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Loan Recoveries and the Financing of Zombie Firms Over the Business Cycle

Asli Demirgüç-Kunt, Bálint Horváth, and Harry Huizinga

Abstract

Using new data from the European Banking Authority on loan recovery outcomes, we examine how variation in loan recovery efficiency affects the transmission of financial sector and overall economic weakness to firm-level financial and real outcomes. We find that firms linked to under-capitalized banks experience higher debt, employment, and sales growth rates, if they are located in countries with less efficient loan recoveries. Furthermore, during economic downturns zombie firms—insolvent firms that continue to receive credit—achieve higher debt, employment, and sales growth, and fewer defaults if they are resident in such countries. Overall, we find that less efficient loan enforcement mitigates the transmission of financial sector and economic weakness to firm-level outcomes. This stabilizing effect, however, is likely to come at the cost of significant distortions documented in earlier literature.

KEYWORDS
loan recovery, zombie firm, business cycle

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Asli Demirgüç-Kunt
Center for Global Development

Bálint Horváth
University of Arizona

Harry Huizinga
Tilburg University and CEPR

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CENTER FOR GLOBAL DEVELOPMENT
2055 L Street, NW Fifth Floor
Washington, DC 20036

1 Abbey Gardens
Great College Street
London
SW1P 3SE

www.cgdev.org

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1. Introduction

Zombie firms are firms that continue to receive credit from their banks despite being insolvent. Weak banks generally have the incentive to provide zombie credit to avoid realizing loan losses on their loans to zombie firms, which would negatively affect bank capitalization. Inefficient insolvency regimes delay and reduce expected loan recoveries, and thus potentially increase incentives for fragile banks to continue to provide credit to faltering firms. As a result, inefficient insolvency regimes could lead to a more muted transmission of bank fragility and economic downturns to firm-level credit availability and real activity. This paper provides empirical evidence on these issues for the case of Europe.

We use newly available data on realized loan enforcement outcomes from the European Banking Authority (EBA) as proxies for loan enforcement efficiency. These data are available separately for SMEs and larger corporations, enabling us to base our estimation on within-country variation in loan enforcement efficiency.

Using information on firm-bank relationships, we find that a firm experiences greater debt growth if it is tied to a bank with a low capitalization rate and located in a country with less efficient loan enforcement, measured by a longer time to recovery and lower recovery proceeds. Specifically, we estimate that a one-standard-deviation reduction in bank capitalization increases debt growth by 0.34% (1.5% its standard deviation) when time to recovery is at the 75th percentile rather than the 25th percentile. Similarly, debt growth is higher by 0.57% (2.6% of its standard deviation) in this scenario when the loan loss rate if at the 75th rather than the 25th percentile. This higher debt growth has real implications, as we find that firms linked to weaker banks and located in countries with less efficient enforcement recovery realize higher employment and sales growth rates.

During economic downturns, banks tend to be weaker, which increases their incentives to continue to provide credit especially to zombie firms. Using EU GDP growth as a proxy for the business cycle, we find that during economic downturns zombie firms, following the definition of De Jonghe, Mulier and Samarin (2021), experience higher debt growth if located in countries with slower loan enforcement. Consistent with this, we show that during economic slowdowns zombie firms experience higher employment and sales growth if located in countries with lower loan recoveries.

The greater debt growth that zombie firms achieve if subject to inefficient loan enforcement potentially helps them to stave off default. Confirming this, we find that zombie firms display lower default rates in periods of lower economic growth, if subject to longer loan recovery and lower loan recoveries.[1] Specifically, we find that a one-standard-deviation reduction in EU GDP growth reduces the default rate of a zombie firm relative to a non-zombie firm by 0.35% (3.1% of its

1 Altman, Dai, and Wang (2022) find that zombie firms are more prevalent in countries with inefficient debt enforcement.

standard deviation) if we compare the firm being located in a country with time to recovery at its 75th percentile rather than its 25th percentile.

Our finding that a firm experiences greater debt growth if tied to a bank with low capitalization and located in a country with longer time to recovery is robust to IV estimation where we instrument for bank capitalization by a bank's exposure to heavily indebted sovereigns during the European debt crisis that started in 2010.

In some regressions, we control for variation in the salability of assets using data from Kim and Kung (2017) as international variation in loan enforcement outcomes in the EBA data could reflect differences in the assets that firms use as loan collateral, finding similar results.

As an alternative to the EBA data on loan recovery outcomes, we consider measures of loan enforcement efficiency available from the World Bank's Doing Business survey for the hypothetical case of a real estate loan secured by a hotel. Using these World Bank (WB) data, we find that firms linked to weaker banks realize higher employment growth if they reside in countries with lower loan recoveries and, in addition, that zombie firms experience higher debt, sales and employment growth rates as well as lower default rates, if located in countries with lower economic growth and slower loan enforcement. However, generally our estimation results are more precise when we use the EBA loan enforcement data than the World Bank data. This could reflect that the EBA loan enforcement data vary by firm size category and represent recoveries of all corporate debts rather than only of a hypothetical mortgage as in the case of the WB survey.

Overall, we find that less efficient loan enforcement mitigates the passthrough of financial sector fragility to firms and, in addition, of economic weakness particularly to zombie firms. These mitigating effects can be taken to be advantageous, as they imply a stabilization of the economic activity of the affected firms. The implied lending to zombie firms, however, comes at a cost, as zombie lending has been documented to create distortions and negative spillovers for non-zombie firms, for instance in the form or reduced employment (see, for instance, Acharya, Crosignani, Eisert and Steffen, 2022). Zombie lending can also lead to an accumulation of risk in the financial sector, creating zombie banks and jeopardizing the stability of the financial system (Kane, 1987).

A few papers investigate the implications of proxies for loan enforcement for the procyclicality of the external finance of firms. Mora-Sanguinetti, Martinez-Matute and Garcia-Posad (2017) examine how regional variation in the quality of loan contract enforcement within Spain affects differences in the availability of credit and in the evolution of non-performing loan ratios over the business cycle. Using data on syndicated loans for European borrowers and WB data on insolvency rules, Becker and Ivashina (2022) find that zombie credit, defined as relatively cheap credit, is more common in years of negative economic growth when insolvency tends to be less efficient. Our paper complements this

earlier work by showing that loan enforcement frictions limit the passthrough of bank fragility and recessions to the borrowing and real activity of zombie firms.

In a related paper, Jordà, Kornejew, Schularick, and Taylor (2022) show that after corporate debt booms, recessions are shallower in countries with greater debt resolution efficiency, suggesting that national business cycles are endogenous to the loan recovery process. In our paper, we take EU GDP growth as a proxy for the stance of the business cycle, which can be taken to be exogenous to the operation of zombie firms and the loan recovery process in individual European countries. In this setting, we show that less efficient loan recovery mitigates the passthrough of economic recessions to the economic activity of zombie firms. Less efficient loan recovery thus has the dual and opposing effects of increasing the amplitude of economic downturns after corporate debt booms, as shown by Jordà, Kornejew, Schularick, and Taylor (2022), and of reducing the passthrough of recessions to the activities of zombie firms as documented in the present paper.

This paper adds to a literature on zombie lending by weakly capitalized banks and its implications. Peek and Rosengren (2005) show evidence of zombie lending by Japanese banks in the 1990s as a way to avoid loan losses with negative implications for bank capitalization. Giannetti and Simonov (2013) find that banks that received insufficient capital injections during the Japanese banking crisis subsequently extended larger loans to zombie banks. Caballero, Hoshi, and Kashyap (2008) find that zombie lending in Japan prevented the zombie firms from reducing employment and losing market share.

Using European data, Acharya, Eisert, Eurfinger, and Hirsch (2019) find that banks that remained undercapitalized following the ECB's OMT announcement in 2021 provided additional zombie lending, which led zombie firms to build higher cash reserves rather than undertake economic activity. Kalemli-Özcan, Laeven and Moreno (2022) find that following the financial crisis European firms with debt overhang invested less, especially if they had relationships with bank with sovereign debt exposures that had declined in value. Using Italian data, Schivardi, Sette and Tabellini (2021) show that during the Eurozone financial crisis undercapitalized banks cut credit to healthy but not to zombie firms, while in sectors with more low-capital banks zombies are more likely to survive. For the case of Portugal, Bonfim, Cerqueiro, Degryse and Ongena (2020) show that following bank inspections banks were less likely to refinance zombie firms giving rise to additional defaults, as inspections, forcing loan loss recognitions, reduced the incentives for zombie lending. This paper adds to the literature on lending by undercapitalized banks by showing that inefficient loan enforcement mitigates the transmission of low bank capitalization into lower firm debt, sales and employment growth.

A related literature investigates how firm-bank relationships affect the availability of credit to firms following economic shocks. Jiménez, Ongena, Peydró, and Saurina (2012) show that Spanish

banks were more likely to continue to lend to long-term clients when GDP growth was low. For Portugal, Iyer, Peydró, da-Rocha-Lopes, and Shoar (2014) find that especially banks with a pre-crisis dependency on interbank lending reduced their credit during the crisis, but less so in the case of firms with a stronger lending relationship. For Italy, Gobbi and Sette (2015) find that firms with a longer lending relationship continued to have greater access to credit after the collapse of Lehman Brothers. Beck, Degryse, De Haas and Van Horen (2018) find that firms tied to relationship lenders were less credit constrained during an economic downturn. Using Italian data before and after the fall of Lehman Brothers, Bolton, Freixas, Gambacorta, and Mistrulli (2016) find that relationship banks, compared to transaction banks, charged higher spreads before the crisis, but offered more favorable lending terms in response to the crisis, resulting in fewer firm defaults.

In several studies, loan recovery efficiency has been found to be an important determinant of credit market development and characteristics. Djankov, Hart, McLiesh, and Shleifer (2008) find that their survey-based measures of the efficiency of debt enforcement are positively related to debt market development. Becker and Josephon (2016) find that the share of bonds in total debt is positively related to a measure of bankruptcy recovery from Djankov et al. (2008). Comparing survey-based measures of loan enforcement efficiency and formal creditor rights, Bae and Goyal (2009) find that the former are more important in determining syndicated loan characteristics. Using information on realized recovery rates from banks in France, Germany, Davydenko and Franks (2008) finding that inefficient bankruptcy is associated with less bond issuance by risky borrowers.

The operation of the courts has been identified as a key determinant of loan recovery inefficiency. Using regional Italian data, Jappelli, Pagano and Bianco (2005) find that judicial backlogs, measured as the stock of pending trials per thousand inhabitants, are associated with lower lending relative to GDP. Studying bankruptcy reform in Brazil, Ponticelli, and Alencar (2016) show that court congestion gives rise to lower use of secured loans, and lower firm-level investment and output. Müller (2022) finds that a consumption bankruptcy reform in the US in 2005, which reduced the caseload of bankruptcy judges, lowered interest rates and increased loan maturities for corporations by increasing expected recovery values for creditors. Iverson, Madsen, Wang and Xu (2023) show that inexperienced judges generate longer bankruptcy cases and lower creditor recovery rates. For the case of Hungary, Franks and Loranth (2014) find that the compensation scheme facing bankruptcy trustees materially affects bankruptcy outcomes. Bankruptcy outcomes also reflect conflicts of interest and asymmetric information among claimants (Carey and Gordy, 2021; Dou, Taylor, Wang, and Wang, 2021).

In the remainder, section 2 discusses the data. Section 3 sets out the methodology. Section 4 presents the empirical results. Section 5 concludes.

2. Data

We examine how loan enforcement efficiency affects the passthrough of economic conditions—represented by bank capitalization and GDP growth—to firm financing, real activity, and bankruptcy. We discuss the data on loan enforcement regimes and other data in turn.

2.1 Loan enforcement data

We consider two aspects of the efficiency of the loan enforcement process: the time it takes to conclude the loan enforcement, and the net recovery proceeds that the bank receives. We use data on these two aspects of loan enforcement efficiency for European countries from two separate sources. First, the EBA (2020) has published summary information on loan enforcement outcomes collected from European banks. The EBA loan enforcement outcome data have been collected from a set of 160 banks that were chosen to be representative with respect to their size and business models. The loan recovery rates pertain to loans for which the loan enforcement process was completed and/or initiated during 2015–2018. Loan recovery data at the national level are reported separately for corporates and SMEs, which enables us to base the estimation on within-country variation in the loan recovery variables. As in the definition of the European Commission,[2] we take an SME to be a firm with total assets less than 50 million EUR and with fewer than 250 employees in a given year.

Alternatively, the World Bank's Doing Business survey provides information on expected loan enforcement outcomes for a hypothetical loan default case of a hotel that is kept common across countries (see Djankov, Hart, McLiesh, and Shleifer, 2008, pp. 1108–1112). These survey data are available on an annual basis. The default scenario in the World Bank survey is fully exogenous, which implies that variation in expected loan enforcement outcomes reported in the survey only reflect differences in the loan enforcement regimes as perceived by survey respondents. Compared to the World Bank survey responses, the EBA data, however, add realism, as they reflect international variation in the loan default outcomes that banks actually experience. This means that the EBA data potentially reflect differences in the assets that are used as loan collateral as well as differences in loan enforcement efficiency. In a robustness check, we control for variation in the salability of assets across different industries when considering the impact of loan enforcement variables from the EBA on firm level outcomes.

In the EBA (2020) report, time to recovery is defined as the length of the recovery period in years, measured as the time between the start of the formal enforcement status to the date of ultimate recovery from the formal enforcement procedures. Columns 1 and 2 of Table 1 provide information on time to recovery for corporates and SMEs, respectively, for individual EU member countries. The average recovery period is 3.3 and 3.0 years for EU corporates and SMEs, respectively. Figure 1 provides a scatter diagram of the times to recovery for corporates and SMEs for individual countries,

2 See 2003/361/EC (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003H0361&from=EN).

showing that corporate loans take longer (shorter) to resolve than SME loans in 10 (7) countries represented in the figure.

Loan recovery procedures provide banks with net recovery proceeds, given by the gross loan recoveries minus the judicial costs of recovery. In the EBA study, the gross recovery rate is defined as the total amount recovered through the formal enforcement process as a share of the notional exposure at the time of default, while judicial cost to recovery is defined as the judicial costs as a share of the defaulted amount.[3] The resulting average net recovery rates for EU corporates and SMEs are 41.6% and 39.6%, respectively. Figure 2 plots the average net recovery rates for corporates and SMES for individual countries, showing that the average net recovery rate for corporates exceeds (is less than) the net recovery rate for SMEs in 7 (6) countries. Thus, there is no clear evidence that loan recoveries vary with firm size categories.[4]

Figure 3 relates the net recovery rate to the time to recovery for corporates in individual countries. The figure displays a negative correlation, indicating that slower loan recovery procedures tend to yield lower net recoveries. Similarly, Figure 4 shows a negative relation between the time to recovery and the net recovery rate for SMEs internationally.

Columns 3 and 4 of Table 1 provide information on loan enforcement variables from the World Bank's Doing Business survey, called Time to enforce contracts and Recovery rate, for individual countries in the year 2004. Time to enforce contracts is defined as the time in years between the filing of a lawsuit in court until payment in case of a commercial dispute, while Recovery rate is the amount recorded as cents on the dollar recovered by secured creditors through judicial reorganization, liquidation or debt enforcement in case of the default of a hypothetical company on a 10-year loan agreement with a domestic bank secured by a mortgage over the company's real estate property.[5] The average Time to enforce contracts and Recovery rate are 1.7 years and 54.7% for the 23 EU countries with data, respectively.

Figure 5 plots national data on the Time to enforce contracts from the World Bank survey against the Time to recovery from the EBA for corporates as well as SMEs, displaying positive correlations.[6] Similarly, Figure 6 shows positive correlations between the Recovery rate from the World Bank and the two Net recovery rates for corporates and SMES from the EBA. The positive correlations in

3 For EU corporates and SMEs, average judicial costs are 2.7% and 3.9%, respectively. Ang, Chua, and McConnell (1982) document scale effects in bankruptcy costs using US data.

4 Countries with a relatively long time to recovery for SMEs (above the diagonal in Figure 1) can have either a relatively lower or higher net recovery rate for SMEs (below or above the diagonal in Figure 2).

5 The hypothcal company does not only owe money to the bank, but also to 50 suppliers, employees, and tax authorities. Further details about the case are available on the Doing Business Archive website at https://archive.doingbusiness.org/en/methodology/resolving-insolvency.

6 The hypothetical firm in the World Bank survey has 201 employees, which would make it an SME according to the European Commission characterization (if we assume that the firm has total assets less than €50 million).

Figures 5 and 6 suggest that the EBA and WB data both provide useful indices of the efficiency of national loan enforcement regimes.

In the empirical work, we will use the variables Net recovery loss, defined as one minus the net recovery rate based on EBA data, and Recovery loss, defined as one minus the recovery rate based on WB data, so that a higher loan enforcement variable (related to the length or net proceeds of loan recoveries) implies a less efficient loan enforcement process form a creditor's perspective.

2.2 Other data

To proxy for a firm's financing, we consider Debt growth, defined as the change in total debt divided by lagged assets. Debt growth has a mean of 4.60% (see Table 2).

Variation in the firm's real activity is represented by two variables. Employment growth is the annual log change in the number of employees, with a mean of 0.0231. Alternatively, Sales growth is the annual log change of turnover, with a mean of 0.0475.

Default is a dummy variable indicating that the firm is in default in the last year in which it is observed, and zero otherwise. The average default rate is 1.32%.

The Tier 1 capital ratio is an index of bank capitalization. The Tier 1 capital ratio has a mean of 13.1%. We were able to link firms located in 18 countries to their primary banks at the parent bank level. To link banks in SNL and Amadeus we first matched on the bank names in SNL with any combination of the first three words of the name of the bank in Amadeus, which we then manually verified.

The regressions include four firm-level control variables, lagged by one year. Size is the natural logarithm of total assets. Leverage is the ratio of liabilities to assets (with a mean of 0.597), Net worth is the ratio of equity minus cash to assets (with a mean of 0.260), and Tangibility is the ratio of tangible assets to total assets (with a mean of 0.316).

In some regressions, we include a measure of the salability of a firm's assets (Asset redeployability) to control for the possibility that the outcomes of loan recovery procedures in a given country are influenced by the asset structures of firms located there. Asset redeployability is taken from Kim and Kung (2017), and it is available at the three-digit SIC industry-year level. For missing years, we take the last available value for the given industry and with this the sample mean of Asset redeployability is 0.427.

SME is a dummy variable that equals one if a firm is an SME, meaning that it has less than 50 million EUR in assets and fewer than 250 employees. SME has a mean of 0.956.[7]

7 Table A2 in the Appendix provides information on how many firms changed SME status in the sample in each year. For instance, in 2019 633 (357) firms became (no longer were) SMEs, amounting to 0.4% and 0.2% of the sample.

Zombie is a dummy variable indicating whether a firm is a zombie firm according to the definition of De Jonghe, Mulier and Samarin (2021). This definition starts from a firm's cash flow, measured as EBITDA plus recurring financial revenues such as dividends, to focus on the cash flow that is actually available to pay interest. Specifically, a firm is labeled a zombie firm if (i) the firm's 3-year accumulated cash flows falls below its 3-year accumulated interest expenses, (ii) yearly cash flows are below interest expenses in at least 2 of these 3 years, and (iii) the firm is at least 10 years old. The consideration of cash flows over a 3-year period serves to make the zombie classification less cyclical. The zombie variable has a mean of 0.0503.

Alternatively, Zombie industry is the fraction of zombie firms in an industry in a given year in a given country. A zombie firm is defined as a firm that has an interest coverage ratio in the bottom 25% in the sample (separately for firms with below and above median current liabilities to total liabilities ratios) and has a lower interest expense/total liabilities ratio than the median safe firm. Safe firms are defined as firms with interest coverage ratios in the top 25% in the relevant sample. Zombie industry has a mean of 0.0254.[8]

Finally, EU GDP growth is the annual real growth rate of EU GDP. Figure 7 displays the annual EU GDP growth rate during the sample period 2009–2019, showing that EU GDP growth was negative in 2009 and 2012. The average EU GDP growth rate was 1.65% during the sample period.

3. Methodology

In the empirical research, we consider how economic conditions external to the firm—represented by bank capitalization and EU GDP growth—affect a firm's financial and real outcomes depending on variation in the loan enforcement variables at the national level. To estimate how bank capitalization and loan enforcement variables jointly affect firm level variables, we estimate the following specification:

$$F_{ibct} = \beta_1 R_{ict} + \beta_2 R_{ict} * C_{bt} + \beta_3 SME_{it} * C_{bt} + \beta_4 SME_{it} + \beta_5 X_{it} + \alpha_{ct} + \gamma_i + \mu_{bt} + \epsilon_{it} \quad (1)$$

where F_{ibct} is a dependent variable for firm i (Debt growth, Employment growth or Sales growth) located in country c and tied to bank b at time t. R_{ict} is a loan enforcement variable for firm i at time t. In our main analysis, R_{ict} is either Time to recovery or Net recovery loss, based on data from the EBA (2020). In this instance, R_{ict} varies within countries as we have separate measures of Time to recovery and Net recovery loss for corporates and SMEs, and it can vary with time depending on whether a firm is a corporate or an SME in a given year. C_{bt} is the Tier 1 capital ratio of the firm's primary bank b at time t. We include the interaction $R_{ict} * C_{bt}$ to test whether a firm experiences, for instance, higher debt growth if it is linked to a bank with a lower capitalization rate and if at the same

8 Similarly, Acharya et al. (2019) define a zombie variable at the industry and year level based on firms' abilities to service their debts.

time the loan recovery process tends to yield worse outcomes.[9] A negative estimate of the coefficient β_2 is consistent with this overall hypothesis. SME_{it} is a dummy variable flagging that firm i is an SME in year t. We include the interaction $SME_{it} * C_{bt}$ to control for the fact that the impact of bank capitalization on firm financing may vary with whether a firm is an SME. X_{it} is a vector of control variables for firm i at time t. We include country-year fixed effects α_{ct}, which enable us to control for, for instance, institutional differences at the national level. In addition, γ_i is a firm fixed effect, and μ_{bt} is a bank-year fixed effect. In a robustness check, we follow the approach of Degryse et al. (2019) and Acharya et al. (2019) of defining clusters of similar firms to control for possibly time-varying credit demand. To do so, we replace the country-year fixed effects by country-year-industry-interest coverage quartile fixed effects, while maintaining the firm and bank-year fixed effects. The inclusion of firm fixed effects implies that the effect of R_{ict} per se and of SME_{it} is identified by firms with varying status as a corporate or SME over time. We report standard errors that are two-way clustered at the country and year levels.

To estimate how the loan enforcement process and EU GDP growth jointly affect firm level variables, we estimate the following specification:

$$F_{ict} = \beta_1 R_{ict} + \beta_2 G_t * R_{ict} * Z_{it} + \beta_3 G_t * R_{ict} + \beta_4 G_t * Z_{it} + \beta_5 R_{ict} * Z_{it} + \beta_6 G_t * Z_{it} * SME_{it} + \beta_7 G_t * SME_{it} + \beta_8 Z_{it} * SME_{it} + \beta_9 Z_{it} + \beta_{10} SME_{it} + \beta_{11} X_{it} + \alpha_{ct} + \gamma_i + \epsilon_{it} \quad (2)$$

where F_{ict} is a financial or real variable for firm i in country c at time t (Debt growth, Employment growth, Sales growth or a dummy indicating that the firm is in default). G_t is the growth rate of EU GDP at time t. Z_{it} is a dummy variable indicating whether firm i is a zombie firm at time t. We include the triple interaction $G_t * R_{ict} * Z_{it}$ to test whether a business cycle downturn, proxied by lower EU GDP growth, gives rise to, for instance, a relatively high debt growth for zombie firms located in countries with less favorable loan enforcement. This could materialize if during an economic downturn banks continue to provide credit especially to such firms in order to avoid realizing relatively large loan losses that would negatively impact bank capital. A negative estimate of β_2 is consistent with this hypothesis, if the dependent variable is Debt growth, Employment growth or Sales growth. Alternatively, a positive estimate of β_2 is expected to materialize, if the dependent variable is a dummy signaling that the firm is in default. The specification is saturated with double interactions involving the variables G_t, R_{ict} and Z_{it}. In addition, we include interaction terms of SME_{it} with G_t, Z_t and their product to control for the fact that the loan enforcement variables are measured separately for corporates and SMEs and thus could possibly reflect firm size. Finally, the specification includes country-time and firm fixed effects.

9 A higher debt growth could result from additional bank credit, or from lower bank debt repayment by firms. Schiantarelli, Stacchini and Strahan (2020) find that firms in Italy tend to delay payments to weak banks if legal enforcement of collateral recovery is slow. Our firm-level data do not allow us to distinguish between additional credit provision and the delayed repayment of existing credit.

4. Empirical results

Sections 4.1 and 4.2 present the results of estimating specifications (1) and (2), respectively.

4.1 The joint effect of loan recovery and bank capitalization on firm outcomes

Table 3 shows the results of estimating specification (1) for the case where the dependent variable is firm-level debt growth. To start, regression 1 includes Time to recovery as the loan enforcement variable R_{ict}, and it is based on a sample of 1.75 million observations for 218,115 separate firms. For brevity, we only report the estimated coefficients for this variable and of its interaction with T1 capital ratio, which are 0.0116 (significant at 1%) and −0.0627 (significant at 5%), respectively. Thus, firms subject to longer loan enforcement experience higher debt growth, especially if they are tied to a less capitalized bank. This supports the hypothesis that undercapitalized banks tend to provide relatively more credit to firms that are subject to slower loan enforcement, as withholding credit in an environment of inefficient loan enforcement could negatively impact bank capitalization.

In regression 2, we replace Time to recovery by Net recovery loss in an otherwise similar regression. Net recovery loss and its interaction with T1 capital ratio are estimated with positive and negative coefficients (significant at 1%). Thus, debt growth varies positively with recovery losses, especially if the firm is linked to a bank with lower capitalization. This suggests that less capitalized banks provide relatively more credit to firms if recovery losses are higher to prevent costly loan enforcement episodes. Weaker banks generally have an incentive to do this, as they can ill afford higher recovery losses that would further reduce their capitalization.

Regression 3 includes both Time to recovery and Net recovery loss and their interactions with T1 capital ratio. In this regression, Time to recovery and Net recovery loss obtain positive significant coefficients, and their interactions with bank capitalization receive negative significant coefficients of −0.0606 and −0.00646, respectively. The estimated coefficients can be used to assess how the loan recovery regime affects the transmission of bank capitalization to firm-level debt growth. In particular, a one-standard-deviation reduction in T1 capital ratio of 0.0253 leads to a relatively higher debt growth of 0.34% (=2.2*0.0253*0.0606) in the case where time to recovery is at its 75th percentile of 4 years compared to its 25th percentile of 1.8 years, which amounts to 1.5% (=0.0034/0.223) of the standard deviation of debt growth of 0.223. At the same time, a one-standard deviation reduction in T1 capital leads to a relatively higher debt growth of 0.57% (=34.7*0.0253*0.00646) when we compare the top quartile net recovery loss of 80 to the bottom quartile of 45.3, which amounts to 2.6% (=0.0057/0.223) of the standard deviation of debt growth. Thus, the passthrough of lower bank capitalization into lower debt growth is estimated to be considerably smaller if loan enforcement is relatively inefficient. As a robustness check, we replace the country-year fixed effects in regressions 1–3 by country-year-industry-interest coverage quartile fixed effect in regressions 4–6, yielding results that are similar.

As discussed in section 2, the EBA loan enforcement data potentially reflect international variation in loan collateralization as well as in loan enforcement efficiency. In particular, low loan recoveries in a country could reflect low asset salability for the firms in that country in addition to low loan enforcement efficiency. This implies that our finding of higher debt growth for firms tied to a lowly capitalized banks and located in a country with low loan recoveries possibly reflects banks' incentives to provide additional loans to firms with less salable assets in order to avoid low recoveries. To check this, we next control for asset salability by including the interaction term Asset redeployability * T1 capital ratio in regressions 1–3, with the results reported as regressions 7–9. This interaction term is insignificant throughout, while interactions of T1 capital ratio with either loan enforcement variable continue to be negative and significant. This is consistent with the notion that lowly capitalized banks provide additional loans to firms in countries with low loan enforcement measures according the EBA, because these data reflect low loan enforcement efficiency rather than low asset salability.[10]

Bank capitalization is potentially endogenous to firm borrowing. As our sample includes the European sovereign debt crisis period of 2010–2012 with documented implications for bank lending (Popov and Van Horen, 2015; Altavilla, Pagano and Simonelli, 2017; De Marco, 2019), we can perform an IV estimation for the sovereign debt crisis period where we use a bank's exposure to the relatively weak GIIPS countries, i.e. Greece, Ireland, Italy, Portugal and Spain, relative to risk-weighted assets in 2009 as an instrument for the bank's T1 capital ratio.[11] In Table 4, regressions 1–3 show the IV results corresponding to regression 1 of Table 3 including country and bank fixed effects, separately for the years 2010, 2011, and 2012.[12] The instrumented interaction Time to recovery * T1 capital ratio obtains a negative and significant coefficient in column 2 for the year 2011, at the height of the sovereign debt crisis, while corresponding coefficients are insignificant in columns 1 and 3 for the years 2010 and 2012. For all three regressions, underidentification tests are satisfied, consistent with a link between sovereign exposure and bank capitalization. Regressions 4–6 show analogous results for the case where we include country-industry-interest coverage quartile fixed effects instead of country fixed effects, yielding negative and significant coefficients for the instrumented Time to recovery * T1 capital ratio in columns 1 and 2. Overall, these IV results provide further evidence that firms subject to less efficient loan enforcement experience higher debt growth if they are tied to less capitalized banks. Analogous regressions using Net recovery loss instead of Time to recovery do not satisfy the underidentification tests and are not reported. In regressions that include both Net recovery loss and Time to recovery and their interactions with T1 capital ratio not all coefficients are estimable due to a lack of sufficient variation.

10 We also included the interaction term Asset redeployability * T1 capital ratio in regressions 4–6 of Table 3 and in Tables 4 and 5, finding very similar results that are not reported.

11 The mean GIIPS exposure relative to risk-weighted assets is 0.105 (see Table 2). De Marco (2019) mentions that about 15% of sovereign debt was marked to market according to EBA data, finding that marking to market of this debt affected bank lending, implying an immediate effect of sovereign debt valuation on bank capitalization.

12 In these regressions we cannot include firm fixed effects as they are collinear with the dependent variable.

Next, we examine the impact of loan enforcement efficiency in combination with bank capitalization on the development of firm-level real activity, as proxied by employment growth and sales growth, using specification (1). In regressions 1–3 of Table 5, Panel A, the dependent variable is employment growth, analogously to the debt growth regressions of Table 3, Panel A. In regression 1, Time to recovery is estimated to be insignificant, while its interaction with the Tier 1 capital ratio is negative and significant. Thus, firms subject to tardier loan enforcement tend to experience relatively higher employment growth, if their bank is less capitalized. In regression 2, Net recovery loss is estimated to be insignificant, while Net recovery loss * T1 capital ratio is negative and significant, implying that firms located in countries with higher recovery losses realize higher employment growth if they are tied to a less capitalized bank. Regression 3 includes both loan enforcement variables and their interactions, yielding a negative significant coefficient for the interaction of Net recovery loss and T1 capital ratio as in regression 2. In the analogous sales growth regressions 4–6, we see that Net recovery loss and Time to recovery are significantly positive in regression 5 and 6, respectively, while the included interaction terms with T1 capital ratio are negative and significant throughout. Thus, firms located in countries with less efficient loan enforcement are estimated to attain higher sales growth if their bank is less capitalized. Specifically, using the estimated coefficient for Time to recovery * T1 capital ratio of –0.06 in the regression 6, we can calculate that a one-standard-deviation reduction in T1 capital ratio of 0.0253 leads to a relatively higher sales growth of 0.33% (=2.2*0.0253*0.06) in the case where time to recovery is at its top quartile of 4 years vs. its bottom quartile of 1.8 years, which amounts to 1.29% (=0.0033/0.255) of the standard deviation of sales growth of 0.255. Analogously, a one-standard-deviation reduction in T1 capital ratio leads to a relatively higher sales growth of 0.60% (=34.7*0.0253*0.00685) or 2.36% of its standard deviation when we compare the top quartile net recovery loss of 80 to the bottom quartile of 45.3. These estimated effects are relatively small but not negligible.[13] In Table 5, Panel B, with alternative fixed effects, we see that Time to recovery * T1 capital ratio is negative and significant in the employment growth regression 1 and the sales growth regression 4, while Net recovery loss * T1 capital ratio is significantly negative in the sales growth regressions 5 and 6, similarly to Panel A.

To conclude this section, we consider the loan enforcement variables from the WB Doing Business database as alternatives to those available from the BEA that we have used so far. Specifically, we re-estimate Panels A of Tables 3 and 5 after replacing the loan enforcement variables from the EBA by those from the World Bank. Regressions analogous to those of Table 3, Panel A, show no significant results for the interactions involving a loan enforcement variable, and they are not reported. Regressions similar to Table 5, Panel A, show negative and significant coefficients for the interaction

13 We estimated instrumental variable regressions analogous to regressions 1–6 of Table 5, Panel A, similar to the regressions in Table 4 but with Employment growth and Sales growth as dependent variables. 8 out of 18 estimated regressions (six regressions for each 2010, 2011 and 2012) failed the underidentification tests, while in the remaining 10 regressions we estimated a statistically significant interaction term involving the T1 capital ratio and one of the loan enforcement variables in one regression. In particular, Time to recovery * T1 capital ratio has a negative coefficient significant at the 5% level, when the dependent variable is Sales growth and the sample is for the year 2010. For brevity these results are not reported.

Recovery loss * T1 capital ratio in the employment growth regression 2 and 3, and these regressions are reported in Table A3, Panel A, in the Appendix. As the EBA and WB indices on loan enforcement efficiency are potentially complementary, we in addition estimated analogous regressions that simultaneously include these variables and their interactions with T1 capital ratio, as reported in Table A4, Panel A, in the Appendix.[14] The interaction of T1 capital ratio with Time to recovery (from the EBA) is negative and significant in some regressions, while its interaction with Time to enforce contracts (from the WB) is insignificant throughout. Interactions of T1 capital ratio with Net recovery loss (from the EBA) and with Recovery loss (from the WB), however, are both negatively significant in some regressions, suggesting some complementarity. Overall, the results from estimating specification (2) when we use the EBA measures of loan efficiency are more consistent with our hypotheses as set out in section 3. In our analysis, the EBA loan enforcement data could be more informative, as they vary by firm size category and reflect recoveries of all corporate debts, rather than only of real estate debt as in the WB survey.

4.2 The joint effect of loan recovery and the business cycle on firm outcomes

In this section we show the results of estimating specification (2) to test whether the state of the business cycle differentially affects firms depending on loan enforcement efficiency and on whether firms are zombie firms. In particular, we test whether loan enforcement inefficiency mitigates the negative consequences of an economic downturn on firm-level financial, real and bankruptcy outcomes, especially in the case that a firm is characterized as a zombie firm. This hypothesis is consistent with a negative (positive) estimated coefficient for the triple interaction $G_t * R_{ict} * Z_{it}$ in specification (2) if the dependent variable is debt, employment or sales growth (a default dummy). To focus on our main hypotheses and for brevity, in the tables we only report the estimated coefficients for the triple interaction $G_t * R_{ict} * Z_{it}$.

To start, the dependent variable in regressions 1–3 of Table 6, Panel A, is Debt growth. In regression 1 the included triple interaction is EU GDP growth * Time to recovery * Zombie, yielding a negative coefficient of –0.0995 (significant at 10%). Thus, any negative impact of an economic downturn on debt growth is mitigated for zombie firms located in countries with lengthy loan enforcement. This is consistent with less capitalized banks continuing to provide credit to especially zombie firms in countries with lengthy loan enforcement during economic downturns. In regression 2, the triple interaction involving Net recovery loss is insignificant. In regression 3, which includes both triple interactions, the triple interaction involving Time to recovery is negative and significant, similarly to regression 1.

14 The variables Time to enforce contracts and Recovery loss from the WB survey are not estimated as they are subsumed by the country-year fixed effects.

Using the estimate of –0.115 for the triple interaction involving Time to recovery from regression 3, we can estimate to what extent a slower time to recovery mitigates the transmission of lower EU GDP growth leading to lower debt growth of zombie firms relative to non-zombies. In particular, a one-standard-deviation reduction in EU GDP growth of 0.00873 increases debt growth for zombie firms subject to a high Time to recovery of 4 years compared to a low Time to recovery of 1.8 years by 0.22% (=0.115*0.0087*2.2), which amounts to 0.99% (=0.0022/0.223) of the standard deviation of debt growth. This is a substantial differential effect for zombie firms subject to varying time to recovery relative to non-zombie firms.

In regressions 4–6, the dependent variable is Employment growth in regressions that are otherwise like regressions 1–3. In regression 5, the triple interaction EU GDP growth * Net recovery loss * Zombie receives a negative coefficient that is significant at 10%. Thus, any negative implications of an economic downturn on employment growth are estimated to be relatively small for zombie firms located in countries with high recovery losses. This is consistent with those firms getting relatively higher bank financing that enables them to maintain a relatively high level of employment. Considering the sales growth regressions 7–9, we find that EU GDP growth * Net recovery loss * Zombie receives a negative coefficient (significant at 10%) in regression 8. This finding is consistent with the employment growth regression (5), as we expect employment growth and sales growth to move together.

As a robustness check, we replace the EU growth rate variable in the regressions of Tables 6, Panel A, by the variable Positive EU GDP growth, which is a dummy variable that equals one if EU GDP growth is positive, and zero otherwise. The EU experienced positive GDP growth in all years during 2009–2019, except for the years 2009 and 2012. As reported in Panel B of Table 6, the triple interaction Positive EU GDP growth * Time to recovery * Zombie is estimated to be significantly negative in the employment growth regressions 4 (at 5%) and 6 (at 10%), and in the sales growth regression 7 (at 10%), indicating that zombie firms tended to have relatively higher employment and sales growth during years of negative EU growth if located in countries with tardier loan enforcement. This triple interaction is insignificant in the debt growth regressions 1 and 3, unlike in Panel A.

Our finding that zombie firms located in countries with inefficient loan recovery experience smaller contractions if EU GDP growth is lower suggests that the rate of bankruptcy of these firms could be differentially affected by economic downturns as well. Specifically, we expect higher debt and real activity growth to coincide with a lower bankruptcy rate. To test this, we estimate specification (2) for the case where the dependent variable is a dummy variable reflecting the default status of the firm.[15] The results are reported in Table 7, Panel A. In regression 1, the term EU GPD growth * Time to recovery * Zombie receives a positive coefficient (significant at 1%), consistent with the notion that lower EU GDP growth causes a relative decline of the bankruptcy rate of zombie firms located in

15 Jacobson, Roszbach and Lindé (2013) examine the relationship between macroeconomic fluctuations and corporate defaults using Swedish data during 1990–2009.

countries with lengthier loan recovery procedures. In regression 2, EU GPD growth * Net recovery loss * Zombie is estimated to be positive (significant at 10%), suggesting that lower EU growth leads to relatively fewer bankruptcies for zombie firms potentially subject to lower loan recoveries. In regression 3, the term EU GPD growth * Time to recovery * Zombie is positive (significant at 10%), while EU GPD growth * Net recovery loss * Zombie is insignificant. Using the estimated coefficient of 0.180 for the triple interaction involving Time to recovery in regression 3, we see that a one-standard-deviation reduction in EU GDP growth of 0.00873 reduces the default rate of zombie firm located in a country with a Time to recovery of 4 years vs. in a country with a Time to recovery of 1.8 years by 0.35% (=0.180*0.00873*2.2) (relative to non-zombie firms), which is equivalent to 3.07% (=0.0035/0.114) of the standard deviation of the default variable of 0.114. Panel B reports analogous regressions including triple interactions that involve the Positive EU GDP growth dummy. In regressions 1 and 3, triple interactions including Time to recovery are positive and significant as in Panel A, but in regression 2 the triple interaction including Net recovery rate is no longer significant. Overall, Table 7 shows evidence that variation in loan recovery efficiency, and in particular the speed of loan recovery, has a material effect on the responsiveness of the default rate of zombie firms to the business cycle.

In a robustness check, we replace the firm-level zombie variable by the fraction of zombie firms in a given industry in a given year in the regressions of Panels A of Tables 6–7. Resulting regressions analogous to Table 6, Panel A, are reported as Table A5 in the Appendix, showing a significant coefficient for the triple interaction EU GDP growth * Time to recovery * Zombie industry in the debt growth regression 1 and in the sales growth regressions 7 and 9. Triple interactions are not significant in default regressions analogous to Table 7, Panel A, and these regressions are not reported.

To conclude, we re-estimated the regressions of Panels A of Tables 6–7 using the WB measures of loan enforcement, or alternatively using both the EBA and WB measures. The results are reported in Panels B and C of Table A3, and Panels B and C of Table A4, respectively. Table A3, Panel B, provides evidence that zombie firms experience relatively high debt and real activity growth rates in countries with lengthier loan enforcement (according to the WB survey) during economic downturns, while Table A3, Panel C, shows that zombie firms have lower default rates in this scenario. Turning to the results that include the enforcement indices from the two sources jointly, we see that in Table A4, Panel B, firms subject to lower loan recoveries (according to the WB measure) experience higher real activity growth rates during economic downturns. In Table A4, Panel C, triple interactions involving the EBA and WB measures of loan recovery are significantly positive (as in Table 7) and unexpectedly significantly negative in default regression 2, while triple interactions involving the EBA and WB measures of enforcement timeliness are both significantly positive in the default regression 3. Overall, estimation results using EBA loan enforcement data are more in line with the hypothesis that less efficient loan enforcement attenuates the transmission of the business cycle to zombie firm.

5. Conclusion

This paper provides evidence on how inefficient loan recovery affects the transmission of bank fragility and economic downturns to firms' borrowing and real activity using European data.

Specifically, we find that a firm experiences greater debt growth if it is tied to a bank with a low capitalization rate and located in a country with less efficient loan enforcement, indicated by a longer time to recovery and lower recovery proceeds based on EBA data on realized loan recoveries. This enhanced debt financing in this scenario has real implications, as we find that firms tied to weaker banks and located in countries with tardier and lower loan recovery realize higher employment and sales growth rates.

We further show that zombie firms tend to experience relatively higher debt growth if located in countries with slower loan enforcement during economic downturns proxied by lower EU GDP growth. With respect to real variables, we find that zombie firms generate relatively higher employment and sales growth during periods of low economic growth if located in countries with low loan recoveries. Furthermore, zombie firms display lower default rates in periods of lower growth if subject to longer loan recovery and lower loan recoveries. The implied lending to zombie firms, however, potentially comes at a significant cost, as zombie lending has previously been documented to create distortions and negative spillovers for non-zombie firms.

Several of these results are robust to using measures of loan enforcement efficiency available from the World Bank Doing Business survey instead of the EBA data. Specifically, using World Bank data we find that firms linked to weaker banks realize higher employment growth if located in countries with lower loan recoveries and, in addition, that zombie firms experience higher debt, sales and employment growth rates as well as lower default rates, if they reside in countries with lower economic growth and less efficient loan enforcement.

Overall, we find that inefficient loan enforcement mitigates the transmission of banking sector weakness and business cycle downturns to the financing, operations, and defaults of firms. European countries differ widely in both the EBA and World Bank measures of loan enforcement efficiency, implying a varied transmission of bank fragility and economic downturns to private sector financial and real variables. The European Commission (2022) has proposed to harmonize insolvency law in the EU to a common efficient standard. Adoption of this proposal would help to eliminate the current varied transmission of bank fragility and economic downturns to European firms documented in this paper.

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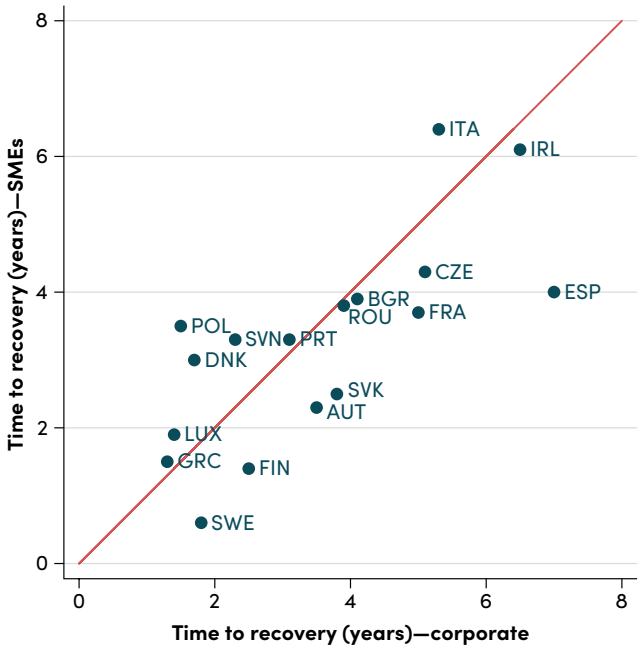
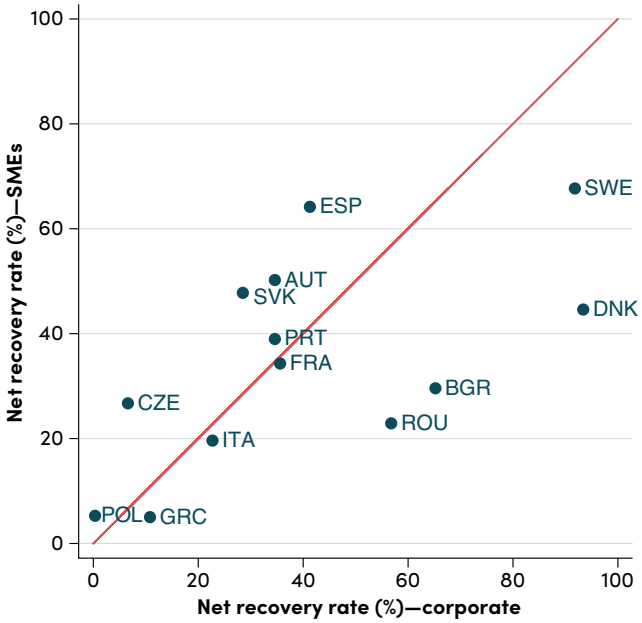
Figures and tables

FIGURE 1. Corporate and SME time to recovery



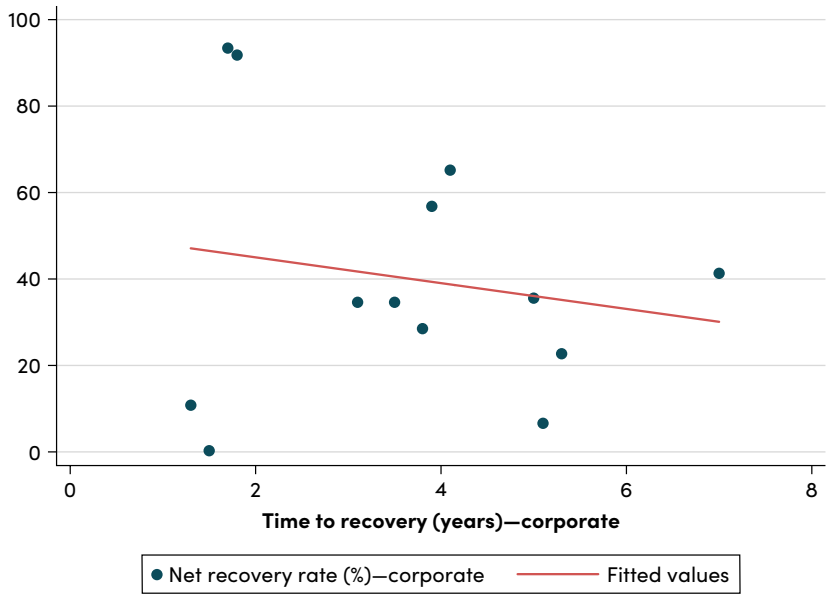
This graph shows the simple average of Time to recovery, which is the length of the recovery period in years, for each EU member state separately for SMEs and corporates. The red line represents the 45-degree line. Data are from EBA (2020).

FIGURE 2. Corporate and SME net recovery rates



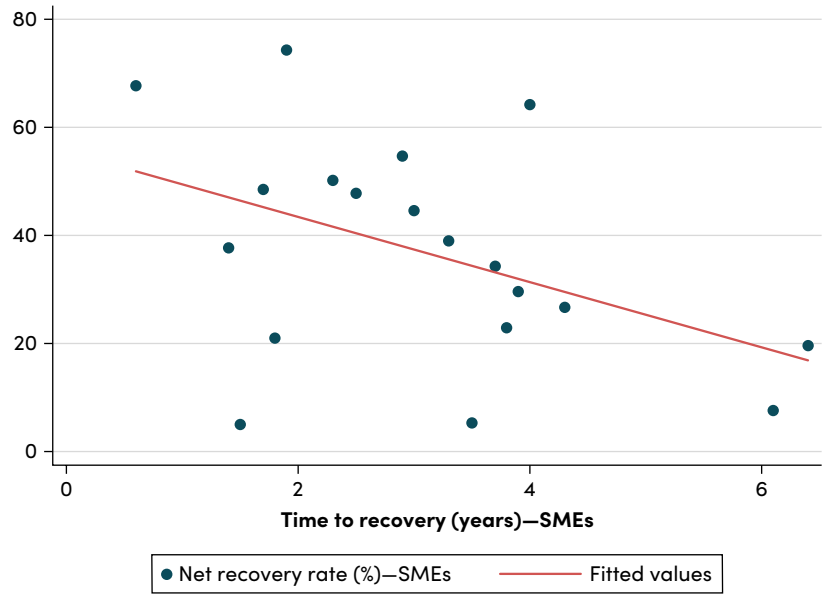
This graph shows the simple average Net recovery rate, measured as Net recovery amount / Notional amount outstanding at time of default, for each EU member state separately for SMEs and corporates. The red line represents the 45-degree line. Data are from EBA (2020).

FIGURE 3. Corporate time to recovery vs net recovery rates



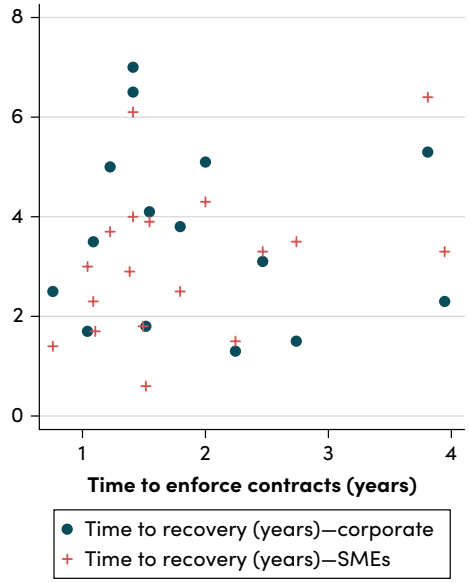
This graph shows the simple average of Time to recovery, which is length of the recovery period in years, for corporates in each EU member state plotted against the simple average of Net recovery rate, measured as the Net recovery amount/ Notional amount outstanding at time of default for corporates along with a regression line. Data are from EBA (2020).

FIGURE 4. SME time to recovery vs net recovery rates



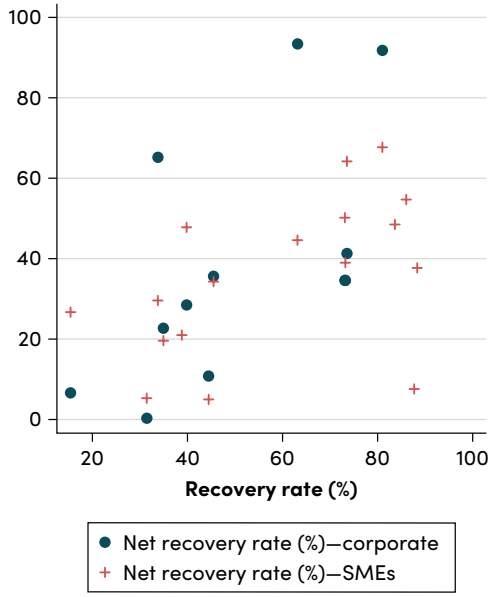
This graph shows the simple average of Time to recovery, which is the length of the recovery period in years, for SMEs in each EU member state plotted against the simple average Net recovery rate, measured as Net recovery amount/Notional amount outstanding at time of default for SMEs along with a regression line. Data are from EBA (2020).

FIGURE 5. Expected time to enforce contracts vs. actual time to recovery



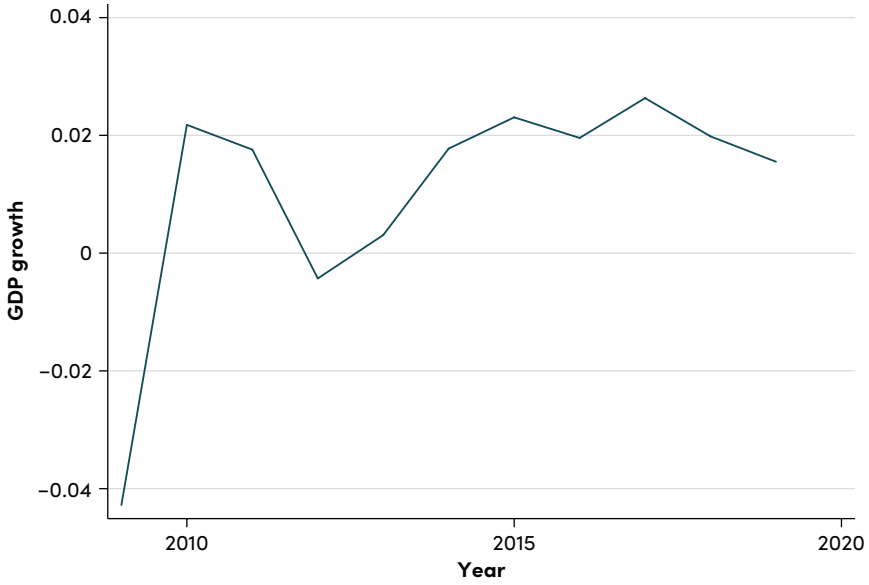
This graph shows the expected time to enforce contracts in years from the World Bank's Doing Business survey plotted against the simple average time to recovery, which is the length of the recovery period in years, separately for SMEs and corporates in each EU member state from the EBA (2020).

FIGURE 6. Expected vs. actual net recovery rates



This graph shows the expected recovery rate in case of insolvency in percentage points based on the World Bank's Doing Business survey plotted against the simple average of Net recovery rate, measure as actual Net recovery amount/Notional amount outstanding at time of default, separately for SMEs and corporates in each EU member state from the EBA (2020).

FIGURE 7. GDP growth in the European Union between 2009 and 2019



This graph shows the annual real GDP growth rates in the European Union between 2009 and 2019.

TABLE 1. Enforcement variables by country

Country	Time to Recovery (years)		Net Recovery Rate (%)		Time to Enforce Contracts (years)	Recovery Rate (%)
	Corporate	SMEs	Corporate	SMEs		
	(1)	(2)	(3)	(4)	(5)	(6)
Austria	3.5	2.3	34.6	50.2	1.1	73.1
Belgium		2.9		54.7	1.4	86.0
Bulgaria	4.1	3.9	65.2	29.6	1.5	33.8
Cyprus	2.2	4.1	15.9	23.7		
Czech Republic	5.1	4.3	6.6	26.7	2.0	15.4
Germany		1.7		48.5	1.1	83.6
Denmark	1.7	3	93.4	44.6	1.0	63.1
Spain	7	4	41.3	64.2	1.4	73.5
Estonia	1.1	2	53.8	29.5	1.2	36.6
Finland	2.5	1.4		37.7	0.8	88.3
France	5	3.7	35.6	34.3	1.2	45.5
Greece	1.3	1.5	10.8	5	2.2	44.5
Croatia	2.4	0.3	27.4	20	1.5	28.8
Hungary		1.8		21	1.5	38.8
Ireland	6.5	6.1		7.6	1.4	87.7
Italy	5.3	6.4	22.7	19.6	3.8	34.9
Lithuania		3.2		53.7	0.6	34.3
Luxembourg	1.4	1.9		74.3		
Latvia		2.2		51.9	0.8	35.7
Malta	5.7	5.3		33.1		
Netherlands	1.4	1.8	67.5	63.3	1.4	87.8
Poland	1.5	3.5	0.3	5.3	2.7	31.4
Portugal	3.1	3.3	34.6	39	2.5	73.2
Romania	3.9	3.8	56.8	22.9		
Slovakia	3.8	2.5	28.5	47.8	1.8	39.8
Slovenia	2.3	3.3			3.9	41.6
Sweden	1.8	0.6	91.8	67.7	1.5	81.0
EU27	3.3	3	41.6	39.6		

Data in columns 1–4 are from EBA (2020). Data are not shown if the number of observations is below 5. EU27 is the average of country averages for the EU27 from Table 1 in EBA (2020). Data in columns 5–6 are from the World Bank Doing Business database for the year 2014.

TABLE 2. Descriptive statistics

Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level based on EBA data. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level based on EBA data. Time to enforce contracts measures the time to enforce contracts in years based on WB survey data. Recovery loss is 100—Recovery rate in percentage points based on WB survey data. Debt growth is the annual change in total liabilities relative to lagged total assets. Employment growth is the annual log change in the number of employees. Sales growth is the annual log change of turnover. Default is a dummy variable indicating that the firm is in default in the last year when it is observed and zero in other years and for non-defaulting firms. T1 capital ratio is the Tier 1 regulatory capital ratio of a firm's bank. GIIPS exposure is sum of sovereign debt exposures issued by Greece, Ireland, Italy, Portugal and Spain as of March 31, 2010, relative to risk-weighted assets at the end of 2009. Asset redeployability is a measure of the salability of the assets of a company in a given three-digit SIC industry in a given year from Kim and Kung (2017). SME is a dummy variable indicating firms with fewer than 250 employees and with total assets less than €50 million. Zombie is a dummy variable indicating that a firm is a zombie firm based on the definition of de Jonghe, Mulier and Samarin (2021). Zombie industry is the fraction of zombie firms in an industry in a given year in a given country where firms are labeled as zombies based on their interest coverage ratios. EU GDP growth is the annual real GDP growth in the European Union. Size, Leverage, Net worth, and Tangibility are firm-year level control variables. Detailed variable definitions can be found in Table A1 in the Appendix.

Variable	Observations	Mean	SD	Min	Max
Time to recovery	4,465,663	3.597	1.774	0.300	7.000
Net recovery loss	4,416,262	61.280	18.650	6.600	99.700
Time to enforce contracts	4,195,115	1.887	0.795	0.822	4.688
Recovery loss	4,195,115	32.280	16.040	9.735	79.120
Debt growth	4,441,922	0.0460	0.223	−0.424	1.142
Employment growth	4,465,663	0.0231	0.172	−0.560	0.677
Sales growth	3,657,277	0.0475	0.255	−0.794	1.073
Default	4,465,663	0.0132	0.114	0.000	1.000
T1 capital ratio	1,776,177	0.131	0.0253	0.0859	0.223
GIIPS exposure	1,042,813	0.105	0.0676	0,000	0.285
Size	4,465,663	14.53	1.543	10.75	19.05
Leverage	4,465,663	0.597	0.250	0.0520	0.992
Net worth	4,465,663	0.260	0.256	−0.420	0.856
Tangibility	4,465,663	0.316	0.249	0.000	0.939
Asset redeployability	1,847,017	0.427	0.0972	0.0687	0.600
SME	4,465,663	0.956	0.206	0.000	1.000
Zombie	2,057,969	0.0503	0.219	0.000	1.000
Zombie industry	4,121,504	0.0254	0.0199	0.000	1.000
EU GDP growth	4,465,663	0.0165	0.00873	−0.00429	0.0263

TABLE 3. Firm financing, loan enforcement and bank regulatory capital

The dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level. T1 capital ratio is the Tier 1 regulatory capital ratio of a firm's bank. Asset redeployability is a measure of the salability of the assets of a company in a given three-digit SIC industry in a given year from Kim and Kung (2017). All regressions include the following firm-year level variables: SME, Size, Leverage, Net worth, Tangibility and an interaction between T1 capital ratio and SME. Detailed variable definitions can be found in Table A1 in the Appendix. Regressions 1 to 3 and 7 to 9 include country-year, firm and bank-year fixed effects. In regressions 4 to 6 country-year fixed effects are replaced by country-year-industry-interest coverage ratio (IC) quartile fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Time to recovery	0.0116***		0.0112**	0.0157***		0.0142***	0.0111***		0.0103**
	(6.45)		(3.06)	(7.63)		(7.11)	(5.72)		(2.64)
Time to recovery * T1 capital ratio	−0.0627**		−0.0606***	−0.0752***		−0.0612***	−0.0639**		−0.0604***
	(−2.61)		(−4.16)	(−3.98)		(−5.16)	(−2.76)		(−3.87)
Net recovery loss		0.00125***	0.000872*		0.00142***	0.000760**		0.00121***	0.000902*
		(6.15)	(1.91)		(8.74)	(2.35)		(5.54)	(1.87)
Net recovery loss * T1 capital ratio		−0.00773***	−0.00646***		−0.00794***	−0.00601***		−0.00781***	−0.00655***
		(−3.40)	(−3.48)		(−5.81)	(−4.57)		(−3.26)	(−3.41)
Asset redeployability							−0.106	−0.111	−0.111
							(−1.49)	(−1.45)	(−1.48)
Asset redeployability * T1 capital ratio							0.408	0.441	0.442
							(1.64)	(1.71)	(1.71)
Observations	1747134	1711258	1711258	1289302	1262502	1262502	1708163	1673016	1673016
Adjusted R-squared	0.305	0.305	0.305	0.320	0.321	0.321	0.304	0.305	0.305
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	–	–	–	Yes	Yes	Yes
Country-industry-IC Quartile FE	No	No	No	Yes	Yes	Yes	No	No	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 4. Firm financing, loan enforcement and bank regulatory capital—instrumental variable estimations

The dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. T1 capital ratio is the Tier 1 regulatory capital ratio of a firm's bank, and is instrumented by a bank's holdings of sovereign debt issued by GIIPS (Greece, Ireland, Italy, Portugal and Spain) countries as of March 31, 2010, relative to its risk-weighted assets. All regressions include the following firm-year level variables: SME, Size, Leverage, Net worth, Tangibility and an interaction between T1 capital ratio and SME. Detailed variable definitions can be found in Table A1 in the Appendix. Regressions 1 to 3 include country and bank fixed effects. In regressions 4 to 6 country fixed effects are replaced by country-industry-interest coverage ratio (IC) quartile fixed effects. In regressions 1 and 4, 2 and 5, and 3 and 6 the sample includes observations in 2010, 2011 and 2012, respectively. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

	2010	2011	2012	2010	2011	2012
	(1)	(2)	(3)	(4)	(5)	(6)
Time to recovery	0.0407*	0.0314**	0.0225	0.0312	0.0400***	0.0219
	(1.94)	(2.41)	(0.94)	(1.57)	(3.69)	(0.85)
Time to recovery * T1 capital ratio	−0.00322	−0.00294**	−0.00212	−0.00346*	−0.00358***	−0.00226
	(−1.43)	(−2.50)	(−0.97)	(−2.06)	(−3.13)	(−0.93)
Observations	11745	52288	103054	9858	43572	74762
Adjusted R-squared	0.016	0.016	0.017	0.019	0.016	0.019
Underid. test (p-value)	0.0337	0.0158	0.0672	0.0742	0.0967	0.0234
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	–	–	–
Country-industry-IC Quartile FE	No	No	No	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 5. Firm real outcomes, loan enforcement and bank regulatory capital

In Panels A and B the dependent variable is Employment growth, defined as the annual log change in the number of employees, in regressions 1 to 3. In regressions 4 to 6 the dependent variable is Sales growth, defined as the annual log change of turnover. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level. T1 capital ratio is the Tier 1 regulatory capital ratio of a firm's bank. Regressions include the following firm-year level variables: SME, Size, Leverage, Net worth, Tangibility and an interaction between T1 capital ratio and SME. Detailed variable definitions can be found in Table A1 in the Appendix. In Panel A all regressions include country-year, firm and bank-year fixed effects. In Panel B country-year fixed effects are replaced by country-year-industry-interest coverage ratio (IC) quartile fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A	**Employment Growth**			**Sales Growth**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Time to recovery	0.000339		0.00133	0.00591		0.0102*
	(0.21)		(0.35)	(1.38)		(2.09)
Time to recovery * T1 capital ratio	−0.0183*		−0.0168	−0.0568*		−0.0600*
	(−1.92)		(−1.22)	(−2.00)		(−2.12)
Net recovery loss		0.0000902	0.000106		0.000684**	0.000397
		(0.58)	(0.35)		(2.76)	(1.74)
Net recovery loss * T1 capital ratio		−0.00284***	−0.00249**		−0.00795***	−0.00685***
		(−3.44)	(−2.61)		(−9.01)	(−10.81)
Observations	1748036	1712080	1712080	1569023	1534635	1534635
Adjusted R-squared	0.136	0.136	0.136	0.164	0.164	0.164
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 5. (Continued)

Panel B	Employment Growth			Sales Growth		
	(1)	(2)	(3)	(4)	(5)	(6)
Time to recovery	0.00245*		0.00332	0.0102		0.00981
	(1.85)		(0.90)	(1.83)		(1.09)
Time to recovery * T1 capital ratio	−0.000247**		−0.000236	−0.000715***		−0.000621
	(−3.05)		(−1.25)	(−4.84)		(−1.62)
Net recovery loss		−0.0000606	−0.000168		0.000599*	0.000248
		(−0.52)	(−0.60)		(2.02)	(1.00)
Net recovery loss * T1 capital ratio		−0.0000106	−0.00000331		−0.0000498***	−0.0000311**
		(−1.38)	(−0.46)		(−14.45)	(−2.75)
Observations	1289747	1262879	1262879	1236970	1211353	1211353
Adjusted R-squared	0.165	0.165	0.165	0.225	0.226	0.226
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes
Country-year-industry-IC Quartile FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 6. Debt growth, firm real outcomes, loan enforcement and zombie firms over the business cycle

In Panels A and B the dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets, in regressions 1 to 3. In regressions 4 to 6 the dependent variable is Employment growth, defined as the annual log change in the number of employees. In regressions 7 to 9 the dependent variable is Sales growth, defined as the annual log change of turnover. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level. EU GDP growth is the annual real GDP growth in the European Union. Positive EU GDP growth is a dummy variable indicating that the annual real GDP growth in the European Union is positive. All regressions include the following firm-year level controls: SME, Zombie, Size, Leverage, Net worth, Tangibility. Regressions include double interactions of EU GDP growth in Panel A and Positive EU GDP growth in Panel B, Zombie and Time to recovery and/or Net recovery loss, and interactions of SME with EU GDP growth in Panel A and Positive EU GDP growth in Panel B, the pertinent loan enforcement variable and their product. Detailed variable definitions can be found in Table A1 in the Appendix. All regressions include country-year, firm and bank-year fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A	**Debt Growth**			**Employment Growth**			**Sales Growth**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
EU GDP growth * Time to recovery * Zombie	−0.0995*		−0.115*	−0.120		−0.0495	−0.167		−0.0453
	(−2.03)		(−2.10)	(−1.13)		(−0.34)	(−1.49)		(−0.20)
EU GDP growth * Net recovery loss * Zombie		−0.00242	0.00223		−0.0193*	−0.0170		−0.0232*	−0.0234
		(−0.88)	(0.71)		(−2.05)	(−1.43)		(−2.09)	(−1.32)
Observations	1946927	1923050	1923050	1955988	1932026	1932026	1863240	1841143	1841143
Adjusted R-squared	0.263	0.264	0.264	0.054	0.053	0.053	0.057	0.057	0.057
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	No	No	No	No	No	No	No	No	No

TABLE 6. (Continued)

Panel B	Debt Growth			Employment Growth			Sales Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Positive EU GDP growth * Time to recovery * Zombie	−0.0000858		−0.0000530	−0.00554**		−0.00552*	−0.00890*		−0.00857
	(−0.07)		(−0.04)	(−2.69)		(−2.28)	(−2.30)		(−1.76)
Positive EU GDP growth * Net recovery rate * Zombie		−0.0000927	−0.0000673		−0.000333	−0.000208		−0.000247	−0.000149
		(−1.26)	(−0.90)		(−1.40)	(−1.06)		(−0.69)	(−0.44)
Observations	1946927	1923050	1923050	1955988	1932026	1932026	1863240	1841143	1841143
Adjusted R-squared	0.263	0.264	0.264	0.054	0.053	0.053	0.057	0.057	0.057
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 7. Default and zombie firms over the business cycle

In Panels A and B, the dependent variable is Default, which is a dummy variable indicating that the firm is in default in the last year when it is observed and zero in other years and for non-defaulting firms. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level. EU GDP growth is the annual real GDP growth in the European Union. Positive EU GDP growth is a dummy variable indicating that the annual real GDP growth in the European Union is positive. All regressions include the following firm-year level controls: SME, Zombie, Size, Leverage, Net worth, Tangibility. Regressions include double interactions of EU GDP growth in Panel A and Positive EU GDP growth in Panel B, Zombie and Time to recovery and/or Net recovery loss, and interactions of SME with EU GDP growth in Panel A and Positive EU GDP growth in Panel B, the pertinent loan enforcement variable and their product. Detailed variable definitions can be found in Table A1 in the Appendix. All regressions include country-year and firm fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A	**(1)**	**(2)**	**(3)**
EU GDP growth * Time to recovery * Zombie	0.250***		0.180*
	(6.40)		(2.24)
EU GDP growth * Net recovery loss * Zombie		0.0187*	0.0125
		(2.25)	(1.36)
Observations	1955988	1932026	1932026
Adjusted R-squared	0.131	0.132	0.132
Firm controls	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Panel B	**(1)**	**(2)**	**(3)**
Positive EU GDP growth * Time to recovery * Zombie	0.00718***		0.00610***
	(5.22)		(4.20)
	(1.81)		(4.84)
Positive EU GDP growth * Net recovery rate * Zombie		0.000356	0.000238
		(1.72)	(1.38)
Observations	1955988	1932026	1932026
Adjusted R-squared	0.131	0.131	0.131
Firm controls	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

Appendix

TABLE A1. Variable definitions

Variable	Definition	Source
Net recovery loss	Simple average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level	EBA
Time to recovery	Simple average of the length of the recovery period in years at the EU member state level	EBA
Recovery loss	1—Recovery rate in percent	World Bank Doing Business Database
Time to enforce contracts	Time to enforce contracts in years	World Bank Doing Business Database
Debt growth	Annual change in total liabilities relative to lagged total assets.	Amadeus
Employment growth	Annual log change in the number of employees.	Amadeus
Sales growth	Annual log change of turnover	Amadeus
Default	Dummy variable indicating that the firm is in default in the last year when it is observed, and zero otherwise (including the years prior to the last observed year regardless of the default status of a firm). A firm is taken to be in default if its legal status is not "Active".	Amadeus
T1 capital ratio	Tier 1 regulatory capital ratio.	SNL
GIIPS exposure	Sum of sovereign debt exposures issued by Greece, Ireland, Italy, Portugal and Spain, net of cash short positions as of March 31, 2010, relative to risk-weighted assets as end of 2009.	EBA, SNL
EU GDP growth	Annual growth rate of the chain-linked volume of GDP at market prices in the European Union.	Eurostat
Size	Natural logarithm of total assets	Amadeus
Leverage	Total liabilities/total assets	Amadeus
Net worth	(Total equity—cash)/total assets	Amadeus
Tangibility	Fixed assets/total assets	Amadeus
Asset redeployability	A measure of the salability of the assets of a company in a given three-digit SIC industry in a given year from Kim and Kung (2017).	Kim and Kung (2017)
SME	Dummy variable indicating firms with fewer than 250 employees and with total assets less than €50 million	Amadeus
Zombie	Dummy variable indicating that a firm is a zombie based on the definition of de Jonghe, Mulier and Samarin (2021). A firm is classified a zombie firm if (i) the firm's 3-year accumulated cash flows falls below its 3-year accumulated interest expenses, (ii) yearly cash flows are below interest expenses in at least 2 of these 3 years, and (iii) the firm is at least 10 years old.	Amadeus
Zombie industry	The fraction of zombie firms in an industry in a given year in a given country. A zombie firm is defined as a firm that has an interest coverage ratio in the bottom 25% in the sample (separately for firms with below and above median current liabilities to total liabilities ratios) and has a lower interest expense/ total liabilities ratio than the median safe firm. Safe firms are defined as firms with interest coverage ratios in the top 25% in the relevant sample.	Amadeus

TABLE A2. Number of firms switching SME status

Columns 2, 3 and 4 show the total number of firms, SMEs and the fraction of SMEs in our sample for each year, respectively. Column 5 (7) shows the number of firms exiting (entering) SME status in our sample. Column 6 (8) shows the number of firms exiting (entering) SME status in our sample relative to the total number of firms in a given year.

Year	Number of Firms	Number of SMEs	Fraction of SMEs	Firms Exiting SME Status		Firms Entering SME Status	
				Number	Fraction	Number	Fraction
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2010	11,182	10,556	94.4%				
2011	52,571	49,386	93.9%	36	0.1%	33	0.1%
2012	109,239	103,374	94.6%	151	0.1%	186	0.2%
2013	112,488	106,516	94.7%	280	0.2%	309	0.3%
2014	115,634	109,377	94.6%	376	0.3%	225	0.2%
2015	128,835	121,443	94.3%	419	0.3%	237	0.2%
2016	139,208	130,904	94.0%	529	0.4%	253	0.2%
2017	161,412	151,922	94.1%	588	0.4%	280	0.2%
2018	170,893	160,627	94.0%	674	0.4%	304	0.2%
2019	164,048	154,053	93.9%	633	0.4%	357	0.2%

TABLE A3. Debt growth, firm real outcomes, default and survey-based loan enforcement measures

In regressions 1 to 3 of Panel A the dependent variable is Employment growth, defined as the annual log change in the number of employees. In regressions 4 to 6 of Panel A the dependent variable is Sales growth, defined as the annual log change of turnover. In regressions 1 to 3 of Panel B the dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets. In regressions 4 to 6 of Panel B the dependent variable is Employment growth. In regressions 6 to 9 of Panel B the dependent variable is Sales growth. In all regressions of Panel C the dependent variable is Default, a dummy variable indicating that the firm is in default in the last year when it is observed and zero in other years and for non-defaulting firms. Time to enforce contracts measures the time to enforce contracts in years based on World Bank survey data. Recovery loss is 100—Recovery rate in percentage points based on World Bank survey data. EU GDP growth is the annual real GDP growth in the European Union. All regressions include the following firm-year level controls: SME, Zombie, Size, Leverage, Net worth, Tangibility. Additional interaction variables as in Tables 6 and 7 are not reported. Detailed variable definitions can be found in Table A1 in the Appendix. All regressions include country-year, firm and bank-year fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A	**Employment Growth**			**Sales Growth**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Time to enforce contracts * T1 capital ratio	0.0483		0.0431	0.0593		0.0543
	(1.18)		(1.23)	(1.67)		(1.55)
Recovery loss * T1 capital ratio		−0.00298***	−0.00289***		−0.00186	−0.00163
		(−8.10)	(−6.27)		(−0.78)	(−0.63)
Observations	1782479	1782479	1782479	1600608	1600608	1600608
Adjusted R-squared	0.137	0.137	0.137	0.163	0.163	0.163
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE A3. (Continued)

Panel B	Debt Growth			Employment Growth			Sales Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EU GDP growth * Time to enforce contracts * Zombie	−0.157*		−0.268**	−0.409*		−0.451**	−0.336		−0.413**
	(−2.22)		(−2.94)	(−1.97)		(−2.51)	(−1.69)		(−2.34)
EU GDP growth * Recovery loss * Zombie		0.00447	0.0146		−0.0124	0.00329		−0.00527	0.00805
		(0.59)	(1.34)		(−0.85)	(0.25)		(−0.30)	(0.51)
Observations	1901429	1901429	1901429	1910490	1910490	1910490	1813043	1813043	1813043
Adjusted R-squared	0.262	0.262	0.262	0.049	0.049	0.049	0.053	0.053	0.053
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C	(1)	(2)	(3)
	Default	Default	Default
EU GDP growth * Time to enforce contracts * Zombie	0.457**		0.592***
	(2.47)		(4.62)
EU GDP growth * Recovery loss * Zombie		0.00503	−0.0161
		(0.43)	(−1.63)
Observations	1910490	1910490	1910490
Adjusted R-squared	0.130	0.130	0.130
Firm controls	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

TABLE A4. Debt growth, firm real outcomes, default and survey-based vs. realized loan enforcement measures

In regressions 1 to 3 of Panel A the dependent variable is Employment growth, defined as the annual log change in the number of employees. In regressions 4 to 6 of Panel A the dependent variable is Sales growth, defined as the annual log change of turnover. In regressions 1 to 3 of Panel B the dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets. In regressions 4 to 6 of Panel B the dependent variable is Employment growth. In regressions 6 to 9 of Panel B the dependent variable is Sales growth. In all regressions of Panel C the dependent variable is Default, a dummy variable indicating that the firm is in default in the last year when it is observed and zero in other years and for non-defaulting firms. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level based on EBA data. Time to enforce contracts measures the time to enforce contracts in years based on World Bank survey data. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level based on EBA data. Recovery loss is 100—Recovery rate in percentage points based on World Bank survey data. EU GDP growth is the annual real GDP growth in the European Union. All regressions include the following firm-year level controls: SME, Zombie, Size, Leverage, Net worth, Tangibility. Additional interaction variables as in Tables 6 and 7 are not reported. Detailed variable definitions can be found in Table A1 in the Appendix. All regressions include country-year, firm and bank-year fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A	**Employment Growth**			**Sales Growth**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Time to recovery	0.000298		0.00136	0.00615		0.00837
	(0.18)		(0.39)	(1.38)		(1.81)
Time to recovery * T1 capital ratio	−0.0182*		−0.0170	−0.0574*		−0.0471
	(−1.85)		(−1.31)	(−2.11)		(−1.77)
Time to enforce contracts * T1 capital ratio	0.0421		0.0160	0.0634		0.149
	(0.89)		(0.16)	(1.26)		(1.57)
Net recovery loss		0.0000451	0.0000693		0.000717**	0.000586**
		(0.30)	(0.28)		(2.77)	(2.83)
Net recovery loss * T1 capital ratio		−0.00250**	−0.00222		−0.00820***	−0.00822***
		(−2.53)	(−1.36)		(−9.06)	(−8.66)
Recovery loss * T1 capital ratio		−0.00203*	−0.00232*		0.00193	0.000424
		(−2.15)	(−2.17)		(0.65)	(0.12)
Observations	1747701	1711803	1711803	1568704	1534372	1534372
Adjusted R-squared	0.136	0.136	0.136	0.164	0.164	0.164
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Interaction with SME	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-year FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE A4. (Continued)

Panel B	Debt Growth			Employment Growth			Sales Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EU GDP growth * Time to recovery * Zombie	−0.0899		−0.0845	−0.0137		−0.0405	−0.0981		−0.0378
	(−1.40)		(−1.60)	(−0.10)		(−0.27)	(−0.45)		(−0.15)
EU GDP growth * Time to enforce contracts * Zombie	−0.0540		−0.264	−0.408		−0.206	−0.278		0.0920
	(−0.49)		(−1.06)	(−1.38)		(−0.57)	(−0.64)		(0.22)
EU GDP growth * Net recovery loss * Zombie		−0.00677	0.00717		−0.0221**	−0.0134		−0.0307***	−0.0320**
		(−1.38)	(0.74)		(−2.33)	(−1.06)		(−4.03)	(−2.31)
EU GDP growth * Recovery loss * Zombie		0.0132	0.0101		0.0119	0.0132		0.0270	0.0223*
		(0.97)	(0.71)		(0.85)	(1.15)		(1.80)	(1.99)
Observations	1823834	1799957	1799957	1832895	1808933	1808933	1740159	1718062	1718062
Adjusted R-squared	0.262	0.263	0.263	0.048	0.047	0.047	0.052	0.052	0.052
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE A4. (Continued)

Panel C	(1)	(2)	(3)
	Default	Default	Default
EU GDP growth * Time to recovery * Zombie	0.192**		0.141**
	(2.83)		(2.50)
EU GDP growth * Time to enforce contracts * Zombie	0.246		0.438**
	(1.42)		(3.27)
EU GDP growth * Net recovery loss * Zombie		0.0241**	−0.000134
		(2.76)	(−0.01)
EU GDP growth * Recovery loss * Zombie		−0.0228*	−0.0100
		(−1.95)	(−1.16)
Observations	1832895	1808933	1808933
Adjusted R-squared	0.128	0.129	0.129
Firm controls	Yes	Yes	Yes
Full set of interactions	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

TABLE A5. Debt growth, firm real outcomes, loan enforcement and zombie industries over the business cycle

In regressions 1 to 3 the dependent variable is Debt growth, which is the annual change in total liabilities relative to lagged total assets. In regressions 4 to 6 the dependent variable is Employment growth, defined as the annual log change in the number of employees. In regressions 7 to 9 the dependent variable is Sales growth, defined as the annual log change of turnover. Time to recovery is the unweighted average of the length of the recovery period in years at the EU member state level. Net recovery loss is the unweighted average of 1—Net recovery amount/Notional amount outstanding at time of default in percent at the EU member state level. EU GDP growth is the annual real GDP growth in the European Union. All regressions include the following firm-year level controls: SME, Zombie industry, Size, Leverage, Net worth, Tangibility. Additional interaction variables as in Table 6 are not reported. Detailed variable definitions can be found in Table A1 in the Appendix. All regressions include country-year, firm and bank-year fixed effects. In all regressions the sample period is 2009–2019. Standard errors are two-way clustered at the country and year levels. *, **, and *** denote significance at 10%, 5%, and 1%.

	Debt Growth			Employment Growth			Sales Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EU GDP growth * Time to recovery * Zombie industry	–2.877*		–2.704	0.344		0.556	–7.049*		–6.930*
	(–1.87)		(–1.54)	(0.40)		(0.49)	(–2.25)		(–2.25)
EU GDP growth * Net recovery rate * Zombie industry		–0.142	–0.0283		–0.0567	–0.0593		–0.338	–0.0687
		(–1.08)	(–0.24)		(–0.56)	(–0.58)		(–1.19)	(–0.27)
Observations	3925128	3877809	3877809	3948018	3900537	3900537	3339510	3295549	3295549
Adjusted R-squared	0.292	0.292	0.292	0.060	0.059	0.059	0.104	0.104	0.104
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interactions with SME	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes