

Are Firms from European Union Financially-Stressed Countries More Credit Constrained?

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Abstract. Using a large microdata database from the European Commission and European Central Bank survey (Survey on Access to Finance of Enterprises), we investigate in this paper what factors are playing a significant role in explaining why companies from European Union are credit constrained, and if the firms from financially stressed countries are more credit constrained. We found that smaller companies are more likely to be more credit constrained than larger companies in all our estimated models. The impact of the age of the firm on credit access is found to be mixed. A positive performance in terms of profitability seems to come hand in hand with a lower likelihood of being credit constraints. A deterioration of the outlook of the firm in terms of sales and profitability or business plan there will trigger a higher likelihood of being credit constrained, the impact being stronger for stressed economies. Not in the last, the access to public financial support, including guarantees, has a “grease” effect on access to bank loans, reducing the probability of being credit constrained, the positive impact being stronger in stressed countries.

Keywords: credit constraints; SMEs; public support; bank lending

Introduction

The access to bank funding of firms, particularly of SMEs, was always a popular topic in the literature, but it became even a more investigated topic during the financial crisis which started in 2007-2008 and during the pandemic crisis which started in 2020. The finding that SMEs are more restricted than large companies to access bank funding is well entrenched in the literature.

According to the SAFE (Survey on Access to Finance of Enterprises) survey conducted by the European Central Bank (ECB) and European Commission (EC) during 2009÷2022, a significantly higher percentage of micro firms are credit constrained as compared to large firms (figure 1), the share of firms being discouraged to apply for a bank loan because of possible rejection being also higher for smaller firms.

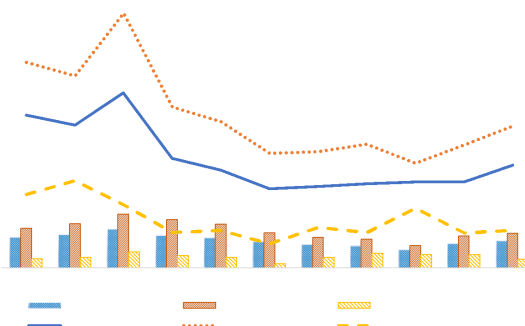


Figure 1. Share of credit constrained firms in EU27 by size of the firm

Source: ECB/EC SAFE.

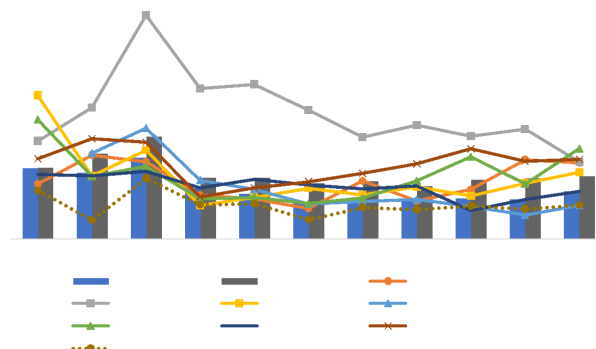
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By countries, there is a large heterogeneity, but in countries with more financial stress the access to loans seems to be more constrained (figure 2). In particular, in Greece the firms are indicating that the access to loans is very challenging, as during 2009–2022 Greece generally recording the highest credit constraints while countries like Germany having one of the lowest. Also, Romanian firms are indicating that they are highly credit constrained.

Figure 2. Share of credit constrained firms – EU27 vs Germany and stressed economies



Source: ECB/EC SAFE.

Using firm level data from the SAFE survey, we investigate in this paper what factors are playing a significant role in explaining why companies are credit constrained. We analyze mainly the fundamental performance and characteristics of the firms as potential explanatory factors for credit constraints. We also investigate if the access of companies to public financial support, including guarantees, can ease credit constraints.

Our analysis is run first for the European Union (EU or EU27) countries aggregate sample and we use in the estimations the binary logit model. In the next phase, we split the sample to see if financially stressed economies are behaving differently in terms of factors affecting credit constraints of companies. Doing so, our approach is adding to the existing literature, which is quite scarce in investigating the heterogeneity of countries from EU27 in terms of access of firms to bank loans. For instance, Öztürk and Mrkaic (2014) investigated the access to bank funding of firms for a more limited sample (just countries from euro zone) and they isolated just 5 countries from Euro area which were defined as financially stressed (Italy, Spain, Ireland, Portugal, and Greece).

The paper is organized as follows. Section 2 provides a brief review of the literature. Sections 3 and section 4 discusses the data and the methodology used, and section 5 presents the results of the estimations. Section 6 concludes and discusses some policy implications.

Literature review

There is quite a large literature trying to explain the weak credit growth performance in the banking sector during the financial crisis or pandemic crisis and to investigate what drives the credit constraints for firms.

Brown et al. (2011) compared the access to bank credit for firms in Eastern Europe to that in some Western European countries. Their analysis reveals that firms in Eastern Europe have a higher need for credit, but also that a higher share of firms is discouraged from applying for a loan. They found out also that credit constraints do have a real cost and the firms which are credit constrained or discouraged from applying are less likely to invest in R&D and introduce new products.

Ferrando and Mullier (2015) used the SAFE survey data on access to finance to investigate the role of firm characteristics with respect to firms' perceived financing constraints and actual financing constraints in the period 2009–2011. Their results are showing that low-profit firms are more likely to face actual financing constraints and low working capital and high leverage ratios have a lower explanatory power for financing constraints. Also, in their estimations firm age, but not size, is important in explaining both the perceived and the actual financial constraints.

Ferrando and Mulier (2022) explain the characteristics and behavior of discouraged borrowers in the euro area, showing that more borrowers are discouraged when the average interest rate charged by banks in a country is higher. They also show that the majority of discouraged borrowers would be unable to get a loan if they would apply and discouraged borrowers tend to be relatively risky firms.

Pigini et al. (2016), investigate firms' access to bank credit in some area countries over the periods 2014–2019. Their empirical results show that small and informationally opaque businesses, with deteriorated public support and credit history, face greater difficulties in obtaining bank loans. Focusing on the subset of firms actually needing additional bank financing, they also found that past credit restrictions significantly reduce their current demand, providing evidence of a significant discouragement effect.

Freel et al. (2012) focused their paper on the companies discouraged from applying for a bank loan because of the fear of rejection. They identified in their study the characteristics of "discouraged borrowers": strategy, sector, prior entrepreneurial experience and banking relationships.

Mac an Bhaird et al. (2016), for a sample of small firms in 9 European countries, examines the decision by firm owners not to apply for intermediated debt due to a perception that their application will be rejected for a. They found that discouraged borrowers are smaller, younger, have declining turnover and an increasing debt to assets ratio.

Mrkaic and Öztürk (2014) show that changes in bank funding costs and borrower leverage matter for firms' access to finance. According with their results using survey data, increases in bank funding costs and borrowers' debt-to-asset ratios are significantly and negatively associated with firms' access to finance. Also, the use of subsidies significantly improve access to finance of SMEs and access to finance is positively related to firm size and firm age. They splitted the euro area sample in financially-stressed countries vs the rest of the euro area and they found no significant differences in results between the two separate samples.

Jiménez et al. (2017) examined the impact of balance-sheet strength on credit availability using a dataset of loan applications matched with bank and firm variables for Spain from 2002 to 2010. Their results suggest that the bank balance-sheet strength determines the granting of loan applications only in crisis times, while firm balance-sheet strength strongly determines this granting in both good and crisis times.

McQuinn (2019) explores the drivers of SME credit access across euro area countries. He investigated the financial and macroeconomic channels that explain variation in credit constraints across countries and time and found out that the soft information channel and firm indebtedness are the most important channels associated with SME access to finance.

Data

We are using in our modeling the microdata provided by ECB/European Commission from the access to finance of SMEs (SAFE) survey (ECB, 2022). This survey is conducted twice a year,

once by the ECB covering euro area countries, and once in cooperation with the European Commission covering all EU member countries plus some neighboring countries.

We used in our estimations the full dataset (from the first round of survey, 17 June 2009÷23 July 2009, to the 27th round, 7 September÷14 October 2022), with more than 334,000 of data observations.

The SAFE survey is a very wide database for the access to funding of companies, covering a large range of funding sources, from bank funding to trade credit, grants or subsidized loans, leasing, debt securities, equity, and other funding. The survey covers some basic characteristics of the firm, the financing of the firm, availability of finance and market conditions, and future growth and obstacles to growth.

We describe bellow the construction of the firm level variables we are using in the estimations.

Our main dependent variable is credit constrained firms, CREDIT_CONSTRAINED - coded 1 if the firm was rejected for a bank loan or received less than 75% of the amount of the requested loan or refused to proceed with the loan because of the cost or did not apply for a loan because of possible rejection (discouraged borrowers). Coded 0 if a firm applied for a bank loan (excluding overdraft and credit lines) and received more than 75% of the loan. We excluded the answers Don't know OR Not Applicable or the Application is still pending.

The alternative dependent variable is credit constrained firms excluding discouraged firms, CREDIT_CONSTRAINED_EX_DISC - coded 1 if the firm was rejected for a bank loan or received less than 75% of the amount of the requested loan or refused to proceed with the loan because of the cost. Coded 0 if a firm applied for a bank loan (excluding overdraft and credit lines) and received more than 75% of the loan. We excluded the answers Don't know OR Not Applicable or the Application is still pending.

- MICRO – Coded 1 if the number of employees of the firm is 1-9 employees, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- SMALL – Coded 1 if the number of employees of the firm is 11-50 employees, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- LARGE – Coded 1 if the number of employees of the firm is higher than 250 employees, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- T0_5 – Coded 1 if turnover of the firm is less than 0.5 mn euro, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- T0_5_1 – Coded 1 if turnover of the firm is between 0.5-1 mn euro, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- T1_2 – Coded 1 if turnover of the firm is between 1-2 mn euro, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- T2_10 - Coded 1 if turnover of the firm is between 2-10 mn euro, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- T10_50 - Coded 1 if turnover of the firm is between 10-50 mn euro, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- OWNERSHIP – Coded 1 if the firm is a subsidiary of another enterprise (a separate, distinct legal entity that is part of a profit-oriented enterprise) OR a branch of another enterprise (branches are controlled by a parent company and are not separate legal entities) OR part of a profit oriented enterprise not taking fully autonomous financial decisions. Coded 0 if the firm is an autonomous profit-oriented enterprise, making independent financial decisions (including partnerships and cooperatives) OR an autonomous profit-oriented enterprise, making independent financial

decisions. We exclude Don't Know OR Not Applicable responses.

- AGE10 - Coded 1 if the age of the firm is above 10 years, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- AGE5_10 - Coded 1 if the age of the firm is between 5-10 years, and 0 otherwise. We excluded Don't know OR Not Applicable responses

- AGE2_5 - Coded 1 if the age of the firm is between 2-5 years, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- PROFITS_IMPROVED - Coded 1 if the firm reported that profits improved, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- PROFITS_UNCHANGED - Coded 1 if the firm reported that profits remained unchanged, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- CH_DECREASED - Coded 1 if the firm reported credit history deteriorated, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- CH_IMPROVED - Coded 1 if the firm reported credit history improved, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- CH_UNCHANGED - Coded 1 if the firm reported credit history remained unchanged, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- Outlook_DETERIORATED - Coded 1 if the firm reported that the enterprise-specific outlook with respect to sales and profitability or business plan deteriorated, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

- Public support - Coded 1 if the firm reported Access to public financial support, including guarantees improved, and 0 otherwise. We excluded Don't know OR Not Applicable responses.

In terms of expected signs/impact of the variables, based on existing literature, smaller companies (both in terms of number of employees, but also in terms of turnover) are expected to be more likely to face difficulties in accessing funding, while large companies to have better access to funding. Age of the firm is also expected to have a mixed impact on access to bank loans, older companies being probably more likely to face less credit constraints. An improved profitability, an improved outlook of the firm with respect to sales and profitability or business plan, and an improved credit history are also expected to result in lower likelihood of being credit constrained.

Also, the access to public financial support, including guarantees is expected to reduce the likelihood of the firm to be credit constrained.

Methodology

As pointed out in section 2, all our variables are binary zero-one variables. Consequently, we will use binary logit models in our estimations. The linear OLS regressions are not appropriate in this case, as the normal distribution and homogeneous error variance assumptions of OLS will likely be violated with a binary dependent variable (see for instance Long, 1997).

We model the observed response by considering a latent variable y_i^* that depends linearly on the explanatory variables x_i :

$$y_i^* = x_i' \beta + u_i$$

where u_i is a random disturbance. In the expression above, the vector of observed firm specific characteristics is given by x .

The observed y_i is determined from y_i^* using the rule:

$$y_i = \{0 \text{ if } y_i^* > 0 \text{ } 1 \text{ if } y_i^* \leq 0$$

In this case the threshold is set to zero. However, the choice of the threshold value is irrelevant as long as a constant term is included in x_i . The probabilities that firm n reports at time t that it is credit constrained is given by:

$$Pr(y_i = 1 | x_i, \beta) = Pr(y_i^* > 0) = Pr(x_i' \beta + u_i > 0) = 1 - F_u(-x_i' \beta)$$

Where F_u is the cumulative distribution function of u . We use the logistic function specification for the F function and we can write:

$$Pr(y_i = 1 | x_i, \beta) = 1 - \left(\frac{e^{-x_i' \beta}}{1 + e^{-x_i' \beta}} \right) = \frac{e^{x_i' \beta}}{1 + e^{x_i' \beta}}$$

Results

We estimated the model using the extended definition of constrained borrowers (baseline estimate), but also excluding the discouraged borrowers. Also, we split the sample and run the analysis for the stressed economies of the EU27 separately to account for the high degree of heterogeneity within the EU in terms of access to bank funding. The stressed economies are the countries from the EU which had during the 2009 - 2022 period an average sovereign bond yield higher than the EU simple arithmetic average (see table 1).

Table 1. 10Y T-bond yield average during 20009-2022 by EU countries

Stressed EU countries	Average 10Y T-bond yield	Non-stressed EU countries	Average 10Y T-bond yield
Greece	7.62	Spain	2.60
Romania	5.37	Slovenia	2.50
Hungary	4.97	Malta	2.3
Portugal	3.91	Czechia	2.2
Poland	3.84	Slovakia	2.0
Cyprus	3.77	Belgium	1.6
Croatia	3.77	France	1.5
Latvia	3.19	Austria	1.4
Italy	2.94	Sweden	1.3
Lithuania	2.90	Finland	1.3
Bulgaria	2.84	Luxembourg	1.3
Ireland	2.76	Netherlands	1.2
EU average	2.66	Denmark	1.2
		Germany	1.0
		Estonia	0.6

Source: EUROSTAT.

The dependent variable in all our estimations is a measure of credit constraints at the enterprise level. As mentioned above, we use two measures for credit constraints. In the “baseline” estimate we have the broadest measure of the credit constraints, namely including partial credit rejections, self-rejections due to interest costs and discouraged borrowers. In the alternative estimate (“Ex_disc”), the credit constraints are defined to exclude discouraged borrowers.

The estimated coefficients of the binary model must be interpreted very carefully (see for instance Greene (2008)). As we are using mainly qualitative data series, we cannot draw the standard conclusions used in the literature (such as 1% in exogenous variables lead to x% increase

or decrease in dependent variables). However, we can discuss the signs and the statistical significance of the estimated coefficients, and we can compare coefficients of different variables.

Table 2 – Results of the estimations

Variable	EU				Stressed economies			
	Baseline		Ex disc		Baseline		Ex disc	
MICRO	0.711	***	0.431	***	0.685	***	0.359	***
SMALL	0.346	***	0.230	***	0.363	***	0.256	***
LARGE	-0.621	***	-0.428	***	-0.569	***	-0.358	***
T0_5	0.411	***	0.300	***	0.428	***	0.271	***
T0_5_1	0.104	***	0.176	***	0.215	***	0.254	***
T1_2	-0.141	***	-0.098	*	-0.108	*	-0.096	
T2_10	-0.236	***	-0.076	**	-0.187	***	-0.025	
T10_50	-0.499	***	-0.282	***	-0.494	***	-0.186	***
OWNERSHIP	0.092	***	-0.048		0.032		-0.093	
AGE10	-0.056		-0.155	**	-0.226	**	-0.324	**
AGE5_10	0.289	***	0.176	**	0.024		-0.069	
AGE2_5	0.525	***	0.373	***	0.335	***	0.232	
PROFITS_IMPROVED	-0.293	***	-0.295	***	-0.241	***	-0.272	***
PROFITS_UNCHANGED	-0.307	***	-0.369	***	-0.282	***	-0.368	***
CH_IMPROVED	-0.828	***	-0.574	***	-0.916	***	-0.650	***
CH_UNCHANGED	-0.607	***	-0.518	***	-0.646	***	-0.548	***
CH_DECREASED	0.188	***	0.481	***	0.133		0.376	***
Outlook_DETERIORATED	0.316	***	0.322	***	0.431	***	0.416	***
Public support	-0.710	***	-0.624	***	-0.870	***	-0.694	***
C	-0.325	***	-1.143	***	0.145		-0.686	***
Mcfadden R-squared	0.116		0.083		0.126		0.082	
Included observations:	67154		54712		25982		19657	

Note: *** p value <1%, ** p value <5%, * p value <10%

Source: Authors' own research.

The results of the model estimations are shown in Table 2. Our results from table 2 are showing that smaller companies (with less employees but also with lower turnover) are more likely to be more credit constrained than larger companies in all estimated models. Moreover, the probability to be credit constrained decreases with increases in size of the firm (the estimated coefficient decreases with the size of the firm, becoming negative for large companies and for companies with turnover in excess of 1 mn euro). If the company is micro or small, it is likely to be credit constrained. If it is a large firm, then there is a decreasing probability to be credit constrained. If the company has a turnover lower than 1 mn euro, then it is likely to be credit constrained, but if the turnover is higher than 1 mn euro, then the likelihood of being credit constrained is lower, the likelihood decreasing when the turnover increases. The results are quite similar in the subsample of stressed economies.

The corporate structure of the company ("Ownership") has a statistically significant role in accessing funding from banks only in the baseline estimate for the full EU sample. In that case, if the company is a subsidiary of another enterprise (a separate, distinct legal entity that is part of a profit-

oriented enterprise) or a branch of another enterprise (branches are controlled by a parent company and are not separate legal entities) or part of a profit-oriented enterprise not taking fully autonomous financial decisions, that is increasing the chance to be credit constrained. This can be explained probably by the more complex corporate structure of subsidiaries, which can make the credit risk assessment more problematic, but also increasing borrower discouragement at the same time.

The impact of the age of the firm on credit access is mixed, being not significant in all specifications of our model. In the case of a full EU sample, higher age of the firm decreases the probability of being credit restricted. However, some coefficients are not statistically significant. However, if the age of the company is longer than 10 years, the age is statistically relevant and positive for accessing banking loans in the case of credit constrained firms if we exclude discouraged borrowers, the impact being even stronger in the case of stressed economies. If the age of the firm is low (2 to 5 years), this is not supportive for the access to loans of firms, the coefficient being statistically significant in 3 out of 4 model specifications.

Turning to the indicators reflecting the financial performance of the companies, a positive or unchanged performance in terms of profitability seems to come with a lower likelihood of credit constraints. If the enterprise-specific outlook with respect to sales and profitability or business plan deteriorates (“Outlook_DETERIORATED”), there will be higher likelihood of being credit constrained, the impact being stronger for stressed economies.

Credit history seems to have a stronger and statistically significant role in accessing banking loans, both for the full EU sample, but also for the stressed economies sample (in this case the impact is even stronger). If credit history is improving, that is supportive for the access to loans, and if credit history is deteriorating, that is detrimental, decreasing the chance to access banking loans. Also, the impact of credit history seems to be asymmetric in all specifications, the improvement in credit history being stronger in terms of favorable impact on access to loans than the negative impact on access to loans from a deterioration in credit history (in case of stressed economies the impact of deteriorating credit history is not statistically significant).

The access to public financial support, including guarantees (“Public support”), has a strong and positive effect on access to bank loans, reducing the probability of being credit constrained. Also, the coefficient is highly statistically significant in all model specifications, the positive impact on accessing loans being stronger for stressed economies from the EU.

The relative stability of the results in different specifications of the model shows that the results are quite robust. In the estimations which exclude discouraged borrowers, the McFadden R-squared is lower (consequently the estimates with broader definition of credit constrained companies are a better statistical fit for the data) and the magnitude of it is relatively similar with other results in the literature (Holton et al., 2013; McQuinn, 2019).

In general, the magnitude of the impact of the exogenous factors, especially the ones capturing the characteristic of the firm and credit history, on the likelihood to be credit constrained is generally lower when discouraged companies are excluded from the model. That suggests that these factors have a relatively stronger impact on the probability of companies to be discouraged to apply for a bank loan.

Our results are broadly in line with the findings from other papers in the literature in terms of the estimated sign of coefficients of variables reflecting firm-level fundamentals (see for instance Holton et al. 2013, McQuinn 2019, and Öztürk & Mrkaic 2014). However, our estimated coefficients are, in general, higher in terms of size and more statistically significant (see for instance for comparison the results obtained by McQuinn 2019).

Our results are adding to the existing literature at least in two respects. First of all, we are using a more comprehensive data sample and our results seems to be more robust and more statistically significant. Secondly, we were able to identify a significantly different behavior of financially stressed economies from EU in terms of access of firms to bank loans. We used a more extensive data sample and we isolated a bigger sample of financially-stressed countries from EU than in other studies from the literature (see for instance Öztürk & Mrkaic 2014). We were able to identify that if the enterprise-specific outlook with respect to sales and profitability or business plan deteriorated there will be significantly higher likelihood of being credit constrained for stressed economies than in the full EU sample. Also, the improvement of credit history seems to have a stronger and statistically significant positive role in accessing banking loans for stressed economies than in the case of full EU sample. Not in the last, we found that the “grease” effect of public financial support, including guarantees, has a stronger positive effect on access to bank loans for stressed economies from EU, which makes a stronger case for using these instruments especially in the case of these countries to alleviate credit constraints.

Conclusions

We explored in this paper the factors that could explain why firms are credit constrained in European Union countries and we were also interested to see if the financially stressed countries from the EU are different in this respect.

Using binary logit model, we estimated initially a baseline model using SAFE micro data for the EU countries including or excluding discouraged borrowers. In a second phase we reduced the sample of the stressed countries from the EU.

We found that smaller companies (both in terms of number of employees but also in terms of the size of turnover) are more likely to be more credit constrained than larger companies in all estimated models.

The results are showing that the probability to be credit constrained decreases with the increase in size of the firm, namely if the company is micro or small or if the turnover is low, it is more likely to be credit constrained than if it is a large company or the turnover is larger. There seems to be no significant differences in terms of the impact of the size of the company on likelihood to be credit constrained for the full EU sample versus the reduced sample of stressed EU economies.

The corporate structure of the company is found to be significant for the access to bank loans only in some specifications of the model we estimated. Also, the impact of the age of the firm on credit access is found to be not very clear.

Financial performance of the companies is found also to be significant for credit constraints. A positive performance in terms of profitability seems to come hand in hand with a lower likelihood of being credit constraints.

A deterioration of the outlook of the firm in terms of sales and profitability or business plan there will trigger a higher likelihood of being credit constrained, the impact being stronger for stressed economies. The same is found to be valid with respect to credit history, for which we found an asymmetric impact on credit constraints.

The access to public financial support, including guarantees has a “grease” effect on access to bank loans, reducing the probability of being credit constrained. Its positive impact on accessing loans is found to be stronger in the case of stressed economies from the EU, which means that state guarantees are a powerful instrument to alleviate credit constraints for firms, especially if there is financial stress in the economy.

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