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Business financing in Europe:
How will higher interest rates affect companies' financial situation?

Authors:

Daniel Bendel
Phone: +49 221 4981-881
E-Mail: bendel@iwkoeln.de

Markus Demary
Phone: +49 221 4981 732
E-Mail: demary@iwkoeln.de

Michael Voigtländer
Phone: +49 221 4981 741
E-Mail: voigtlaender@iwkoeln.de

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Postfach 101942 - 50459 Köln

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Executive Summary

Companies' access to finance has a significant impact on their profitability and growth prospects. Without external financing, most firms are not able to invest, which is a prerequisite for economic growth. In contrast to the US, which has a capital market-based financial system, banks are the dominant lenders for firms in the euro area. Banking crises endanger access to finance. In the wake of the banking and sovereign debt crisis in the euro area, risk premiums for sovereign debt went up and spilled over to banking markets. Besides sovereigns, firms too faced credit constraints, especially in countries with presumably less sustainable public debt. After the European Central Bank (ECB) accelerated its accommodative monetary policy stance even further, interest rates for sovereigns and firms fell considerably, enabling firms to lend money at historically low rates. With the strengthened recovery of the euro area, the end of this ultra-low interest rate environment seems to be near, posing new challenges for firms in the euro area.

The aim of this study is to analyse how firms have dealt with this changing financing environment in recent years and to what extent companies are ready for a change towards higher interest rates. To answer this research question, we have used data from the survey on the access to finance of enterprises (SAFE) provided by the ECB.

We identify companies that are vulnerable to rising interest rates, as they will presumably encounter economic problems when financing costs rise. The percentage of vulnerable companies is extremely high in Greece (9.4 percent), Italy (8.5 percent) and France (5.7 percent). The lowest rate is in Germany (0.7 percent). In relation to the size of the national business sectors, 39 percent of all vulnerable firms are located in Italy, 23 percent in France and 15 percent in Spain. When the ECB starts to normalize monetary policy, these countries could be hit hard through their business sectors' vulnerability. As a comparatively many large companies are prone to the risk of rising interest rates in Portugal (4.0 percent of big Portuguese companies) and Greece (10.0 percent of big Greek companies), the labour markets in those countries could be disproportionally affected when interest rates rise too quickly or become too high.

1. Introduction

Access to finance has a significant impact on the profitability and growth prospects of enterprises. Without financial support, most firms are not able to invest, and business investment is a prerequisite for economic growth. In contrast to the US, banks are the dominant lenders to firms in the euro area. Banking crises threaten access to finance in a bank-based financial system, as the banking and sovereign debt crisis in the euro area has shown. As confidence in the sustainability of public finances eroded, risk premiums on sovereign bonds went up and the tensions in sovereign debt markets spilled over to the banking markets. The ECB's action to accelerate its accommodative monetary policy stance was necessary to prevent a credit crunch, and interest rates for states and firms went down considerably, enabling firms to lend money at historically low rates. With the strengthening recovery in the euro area, the end of this ultra-low interest rate environment seems to be near, posing new challenges for firms in the euro area.

The aim of this study is to analyse how firms have dealt with the changing financing environment and shortages in access to finance in recent years. For this purpose, we use data from the survey on the access to finance of enterprises (SAFE) provided by the ECB. SAFE is a bi-annual survey, which allows for the identification of different financing trends in countries, sectors and firm sizes. With this data set, we are able to derive how companies in the euro area have responded to changing interest rates since 2010. We also investigate how companies have been prepared for a shift towards higher interest rates. To identify the impact of higher interest rates on the financial situation of firms, we develop an indicator that enables so-called vulnerable firms to be identified, i.e. firms that are likely to face economic problems when monetary policy tightens. Besides Greece, the percentage of vulnerable companies is especially high in Italy, France and Spain, indicating that a "normalization" of interest rates poses a challenge for economic recovery in those countries.

The study is organized as follows. As a first step, the database is explained. Next, changes in access to finance over the last few years are described and consequences for corporate finance are derived. Then, potentially vulnerable firms in the euro area are detected and hypotheses relating to potential influence factors are empirically derived. The study ends with a conclusion.

2. Data set

SAFE is used as the main dataset for this empirical analysis. SAFE is an anonymized panel data set collected by means of a survey of companies headquartered in the

European Union (EU). The survey is run every six months, with a set of questions relating to firm-specific topics such as the development of balance sheet items or of the availability of different types of financing. The first wave started in the first half of 2009.

Within the survey, firms are stratified by their country of residence, their size, ranging from micro (1-9 employees) and small (10-49 employees) to medium-sized (50-249 employees) and large enterprises (250 or more employees) and four major economic sectors: industry, construction, trade and services.

In this study, we concentrate on firms located in countries that are part of the euro area. The reason for this is that those firms were hit by sharply rising interest rates during the banking and sovereign debt crisis in the euro area. Moreover, those firms experienced a period of falling interest rates owing to the ECB's large-scale monetary policy measures of recent years. The main question we seek to answer is how firms will be affected when borrowing conditions tighten again due to a possible move away from the extremely accommodative monetary policy stance. Since we are interested in the effects of changes in borrowing conditions, we focus on firms that have reported having a positive debt-to-asset ratio.

3. The changing financing environment

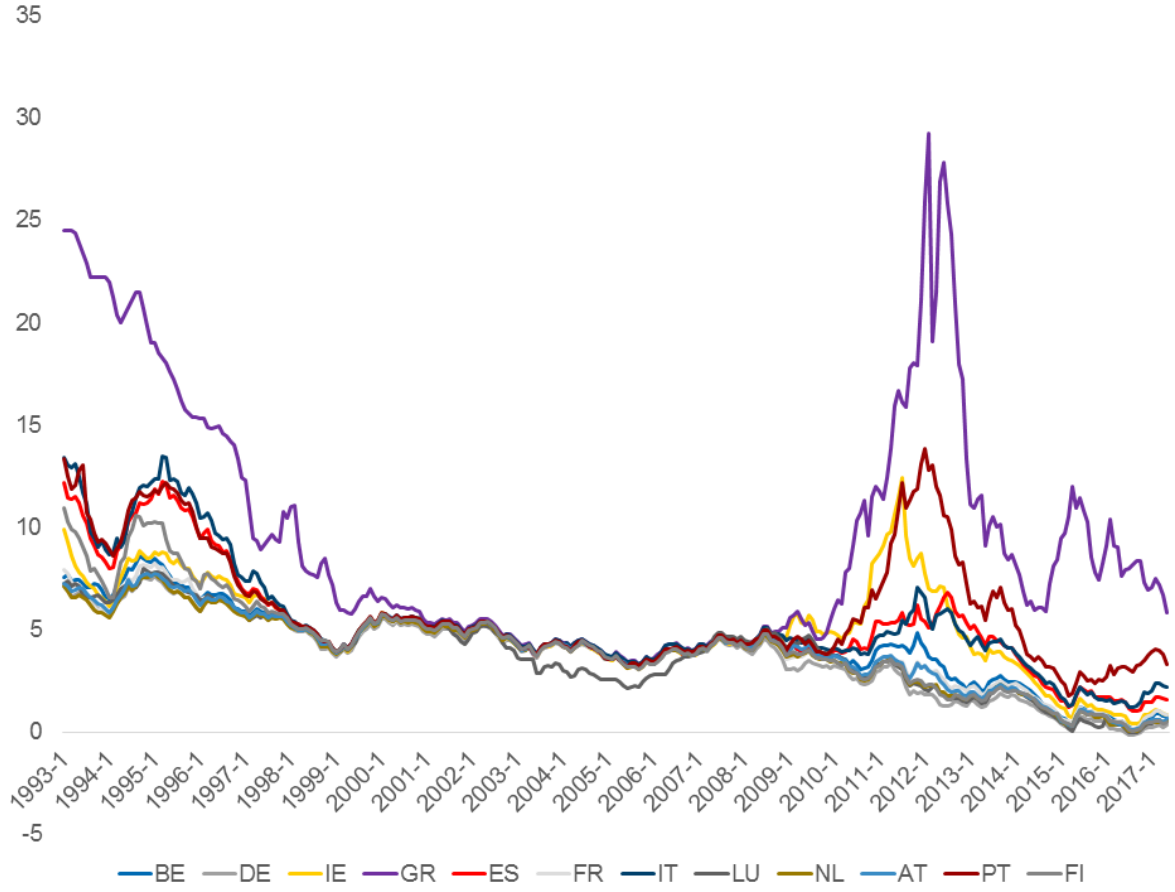
During the banking and sovereign debt crisis in the euro area, financing conditions and access to finance have proven to be vulnerable to tensions in sovereign debt markets. The European Central Bank has intervened in these markets with large-scale measures to bring interest rates back down. However, financing conditions are likely to tighten again when the ECB moves away from its accommodative monetary policy stance. This raises the question of how vulnerable companies are to increasing interest rates. Based on an analysis of the macroeconomic environment in an ensuing chapter, we develop hypotheses for the empirical analysis with the company-level data from SAFE.

3.1 The 2010 to 2012 crisis

Tensions started in 2010 and heightened in 2012. After a long period of converging interest rates, investors lost confidence in the debt sustainability of Greece, Ireland, Italy, Portugal and Spain (figure 3-1). The divergence between the yields on sovereign bonds contributed to a fragmentation of the capital markets in the euro area, caused by investors who moved their money from crisis countries to safe-haven countries like Germany, while banks in the crisis countries experienced a

liquidity shortfall. The situation called for emergency liquidity measures by the national central banks in the Eurosystem. Although extensive lender-of-last-resort measures were adopted, banks in the crisis countries had to cut their lending, and borrowing costs for businesses surged as a response to tensions in the money markets (figure 3-2).

Figure 3-1: Yields on sovereign bonds
In percentage terms



Source: Eurostat

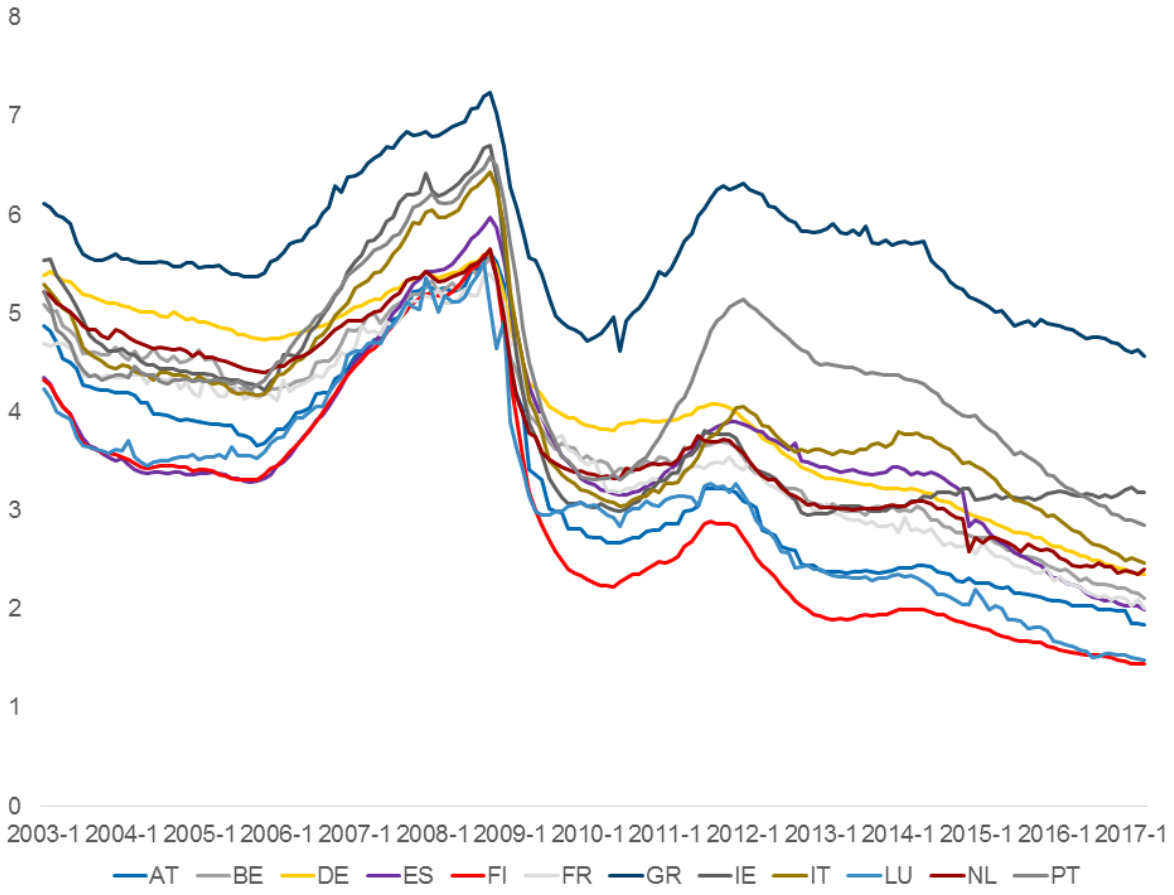
The sovereign debt crisis in the euro area had severe consequences in terms of access to finance and borrowing costs for businesses: the financial system in Europe is mainly bank-based and there is a strong nexus between the balance-sheet quality of sovereigns and banks. Thus, financing conditions for businesses depend in several ways on the state of sovereign finances:

- When credit-rating agencies downgrade the sovereign's rating, they also downgrade the credit rating of companies. The rationale behind this is that worsening government finances indicate a higher likelihood of future tax increases, which, all else being equal, decreases the future profits of

businesses. The expected lower profitability reduces the credit rating of businesses and increases the risk premium that investors will demand.

- Deteriorating prices on sovereign bonds cause balance-sheet losses for banks and worsen the funding conditions for banks on the money markets because banks use sovereign bonds as collateral in refinancing operations (repurchase agreements). Banks normally respond to tensions on sovereign debt markets by restricting their lending to businesses and households and raising the interest rates on their loans.

Figure 3-2: Bank interest rates
In percentage terms

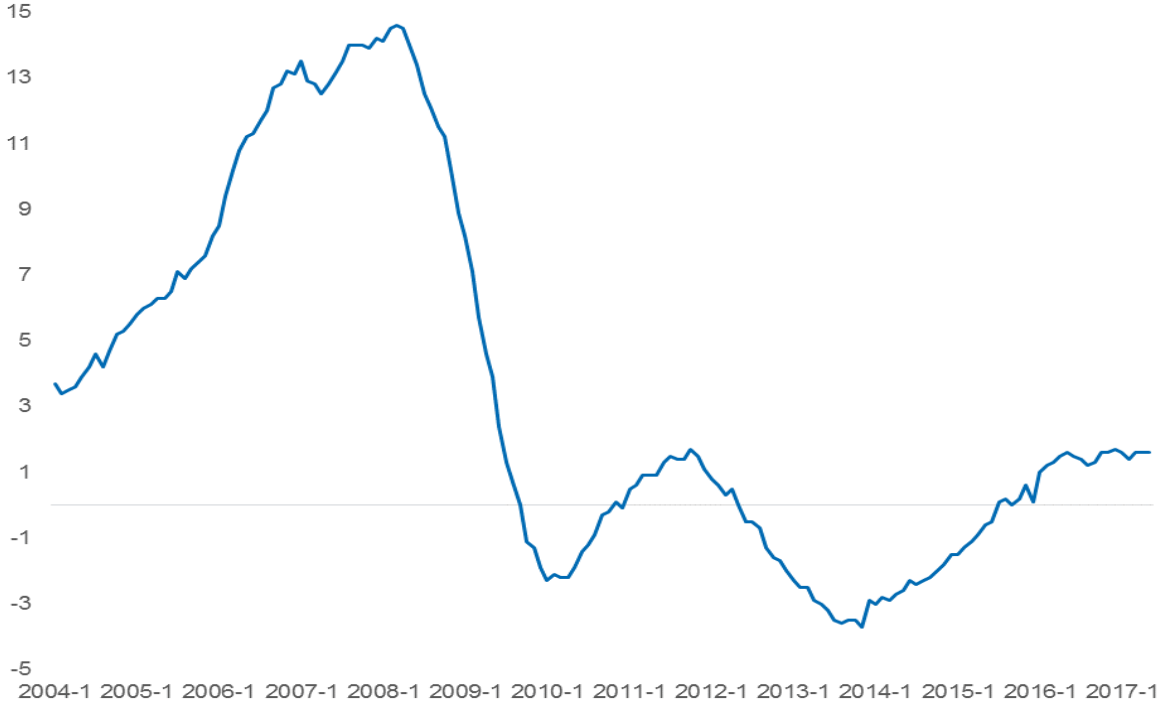


Source: European Central Bank

Bank lending dropped sharply after the outbreak of the global financial crisis in 2008, then shortly recovered and dropped again after the outbreak of the banking and sovereign-debt crisis in the euro area (figure 3-3). Small and medium-sized companies tended to be more affected by tensions in banking markets because they are more bank-dependent than larger corporates that also issue stocks and bonds. Bofondi et al. (2013) found that non-financial corporations, which mostly relied on

bank credit suffered more from the crisis than companies which had access to alternative sources of funding. Moreover, Bentilia et al. (2013) found that companies, which were customers of distressed banks faced tougher credit restrictions compared to corporations than customers of non-distressed banks.

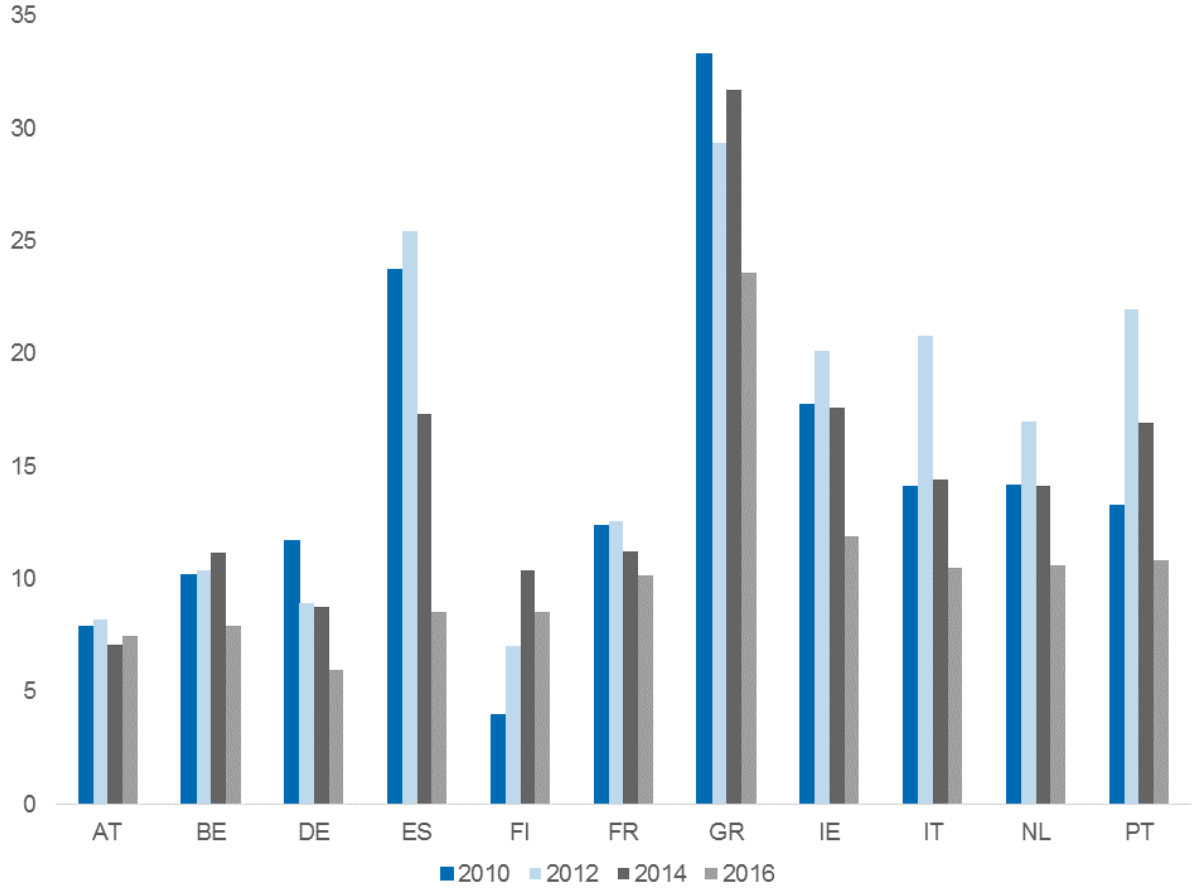
Figure 3-3: Bank lending in the euro area
Index of notional stocks, percentage change from the previous year



Source: European Central Bank

The deterioration in access to finance for small and medium-sized companies is concentrated in the countries that experienced the most stress on the sovereign-debt markets and have been worst affected by capital flight, i.e. Greece, Ireland, Italy, Portugal and Spain. As the data show, in Greece, for example, 29.3 percent of SMEs responded in 2012 that they experienced access to finance as their most pressing problem. This number fell to 23.6 percent in 2016, but limited access to finance is still a severe problem in that country. There was a similar development in Spain, where 25.4 percent of the SMEs reported limited access to finance in 2012. This number fell to 8.5 percent in 2016 and it is now comparable to the results in Finland. In Italy, 20.8 percent of SMEs experienced limited access to finance in 2012 and this number halved in 2016. In contrast, in Germany, where there were no tensions in the sovereign debt market, the number of SMEs with restricted access to finance was around 5 percent in 2016 (figure 3-4).

Figure 3-4: Access to finance of small and medium-sized companies
Small and medium-sized companies replying that their most pressing problem is access to finance, as a percentage of respondents



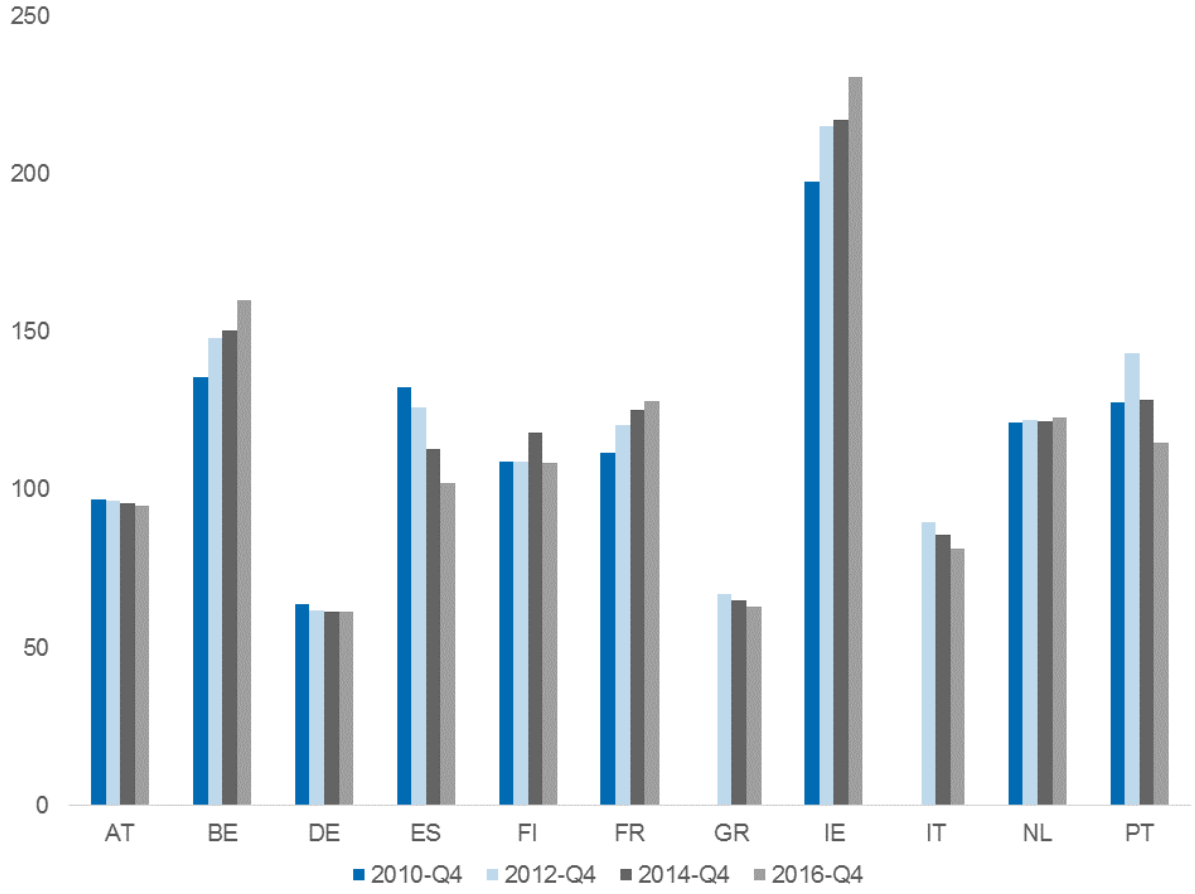
Source: European Central Bank

3.2 Improvements in borrowing conditions since 2012

The ECB has responded by adopting a very accommodative monetary-policy stance. Because of the risks of deflation in the euro area, it launched a large-scale asset purchase programme in order to bring interest rates down even further. These large-scale measures contributed to the improvement of funding conditions for companies in the euro area. Meanwhile, bank lending is normalizing at a slow pace (figure 3-3). Limited access to finance and unfavourable borrowing conditions are expected to be less of a problem for the majority of firms now. However, access to finance can still be restricted in the case of firms with high debt levels and low profitability. Many companies might have used the period of extremely low interest rates to restructure their business in order to become profitable again. However, business sectors in the euro-area countries reacted to the falling interest rates in different ways. While the period of falling interest rates from 2012 onwards was accompanied by declining

business-sector debt levels in Germany, Italy, Portugal and Spain, debt levels rose in Belgium, France and Ireland (figure 3-5).

Figure 3-5: Business Sector Indebtedness
As a percentage of gross domestic product



Source: European Central Bank

3.3 Improving economic conditions for companies

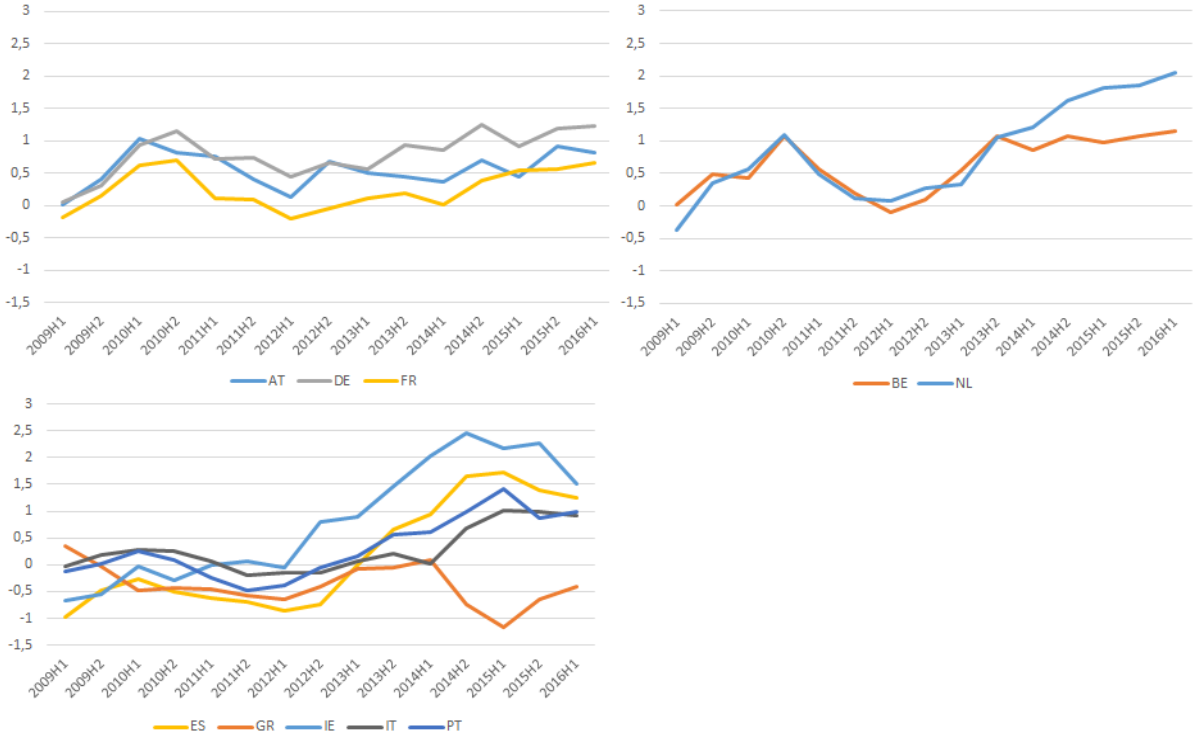
Since financial conditions are linked to economic conditions, we will start by describing the economic conditions for firms in the euro area. In the SAFE survey, the ECB asks whether factors such as the general economic outlook, access to public financial support, the enterprise-specific outlook, the enterprise's own capital and credit history have improved, remained unchanged or deteriorated. These five factors can be combined into an index which measures the general economic conditions of European firms (GECX). It is defined as

$$GECX_{tl} = \frac{\sum_{i=1}^{n} w_i \sum_{j=1}^{5} v_{ij}}{\sum_{i=1}^{n} w_i},$$

where t is the time index, l is the country-specific index, i is the firm-specific index, n is the number of firms per country, j is the factor index and thus v_{ij} is the factor-

specific index for each firm. v_{ij} takes values of 1 for improved, 0 for remained unchanged and -1 for deteriorated economic conditions. Thus, the higher the index the better the economic conditions for firms. In addition, values around zero indicate that the negative and positive trends of the different factors cancel each other out or no change has taken place. Values higher than one indicate that the positive answers outweigh the negative ones, whereas values lower than minus one indicate the contrary.

Figure 3-6: General economic condition index (GECX) for firms in the euro area
In index points



Source: SAFE, European Central Bank, Cologne Institute for Economic Research

Figure 3-6 shows the time series for the GECX index by country. Countries are grouped by the similarity of development in the time series. It can be seen that between 2009 and 2012 firms in the countries worst affected by the crisis, like Cyprus, Greece, Ireland, Italy, Portugal and Spain, reported mainly deteriorating economic conditions for firms, shown by the negative values of the GECX. However, in most of those countries the index clearly improved, except in Greece, where the situation is still unfavourable for companies. Companies in Ireland were able to improve their general economic circumstances the most, as shown by the index, which hiked from -0.65 in first half of 2009 to 2.26 in the second half of 2015 - with a drop, however, to 1.51 in the first half of 2016.

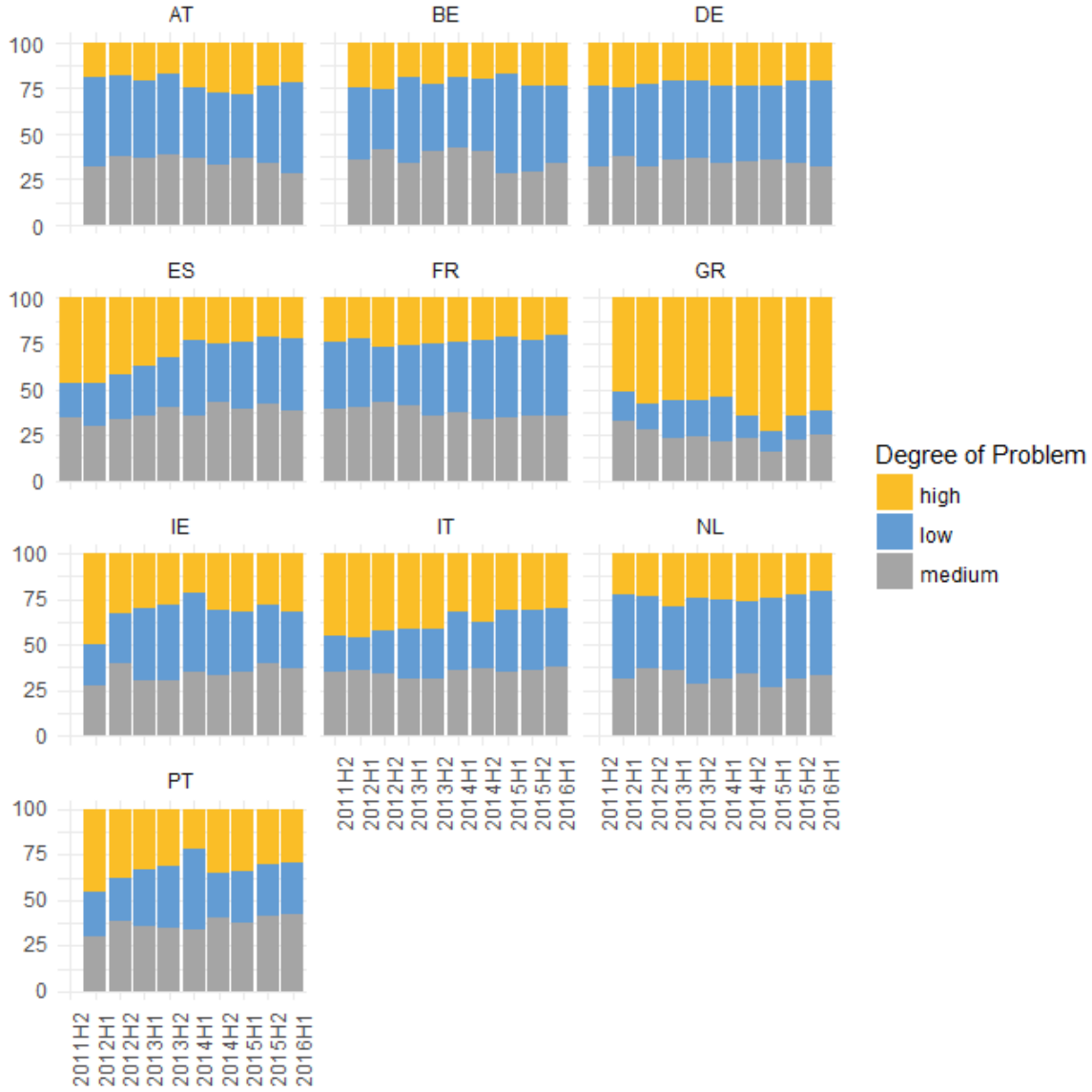
The development of economic conditions is also reflected in the firms' access to finance. Figure 3-7 shows the answers given by firms, which were asked to describe the scale of the problems they face in getting access to finance. In the survey, firms can rate the problems they have in getting access to finance on a scale from 1 to 10, where 1 means "not at all important" and 10 means "extremely important". To make interpretation easier, we summarise the scale of the problems faced by labelling answers from 1 to 3 as low, from 4 to 7 as medium and from 8 to 10 as high.
The numbers show an improvement in access to finance in several countries, e.g. Ireland, Italy, Portugal and Spain. In Spain, for example, there was a successive fall in the percentage of firms reporting that they have serious problems (rating of 10) getting access to finance: the proportion decreases from 23 percent in the second half of 2012 to 8 percent in the first half of 2016. However, there is still a larger percentage of Greek firms reporting that they face serious problems in getting access to finance. In the first half of 2016, the share is still high - 68 percent of all firms gave a rating between 7 and 10, with 10 as the most frequent answer (35 percent). In contrast, businesses in Austria, Belgium, Germany and the Netherlands show the most stable development, with high proportions of firms reporting no problem with getting access to finance. This percentage of firms is quite high, at around 43 percent on average.

3.4 Financing of growth ambitions

Improved general economic prospects contribute to firms' investments in their own growth. On the other hand, a better economic environment increases the willingness of banks and other external investors to finance these growth ambitions. Therefore, it is not surprising that firms report reduced problems in getting access to finance for growth ambitions. Figure 3-8 shows that in most countries the percentage of firms reporting that they faced no obstacles to gaining this type of financing ranged from 28 percent in Ireland to 64 percent in Germany in the first half of 2016.

Figure 3-7: Change in the scale of access-to-finance problems by country and year

In percentage terms



Source: SAFE, European Central Bank, Cologne Institute for Economic Research

However, only two countries are characterized by a small percentage of firms experiencing no obstacles to the financing of their growth: Greece with only 9 percent in the first half of 2016 and Cyprus (not shown in figure 3-7) with 17 percent in the first half of 2016.

The main problem (see figure 3-8) for businesses in Greece is that financing is not available at all (30 percent) and that the interest on or price of the financing is too high (30 percent). These problems are most probably caused by the state of the

Greek banking sector, which took a big hit when the value of the Greek bonds in the banks' balance sheets deteriorated. The main problem (not shown in figure 3-8) for firms located in Cyprus is high financing costs (24 percent) and problems with insufficient collateral or guarantees (21 percent).

Figure 3-8: Change in reported problems faced in accessing external financing for growth ambitions by country and year[1]
In percentage terms

Source: SAFE, European Central Bank, Cologne Institute for Economic Research

[1] Firms that report "Do not know" are excluded. In addition, all NAs are excluded.

Overall, however, it is obvious that financing for a firm's growth ambitions has become relatively sound in the euro area. Most firms in the countries with improving economic conditions also have fewer problems now with accessing finance in general and specifically for growth ambitions.

4. Hypotheses about firms' vulnerability to interest-rate rises

Although companies in the euro area have experienced an easing of borrowing conditions and a recovering loan supply, conditions might tighten in the future either because of a new recession or because of departure by the ECB from its accommodative policy stance. The yields on German bonds have already surged in response to the optimistic tone of Mario Draghi's speech in Sintra this year. From the analysis so far, it can be inferred that companies may face funding shortages and increased borrowing costs in the future, when interest rates start to rise again.

Firms are expected to be differently affected by a tightening of borrowing conditions, since the vulnerability of companies to higher interest rates is dependent on several factors. For our empirical analysis in the next section, we deduce the following hypothesis about the effects of rising interest rates on firms' vulnerability:

- **Time-effect:** The ECB's accommodative monetary policy stance and the strengthening recovery of the euro area have improved the environment in which companies conduct their business over time. Therefore, the percentage of vulnerable firms is expected to decrease over time.
- **Country-specific effect:** Borrowing conditions for companies in countries with high corporate indebtedness and unsustainable government finances are expected to worsen compared to businesses from other European countries when interest rates rise. This is either because the deleveraging of the companies in the former crisis countries is still unfinished or because credit-rating agencies will downgrade the country's credit rating. A country-specific effect would be incompatible with financial integration in the single market and hint at a fragmentation of the single market for capital along national borders.
- **Effect at company level:** Small companies might be more affected when banks restrict their borrowings because smaller companies are often younger and less capitalized, without established customer bases and long credit histories. Medium-sized companies are well-established in their businesses with stable cash-flows and longer credit histories, but these companies are more bank-dependent than larger companies, which can also issue stocks and bonds in capital markets relatively easily. We expect that small and medium-

sized enterprises are therefore more vulnerable to worsening borrowing conditions than larger firms.

- **Sector-specific effect:** The construction sector in Ireland, Portugal and Spain was hit by a bursting real-estate bubble. It can therefore be expected that the percentage of vulnerable firms is higher in this sector.
- **Debt-level effect:** There will be companies that used the low interest rate period to reduce their debt levels, but there might also be firms that had a hard time restructuring their debts. Companies with a higher debt level are therefore expected to be more vulnerable to rising interest rates.

In the empirical analysis in the next section, we try to identify the firms, which are currently vulnerable to an interest-rate increase, in order to assess the risk of rising interest rates for the business sector.

5. The risk posed by tightening financial conditions

In order to evaluate the risk which increasing interest rates pose to the financing of European firms, we look at the firms, which are especially vulnerable to changes in interest rates.

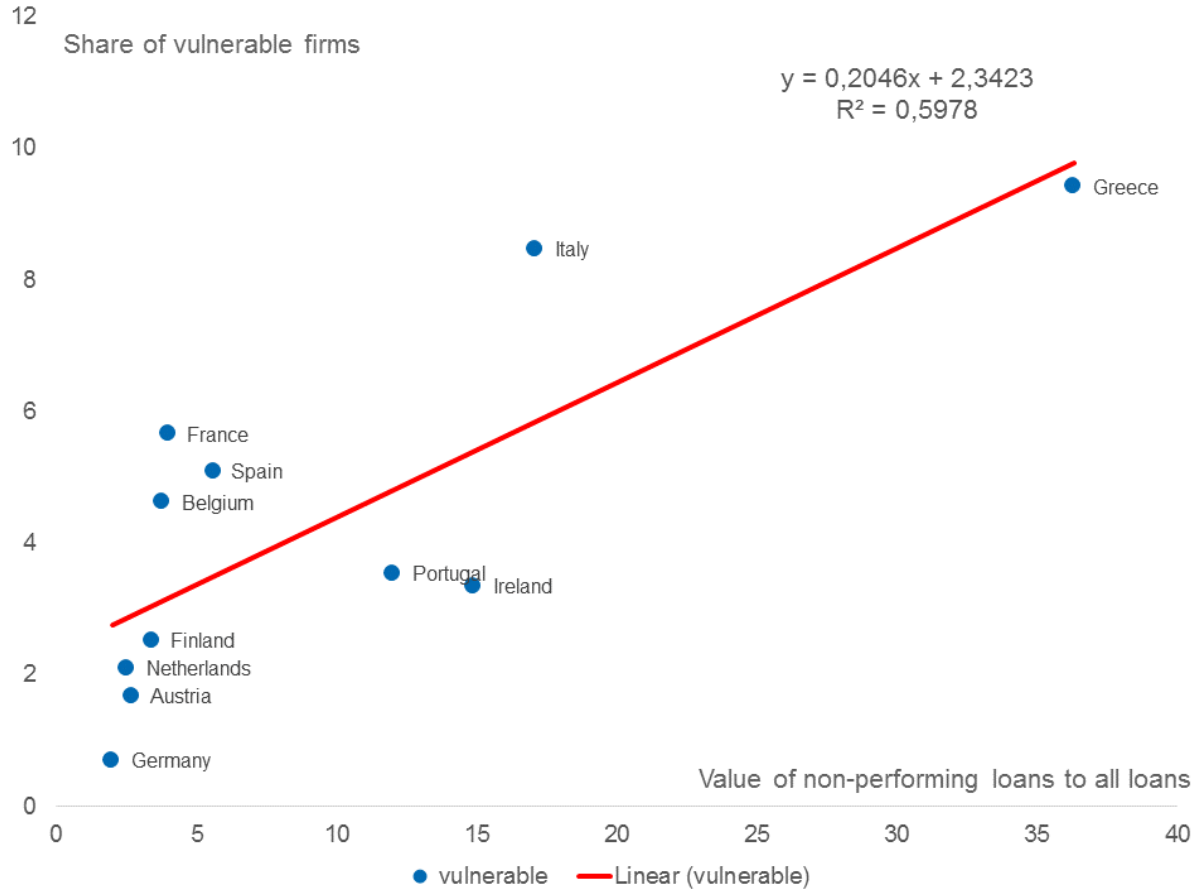
In order to identify the firms concerned as vulnerable to an interest-rate rise, we develop an index that sets one as the figure for firms which have reported lower turnover, decreased profits, higher interest costs and a higher or unchanged debt-to-asset ratio, with zero otherwise. The rationale behind this classification is as follows:

- Lower turnover suggests that a company is having greater difficulties servicing its debt.
- Decreased profits hint at difficulties in maintaining the credit rating at which banks might respond by restricting access to finance.
- Higher interest costs in combination with lower turnover hint at a deteriorating financial situation.
- A higher or unchanged debt-to-asset ratio in combination with lower turnover, falling profits and higher interest rate costs hint at difficulties in debt consolidation.

The validity of our indicator of the vulnerability of firms to rising interest rates can be seen from the scatter plot in figure 5-1. The plot shows the percentage of vulnerable firms by country on the y-axis and the value of non-performing loans to total loans per country on the x-axis. The figure clearly shows that all data points are close to the fitted regression line. The goodness-of-fit statistic of 0.60 percent highlights the

high correlation between the two indicators. Countries with a higher proportion of non-performing loans in banks' balance sheets tend to have a higher share of vulnerable firms.

Figure 5-1: Correlation between vulnerable firms and non-performing loans
Vulnerable firms as a percentage of all firms, value of non-performing loans as a percentage of the value of all bank loans



Source: OECD, World Bank, SAFE, European Central Bank, Cologne Institute for Economic Research

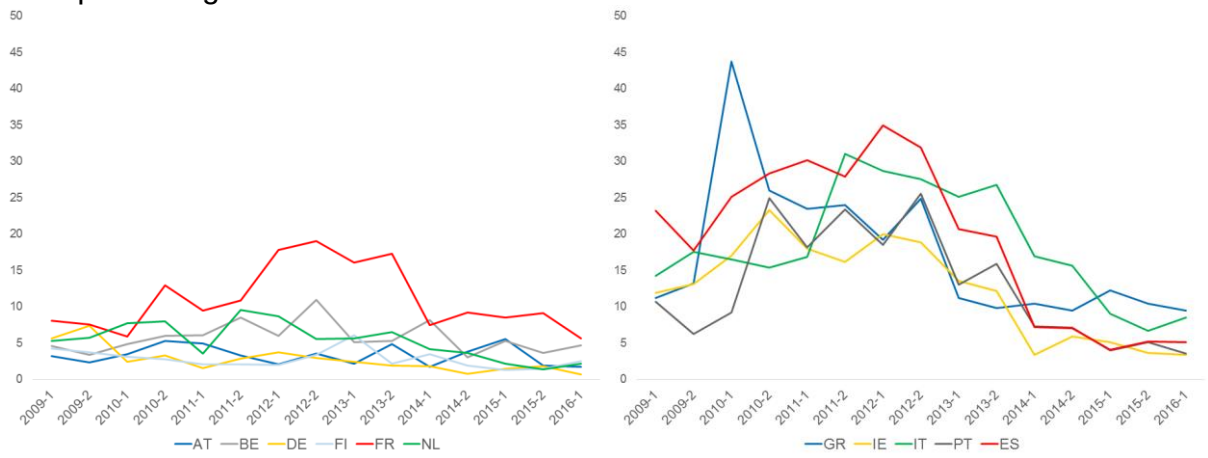
5.1 Changes in firms' vulnerability

Figure 5-2 shows the percentage of vulnerable firms in relation to all firms over the period concerned for different countries in the euro area. Visual inspection indicates a possible country-specific effect. High rates of vulnerability can be seen among firms located in Greece, Ireland, Italy, Portugal and Spain:

- In Greece, the percentage of vulnerable firms rose from 13.2 percent in the second half of 2009 to 43.7 percent in the first half of 2010. The numbers then declined, but started to rise to 24.8 in the second half of 2012.

- In Ireland, the percentage of vulnerable firms went up to 23.3 percent in the second half of 2010 and then declined steadily to 3.3 percent in the first half of 2016.
- Italian firms were most vulnerable in the first half of 2011. In that year, 31.0 percent of all Italian firms were in financial difficulties as measured by our index. As economic conditions have improved, the share of vulnerable firms declined to 8.5 percent, which, however, is still quite high in a cross-country comparison.
- In the second half of 2012, 25.6 percent of all Portuguese firms were hit by financial problems as measured by our index. The figure is now 3.5 percent.
- In the first half of 2012, 34.9 percent of all Italian companies were vulnerable to interest-rate rises. The number declined to 5.1 percent.

Figure 5-2: Percentage of vulnerable firms in the euro area
As a percentage of all firms



Source: SAFE, European Central Bank, Cologne Institute for Economic Research

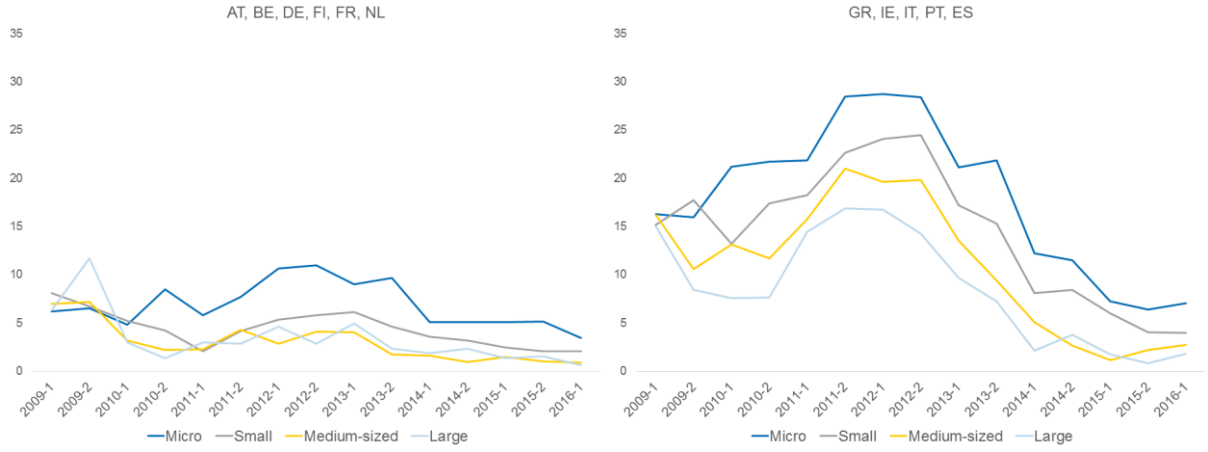
Smaller firms tend to be more vulnerable than larger firms, as can be seen from figure 5-3. Moreover, it can be seen that during the height of the banking and sovereign debt crisis larger firms in crisis countries tended to be vulnerable more often than micro firms in non-crisis countries. The country-specific effects are mostly driven by the number of micro firms with one to nine employees: these account for 93.4 percent of all companies, ranging from 83.6 percent in Germany to 96.6 percent in Greece. But problems with access to finance can also be found among larger companies in the former crisis countries:

- Among companies with 10 to 49 employees, only 1.2 percent were vulnerable in Austria in 2012, as opposed to 11.2 percent in France, 25.2 percent in Greece, 24.1 percent in Italy, 11.8 percent in the Netherlands, 19.1 percent in Portugal and 29.7 percent in Spain. The numbers have significantly declined,

ranging from 1.0 percent in Germany and the Netherlands to 7.2 percent in Portugal.

- The percentage of medium-sized firms with 50 to 249 employees which are identified as financially vulnerable was of comparable magnitude in the second half of 2012, with 9.4 percent in France, 18.4 percent in Greece, 17.9 percent in Italy, 23.3 percent in Portugal and 20.1 percent in Spain. The numbers have significantly declined, ranging from under 1.0 percent in Belgium, Germany, Finland and the Netherlands to 2.6 percent in Greece.
- In the crisis year of 2012, a significant fraction even of large companies could be identified as vulnerable, with 33.3 percent in Greece, 13.3 percent in Portugal and 20.0 in Spain. The numbers declined to less than one percent in most countries except Finland (2.0 percent), France (1.1 percent), Greece (10.0 percent), Italy (2.2 percent) and Portugal (4.0 percent).

Figure 5-3: Proportion of vulnerable firms by company size
As a percentage of all firms in the size class



Source: SAFE, European Central Bank, Cologne Institute for Economic Research

5.2 Determinants of firms' vulnerability

In order to identify the isolated effect of factors that drive the probability of becoming a vulnerable firm, we run a logistic regression.

To interpret the estimated coefficients one has to keep in mind that the dependent variable is limited. While in the case of a continuous dependent variable a slope coefficient can be interpreted as the change in the dependent variable in response to a change in the independent variable, the slope coefficient in our limited dependent-variable model has to be interpreted as the change in the probability of moving from

not vulnerable to vulnerable in response to a change in the independent variable where the other independent variables are evaluated at their mean values.

As independent variables we choose the size of the firm, the economic sector of the firm, the country of the firm, the year, and six questions asked in the survey which give information about the overall situation of the firm. The coding of the questions is given in the appendix (table A-1).

The estimated results can be found in the appendix (table A-2). Figure 5-4 shows the marginal effects and the corresponding 95-percent confidence interval of the different independent variables on the probability of being a vulnerable firm according to estimation with a logistic regression.[2] We exclude the following countries as they provide too little data, leading to extreme standard errors of the corresponding country dummies: Luxembourg, Lithuania, Estonia, Malta, Slovenia, Slovakia and Cyprus. The data used are from the second half of 2011 to the first half of 2016, because the six firm-specific questions were only asked from the second half of 2011 onwards.

In the regression analysis, we find the following effects:

- **Time effect on the vulnerability of firms:** The results of the estimation show a time effect on the probability of being a vulnerable firm where other factors are evaluated at their mean values. This time effect decreases over time with the probability of being vulnerable highest during the spike in the euro area's banking and sovereign debt crisis around 2012. The time effect also mirrors the overall recovery of the European economies after the crisis years around 2011 and 2012, as can be seen from the decreasing probability of being vulnerable.

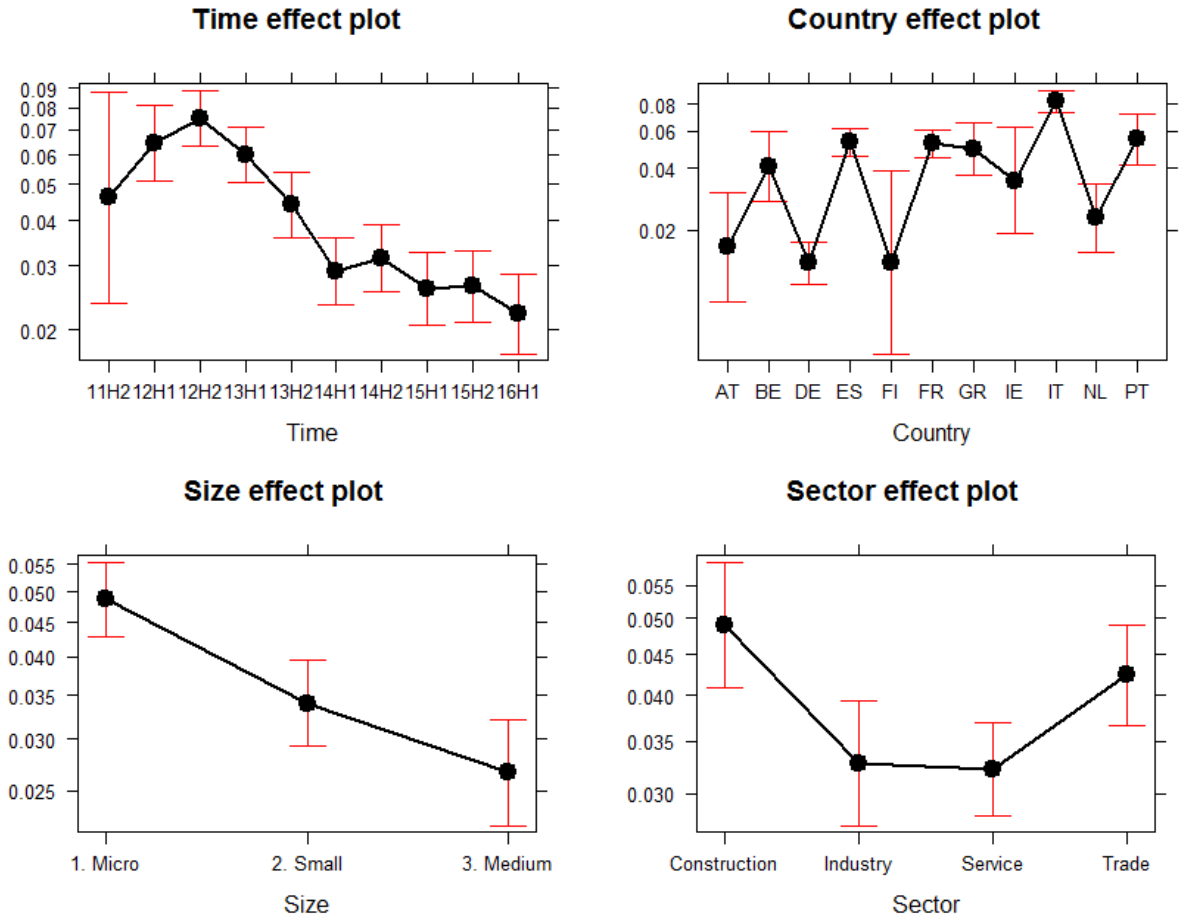
- **Country-specific effect on the vulnerability of firms:** We also find empirical evidence for a country-specific effect. Having its business in France, Greece, Italy, Portugal and Spain, significantly increases the probability of a firm's being vulnerable in otherwise average circumstances. The existence of the country-specific effect proves that the single market fragments along national lines, because with full financial integration the country of residence should not be a factor that determines borrowing conditions. The ECB argued before the German Constitutional Court and the Court of Justice of the European Union

[2] To test the performance of the logistic regression model, we use 25 percent of the data as testing data. Within these new data the model is able to identify 77 percent of the vulnerable firms correctly.

that their Outright Monetary Transactions (OMT) programme was justified because of the country-specific effect on firms' access to finance (BVG, 2016; CJEU, 2015). Our results so far support this argument.

- **Size-specific effect on the vulnerability of firms:** We find empirical evidence of a size-specific effect on the vulnerability of firms, with micro firms more vulnerable than small firms, which in turn are more vulnerable than medium-sized firms. As micro firms tend to be very young firms with often unstable cash-flows and no credit history, we expected such firms to be the most vulnerable. Since larger and medium-sized firms have established business models with stable customer bases and longer credit histories, these firms are less vulnerable where the other characteristics were held constant. It has also to be noted that firms located in the countries most affected by the crisis also have a high proportion of micro and small firms, which further increases the probability of becoming a vulnerable firm.

Figure 5-4: Marginal Effects estimated with a logistic regression model



Source: Cologne Institute for Economic Research based on SAFE data.

- **Sector-specific effect on the vulnerability of firms:** We also find empirical evidence for a sector-specific effect. Firms with the smallest probability of being vulnerable are in the industry and service sectors. Being in the trade sector increases the probability slightly more. However, the confidence intervals overlap in such a way that one cannot say that they are significantly different. Being part of the construction sector leads to the highest probability of a firm's being vulnerable, which mirrors the real-estate bubbles in several euro-area member countries, e.g. Ireland, Portugal and Spain. This effect is not surprising, as a collapsing house-price bubble leads to losses in the real-estate sector.

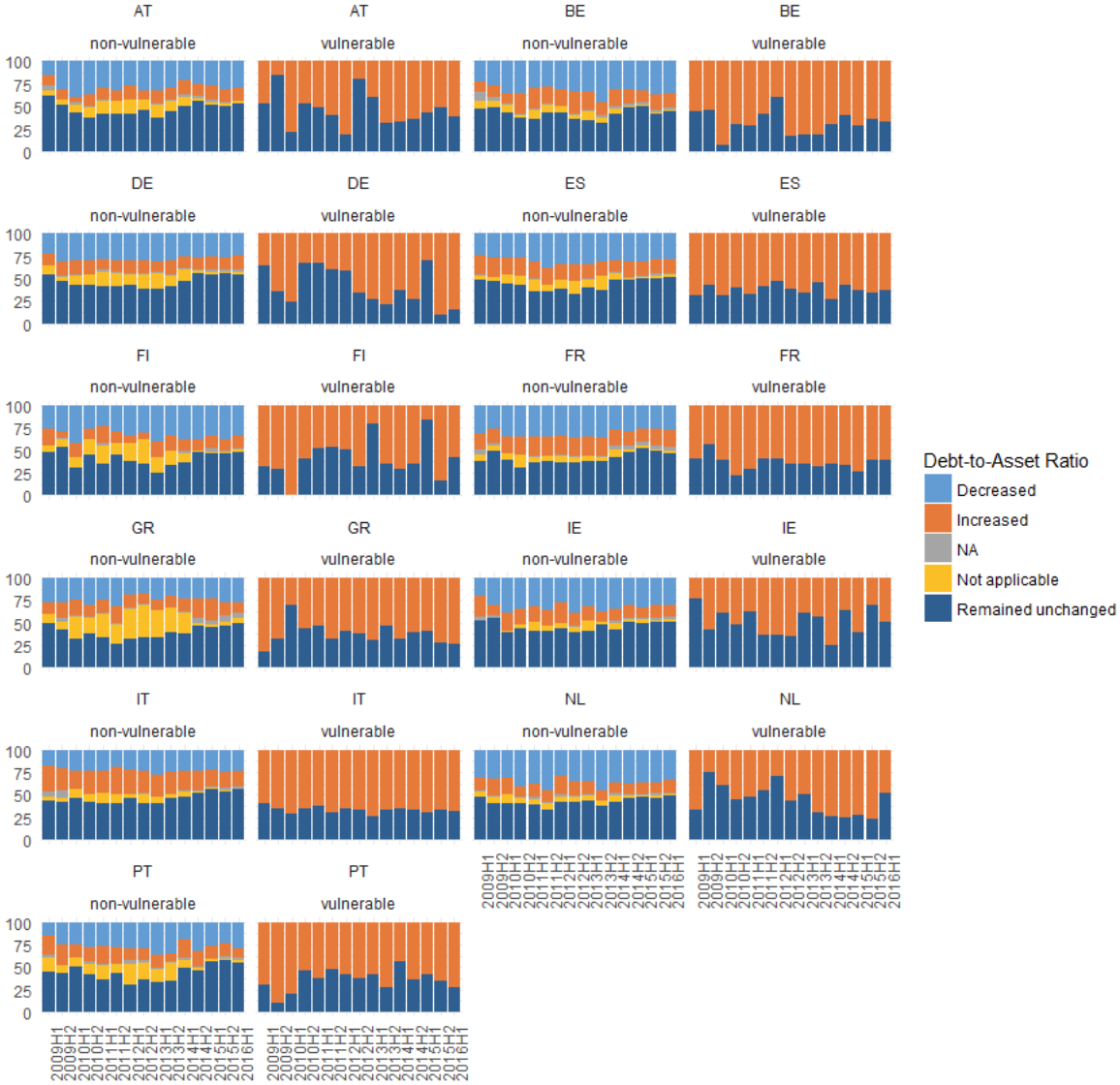
- **Debt-level effect on the vulnerability of firms:** We also find evidence for a debt-level effect. In particular, we find that the percentage of vulnerable firms that reported increased debt-to-asset ratios is significantly higher than that of non-vulnerable firms. However, most firms reported that their interest costs have remained unchanged. While we observe constantly falling market-interest rates, unchanged interest costs during a period of falling interest rates will only occur if firms increase their debt or have a high amount of long-term debt at fixed interest rates. Figure 5-4 shows how firms answer the question of how their debt-to-asset ratio has changed in the previous six months. One can see a clear difference between vulnerable and non-vulnerable firms. However, this effect should not be interpreted as causal, as there is a two-way causality: having a higher debt-to-asset ratio makes firms more vulnerable to increasing interest rates and tighter economic conditions, while being vulnerable can cause high interest-rate costs and restricted access to finance.

- **Other factors with an effect on the vulnerability of firms:** Lastly, we want to investigate which additional problems reported by the firms have an effect on the probability of being a vulnerable firm. From the estimation results we can see that all six questions, except for the question regarding problems with regulation, have a significant effect on the probability of becoming a vulnerable firm. Except for the question regarding the availability of skilled staff, all coefficients show that the more important the corresponding problems are, the higher the probability of being a vulnerable firm is. The greatest effect on probability is associated with the question regarding problems with securing access to finance and problems finding customers.

Summing up, these results show that firms experiencing a difficult economic situation in the previous six months have on average had more problems in accessing finance. Thus, not only do vulnerable firms have problems getting finance, but they also incur higher costs when they get financing.

Besides the characteristics of particular firms, problems with accessing finance also depend on the state of the banking sector. The data show that most vulnerable firms mainly use bank credits, bank credit lines and bank overdrafts to finance their businesses. At the same time, however, firms from countries with the highest percentage of vulnerable firms report that one of the most common problems in obtaining financing from banks is excessively high interest rates. Thus, even though interest rates on the money market are at their historical low, most vulnerable firms have not benefited from these lower interest rates. In such an environment, a rise in the interest rates would make financing and refinancing even more difficult.

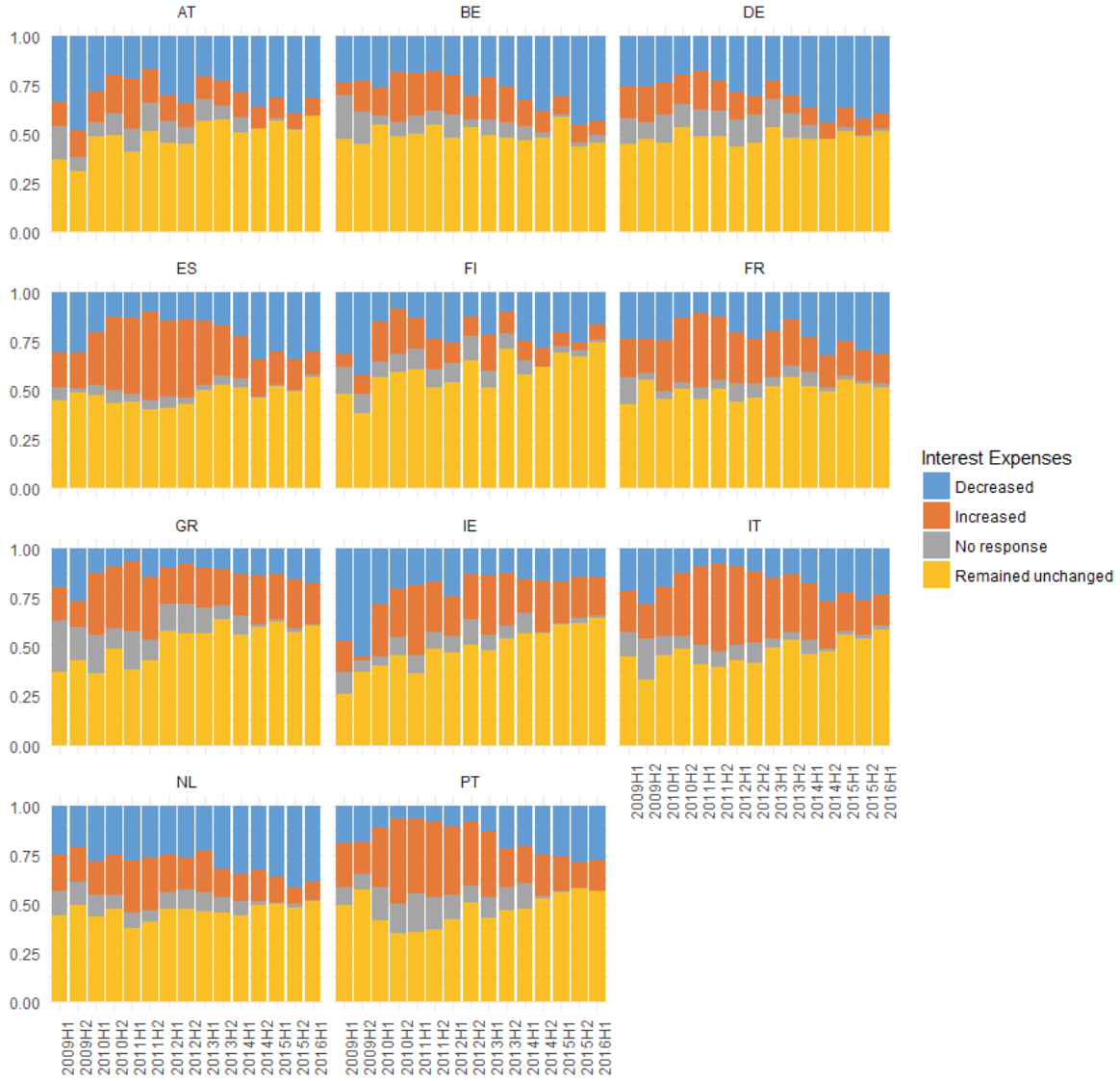
Figure 5-5: Distribution of the answers to the question about how the debt-to-asset ratio has changed by country and firm type over time
In percentage terms



Source: Cologne Institute for Economic Research based on SAFE data

For the group of non-vulnerable firms, we expect only minor problems when interest rates rise. As can be seen in figure 5-6, the percentage of firms that reported rising interest costs steadily decreased in most European countries, while the percentage of non-vulnerable firms that reported unchanged and decreased interest costs increased over time.

Figure 5-6: Distribution of the answers to the question about how interest costs have changed by country for all non-vulnerable firms
In percentage terms



Source: Cologne Institute for Economic Research based on safe data

5.3 Forecast

We identify companies that are vulnerable to increasing interest rates, as they will presumably face economic problems when financing costs rise.

Table 5-2: Proportion of vulnerable firms
First half of 2016

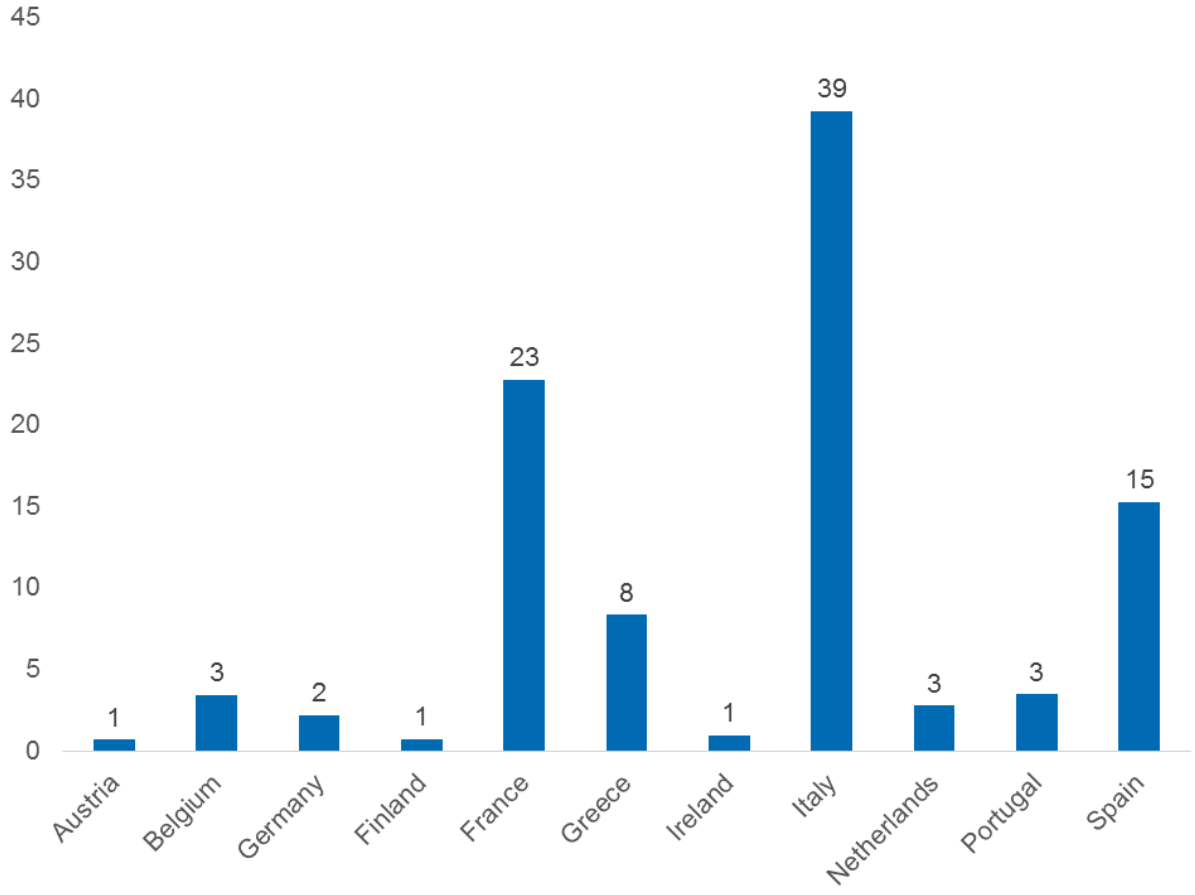
	Firm size				
Country	**Micro**	**Small**	**Medium**	**Large**	**Total**
Estimated number of vulnerable firms					
Austria	4 839	285	241	0	5 365
Belgium	26 980	419	0	0	27 399
Germany	13 854	2 272	1 202	61	17 389
Finland	5 480	243	46	12	5 780
France	174 537	5 262	528	47	180 374
Greece	64 527	1 342	66	39	65 974
Ireland	7 320	386	45	0	7 752
Italy	305 397	4 650	443	68	310 558
Netherlands	21 669	250	208	0	22 128
Portugal	25 870	1 462	294	30	27 655
Spain	117 590	1 790	1 608	0	120 988
Total	**768 064**	**18 362**	**4 681**	**256**	**791 363**
Vulnerable firms as a percentage of all firms in the size class					
Austria	1.7	1.3	1.4	0.0	1.7
Belgium	4.8	2.4	0.0	0.0	4.6
Germany	0.7	1.0	0.7	0.6	0.7
Finland	2.6	2.3	0.5	2.0	2.5
France	5.7	4.3	2.7	1.1	5.7
Greece	9.5	6.5	2.6	10.0	9.4
Ireland	3.4	2.9	1.8	0.0	3.3
Italy	8.7	4.0	2.4	2.2	8.5
Netherlands	2.2	1.0	0.9	0.0	2.1
Portugal	3.5	7.2	1.9	4.0	3.5
Spain	5.2	2.6	3.2	0.0	5.1
Total	**5.3**	**2.7**	**1.4**	**0.9**	**5.1**

Source: Eurostat; Cologne Institute for Economic Research based on SAFE data

The proportion of vulnerable companies is extremely high in Greece (9.4 percent), Italy (8.5 percent) and France (5.7 percent). The lowest proportion can be found in Germany (0.7 percent). In relation to the size of the national business sectors, 39 percent of all vulnerable firms are located in Italy, 23 percent in France and 15

percent in Spain. Thus, these countries could be hard-hit when the ECB starts to tighten monetary policy. As a comparatively large number of big companies are prone to the risk of rising finance costs in Portugal (4.0 percent of big Portuguese companies) and Greece (10.0 percent of big Greek companies), the labour market in those countries could be affected disproportionately (table 5-2, figure 5-6).

Figure 5-6: Vulnerable firms
As a percentage of the total



Source: Cologne Institute for Economic Research based on SAFE data

On average over all countries, 5.1 percent of the firms will face financial constraints when interest rates increase. These problems are more severe for micro firms with one to nine employees (5.3 percent) and small companies with 10 to 49 employees (2.7 percent), while only 0.9 percent of the large companies with 250 and more employees will be sensitive to interest-rate rises. The situation is different is Greece, where 10.0 of large companies will face financial difficulties if interest rates are higher. In Portugal and Spain, too, the number of large firms that are vulnerable to interest-rate rises is above the average for that size class.

6. Conclusion

Most studies that analyse the forthcoming normalization of monetary policy in the euro area typically stress the risks for public debt sustainability. There is, however, less research on the impact of an interest-rate rise on the financing of companies. While there is a considerable percentage of companies all over the euro area which have used low interest rates to deleverage, there are also companies which (had to) increase(d) indebtedness and which suffer from falling turnovers and profitability.

In this study, we have identified companies that are vulnerable to rising interest rates, as they will presumably run into economic problems when borrowing costs increase. The percentage of vulnerable companies is extremely high in Greece (9.4 percent), Italy (8.5 percent) and France (5.7 percent). In relation to the size of the national business sectors, 39 percent of all vulnerable firms are located in Italy, 23 percent in France and 15 percent in Spain. Those countries could therefore be hit hard if the ECB starts to tighten monetary policy. As a comparatively large number of big companies are prone to the risk of rising finance costs in Greece, Portugal and Spain, the labour market in those countries could be affected disproportionately. The lowest percentage of vulnerable firms is in Germany (0.7 percent).

This paper argues neither for nor against a tightening of monetary policy. However, the risks to the national corporate sectors should be taken into account. Any change in the monetary-policy stance should therefore be made slowly, to mitigate the risks to the corporate sector. A fact to be taken into account is that an economic downswing due to a rapid tightening of monetary policy would demand a return to a loose monetary policy. Therefore, if a “normalization” of interest rates is intended, it should be carried out slowly in order to give companies (and public finance) enough leeway to adapt to higher financing costs.

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Appendix

Table A-1: Coding of the survey questions

Code	Question
	How important have the following problems been for your enterprise in the past six months? Please answer on a scale of 1-10, where 1 means it is not at all important and 10 means it is extremely important.
q0b_1	Finding customers
q0b_2	Competition
q0b_3	Access to finance
q0b_4	Cost of production or labour
q0b_5	Availability of skilled staff or experienced managers
q0b_6	Regulation

Source: European Central Bank

Table A-2: Estimated results of the logistic regression

Variable	Co-efficient	Standard Error	T-Statistic	Significance Level
Time-Effects				
2011-H2	-5.240	0.505	-10.384	1 percent
2012-H1	-4.882	0.383	-12.760	1 percent
2012-H2	-4.721	0.372	-12.681	1 percent
2013-H1	-4.960	0.371	-13.366	1 percent
2013-H2	-5.286	0.377	-14.008	1 percent
2014-H1	-5.716	0.377	-15.160	1 percent
2014-H2	-5.637	0.379	-14.861	1 percent
2015-H1	-5.833	0.381	-15.309	1 percent
2015-H2	-5.818	0.379	-15.343	1 percent
2016-H1	-5.998	0.387	-15.505	1 percent
Country-Specific Effects				
BE	0.927	0.378	2.449	1 percent
DE	-0.182	0.338	-0.537	Not significant

ES	1.207	0.327	3.695	1 percent
FI	-0.175	0.624	-0.280	Not significant
FR	1.192	0.326	3.653	1 percent
GR	1.1319	0.350	3.230	1 percent
IE	0.764	0.445	1.719	Not significant
IT	1.675	0.323	5.187	1 percent
NL	0.340	0.375	0.906	Not significant
PT	1.240	0.350	3.543	1 percent
Firm-size effects				
Small	-0.374	0.078	-4.783	1 percent
Medium	-0.626	0.100	-6.211	1 percent
Sector-specific effects				
Industry	-0.419	0.118	-3.556	1 percent
Service	-0.438	0.097	-4.517	1 percent
Trade	-0.152	0.102	-1.495	Not significant
Firm's most pressing problem				
Finding customers	0.059	0.015	3.978	1 percent
Competition	0.051	0.015	3.314	1 percent
Access to finance	0.192	0.012	15.448	1 percent
Cost of production or labour	0.074	0.017	4.382	1 percent
Availability of skilled staff or experienced managers	-0.045	0.013	-3.482	1 percent
Regulation	0.013	0.013	0.940	Not significant

Source: Cologne Institute for Economic Research based on SAFE Data