_{icst-1} + \beta_8 EBIDTA/assets_{icst-1} + \beta_9 Tobin's\ q_{icst-1} + \beta_9 working\ capital/assets_{icst-1} + \mu_{cst} + \varepsilon_{ict}$, where *D(hedge)icst* is a dummy variable taking on the value of one if firm *i* in country *c* in sector *s* hedges interest rate risk in year *t*, and, μ_{cst} are country-sector-year fixed effects. Standard errors clustered by firm. Error bands denote 95% confidence levels. [2] Impact of a 100 basis point increase in policy rates on firm-level variables estimated with the following regression: $y_{icst} = \beta_1 \Delta policyrate_{ct} + \beta_2 D(hedge)_{isct-1} + \beta_3 D(hedge)_{icst-1} \times \Delta policyrate_{ct} + + \gamma additionalcontrols_{icst-1} + \mu_{ct} + \delta_{cs} + \varepsilon_{isct}$, where y_{icst} is either the annual change in the interest coverage ratio, market capitalisation or employment growth of firm *i*, in country *c* in sector *s* and in year *t*. $\Delta policyrate_{ct}$ is the change in the policy rate between year *t* and *t*–1. Additional controls include Tobin's q, log of total assets, cash/assets, net plant, property and equipment/assets, market leverage and variable debt/assets. Employment growth is computed as (*employment*$_t$ – *emplyoment*$_{t-1}$) / (0.5 * (*employment*$_t$ – *emplyoment*$_{t-1}$)) * 100. $\mu_{ct}$and δ_{cs} are country-time and country-sector fixed effects, respectively. The regression is estimated in the set of firms with variable rate debt. The red bars show the estimate of β_1, while the green bars show the sum of β_1, β_2 and β_3 coefficients. Additional tests show that the green bars are statistically different from the red bars at the 10% level.

Sources: Capital IQ; BIS.

Do interest rate hedges shield firms from interest rate increases?

To what extent do interest rate hedges shields firms from rising interest rates? To answer this question, we look at changes in the financial and economic performance of firms around interest rate changes, comparing firms with interest rate hedges to those without.

Interest rate hedges do shield firms from rising interest rates (Graph 3.B). Following a 100 basis point increase in interest rates, firms without interest rate hedges see a fall in their interest coverage ratios (ratio of earnings before interest and taxes to interest expenses) (red bar). By contrast, firms with interest rate hedges experience no significant change (green bar). The protection provided by interest rate hedges is in turn reflected in firms' equity valuations. While firms without interest rate hedges see their equity valuations decline by 6% on average following a 100 basis point rise in interest rates, firms with hedges only experience a 2% decline. Moreover, the negative impact for hedgers is not statistically significant. Finally, firms with interest rate hedges tend to maintain their existing employment levels despite the rise in interest rates. By contrast, unhedged firms shed workers when interest rates rise. Additional statistical tests show that the above differences between hedgers and non-hedgers are statistically meaningful.

Conclusion

Hedging interest rate risk can reduce firms' exposure to higher interest rates whenever they hold variable rate debt. However, it is not easy to get a comprehensive assessment of interest rate hedging among non-financial companies, because this detailed information is only disclosed as free-form text in the notes to their financial statements. We use natural language text analysis to "read" the notes of over 80,000 company financial statements across 14,000 firms in the euro area, UK and US.

We find that many firms with variable rate debt liabilities hedge this risk, but around 50% do not. Our analysis suggests that firms with interest rate hedges are likely to be insulated from the current tightening of monetary policy, at least for the duration of their hedges. By contrast, the many firms that have not hedged their interest rate risk are likely to have experienced a significant tightening of financial conditions over the past 18 months. Our results highlight the importance of having a comprehensive view of interest rate hedging activity in order to assess the potential impact of rising interest rates on the non-financial corporate sector.

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