Relationship lending and employment decisions in firms' bad times

Online Appendix

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A1 Evidence from the years of the financial crisis

Our baseline analysis excludes the years of the global financial crisis (2007-2009). The shocks related to the global recession are, in fact, different in nature with respect to the idiosyncratic drop in sales turnover considered in our baseline specification. More importantly, during this period, Italian banks suffered from capital and liquidity problems that impaired their lending capacity and produced a severe credit crunch for firms, especially if borrowing from transactional lenders (Bonaccorsi di Patti and Sette, 2012; Presbitero et al., 2014; Sette and Gobbi, 2015; Barone et al., 2018). All these effects may have a confounding impact that may alter our estimates. Indeed, when replicating the baseline analysis by using the EFIGE survey we find an average larger and significant impact of sales shocks on firms' employment, while the mitigating effect of relationship lending – i.e., the positive coefficient on the interaction term Rel length $\times$ Shock on sales 5% – is smaller and noisily estimated (Table A1). However, we abstain from a unique interpretation of these results, because, when considering possible differences in the role of relationship banking in a crisis period, it would be important to take into consideration the exposure of the main bank to the aggregate collapse. Unfortunately, our survey data does not provide information about the identity of the main bank and we cannot control for the exposure of the main bank to the aggregate collapse.

A2 IV strategy

In the spirit of Guiso et al. (2004) and Herrera and Minetti (2007), we propose an IV approach by instrumenting the length of the bank-firm relation (measured at the firm level) with variation in local banking markets (at the provincial level), which is related to banking regulation waves which occurred in Italy in the late 1930s.

The IV strategy relies on identifying exogenous restrictions on the local financial system that affect the firms' opportunity and availability of borrowing from a main bank on a relational basis but do not directly affect firms' decisions about workforce dynamics. To this end we exploit the 1936 Banking Law which subjected the Italian banking system to strict regulation of

entry and branch opening in provinces, freezing the size and bank-composition of the local credit market until the end of the 1980s. The rationale for using this regulatory event to instrument relationship length is the theoretical and empirical evidence showing that the likelihood of close bank-firm relationships depends on the concentration, size and organizational structure of local credit markets (Boot and Thakor, 2000; Elsas, 2005; Berger et al., 2005; Hauswald and Marquez, 2006; Berger et al., 2007; Presbitero and Zazzaro, 2011).

Based on the prevailing opinion that an excess of banking competition lay at the root of recurrent crises that plagued the Italian banking industry in the 1920s, the objective of the banking regulation was to enhance bank stability through severe restrictions on bank competition. The 1936 Banking Law imposed strict limits on the ability of different types of banking institutions to open new branches. Specifically, each bank type was attributed a geographical area of competence based on its presence in 1936, and its ability to grow and lend was restricted to that area. In particular, national banks could open branches only in the main cities; cooperative and local commercial banks could open branches within the boundaries of the province; savings banks could expand within the boundaries of the region. Guiso et al. (2004) demonstrate that the geographical distribution of bank branches in 1936 was broadly uncorrelated with the geography of economic development, and that it deeply impacted local credit markets in the decades that followed. Entry into the local markets was liberalized only during the 1990s.[1]

In practice, as instruments we use two indicators that Guiso et al. (2004) employ to characterize the local structure of the banking system in 1936: (i) the share of bank branches owned by local banks over total banks in the province in 1936 ($Z_{p,1}$), and (ii) the number of bank branches in the province per 100,000 inhabitants ($Z_{p,2}$) in 1936.[2] Notice that the instrumental variables are measured at the provincial level, and for this reason our IV regression analyses cannot incorporate province fixed effects. However, to control for geographical characteristics, we include a broader definition of geographical area in IV regressions interacted with year fixed

[1]Between 1936 and 1985, in Italy the total number of bank branches grew by 87 percent versus 1228 percent in the United States. By contrast, after deregulation, between the end of the 1980s and the late 1990s, the total number of branches grew by about 80 percent, almost double that in the United States.

[2]Source: the book "Struttura funzionale e territoriale del sistema bancario italiano 1936-1974" (SFT) by the Bank of Italy.

effects.[3] Furthermore, in line with the baseline strategy, the IV regressions also include sector-year fixed effects. We instrument the variables R_{it} and $R_{it} \times S_{it}$ with the identified instruments $Z_{p,1}$ and $Z_{p,2}$ and their interactions with the variable S_{it} used in the baseline estimates showed in equation (1). The two-stage-least-squares results are presented in Table A3. The columns (1) and (2) are from specifications that respectively do not and do include the vector of controls X_{it} and their interactions with the Shock on sales. Estimates of $\beta_{1,IV}$ and $\beta_{2,IV}$ appear to be qualitatively in line with the OLS results. In particular, the estimated $\beta_{2,IV}$ coefficient is always positive and statistically different from zero, confirming the robustness of our baseline estimates. Note that the magnitude of the estimated coefficients in Table A3 is not directly comparable to the OLS estimates; this is naturally due to the fact that IV strategy does not allow for the inclusion of province fixed effects and that the main variation, in the IV specifications, is mainly related to geographical-level variation.

First stage results are shown in Table A2; in columns (1) and (3) we display the estimates from the first stage equation where the lenght of the relationship is regressed on the excluded instruments, while in columns (2) and (4) the dependent variable is the interaction term between the lenght of the relationship and the shock on sales. Notice that, in line with the arguments by Herrera and Minetti (2007), we do not have a strong prior on the direction of the effect of our instruments on the strength of relationship lending as there exist conflicting arguments on whether financial development tends to weaken or reinforce existing credit relationships. First stage estimates display that the share of local bank branches in 1936 in the province have a strong negative impact on bank-firm relationship lenght, while total branches per 100,000 inhabitants in 1936 have a weaker positive effect. [4]

[3] Area dummies that identify the Italian macro-regions: North, Center and South.

[4] Table A3 shows that the F-statistics that are below the rule of thumb thresholds used in the literature. For this reason, we verify the robustness of our IV estimates to the LIML methodology (results available upon request).

A3 Additional results on capital expenditure

Table 12 in the main text shows that relationship lending has no moderating role on capital expenditure. To strengthen this result, we replicate the heterogeneity analysis in Table 11 by using capital expenditures scaled by tangible assets as dependent variable. Estimates in Panel A of Table A4 show that the interaction term between relationship lending and the shock on sales is not statistically different from zero for firms in the high-tech and traditional sectors, as well as for firms located in provinces where the share of pending trials in labor matters is above or below the median value. The triple interaction estimates in Panel B of Table A4 show a significant difference between high-tech vs no high-tech firms but, importantly, the sign of difference is opposite with respect to the results on employment displayed in Table 11.

Furthermore, following an empirical strategy in line with (Benmelech et al., 2021), we include capital expenditures scaled by tangible assets in our baseline regression in Table 2 as an additional regressor (column 1), and also its interaction with the shock on sales (column 2). Results in Table A5 display a positive and significant impact of capital expenditure on employment. Importantly, our coefficients of interest in Table 2 in the main text are confirmed after this additional control.

REFERENCES

Barone, G., G. De Blasio, and S. Mocetti (2018). The real effects of credit crunch in the great recession: evidence from Italian provinces. *Regional Science and Urban Economics 70*, 352–359.

Benmelech, E., N. K. Bergman, and A. Seru (2021). Financing labor. *Review of Finance 25*(5), 1365–1393.

Berger, A., N. Miller, M. Petersen, R. Rajan, and J. Stein (2005). Does function follow organizational form? Evidence from the lending practices of large and small banks. *Journal of Financial Economics 76*(2), 237–269.

Berger, A., R. Rosen, and G. Udell (2007). Does market size structure affect competition? The case of small business lending. *Journal of Banking and Finance 31*(1), 11–33.

Bonaccorsi di Patti, E. and E. Sette (2012). Bank balance sheets and the transmission of financial shocks to borrowers: Evidence from the 2007-2008 crisis. Working Paper 848, Bank of Italy.

Boot, A. W. and A. V. Thakor (2000). Can relationship banking survive competition? *The Journal of Finance 55*(2), 679–713.

Elsas, R. (2005). Empirical determinants of relationship lending. *Journal of Financial Intermediation 14*(1), 32–57.

Guiso, L., P. Sapienza, and L. Zingales (2004). Does local financial development matter? *Quarterly Journal of Economics 119*(3), 929–969.

Hauswald, R. and R. Marquez (2006). Competition and strategic information acquisition in credit markets. *Review of Financial Studies 19*(3), 967–1000.

Herrera, A. M. and R. Minetti (2007). Informed finance and technological change: Evidence from credit relationships. *Journal of Financial Economics 83*(1), 223–269.

Presbitero, A. F., G. F. Udell, and A. Zazzaro (2014). The Home Bias and the Credit Crunch: A Regional Perspective. *Journal of Money, Credit and Banking 46*(s1), 53–85.

Presbitero, A. F. and A. Zazzaro (2011). Competition and relationship lending: Friends or foes? *Journal of Financial Intermediation 20*(3), 387–413.

Sette, E. and G. Gobbi (2015). Relationship lending during a financial crisis. *Journal of the European Economic Association 13*(3), 453–481.

Table A1. Baseline estimates using Italian data from EFIGE survey

Dependent variable	(1) Growth rate (employment)	(2) Growth rate (employment)	(3) Growth rate (employment)
Relationship length (ln)	-0.053	-0.050	-0.045
	(0.040)	(0.038)	(0.033)
Rel length * Shock on sales 5% (0/1)	0.004	0.004*	0.004*
	(0.003)	(0.003)	(0.002)
Shock on sales 5% (0/1)	-0.154**	-0.154**	-0.296
	(0.062)	(0.063)	(0.302)
Total assets (ln)		0.003	-0.013
		(0.010)	(0.028)
Age		-0.000	-0.001
		(0.000)	(0.001)
Family		-0.053	-0.079
		(0.037)	(0.069)
Corporation		0.075**	0.136***
		(0.038)	(0.047)
ROE		0.222***	-0.365
		(0.055)	(0.460)
Business group		-0.006	0.040
		(0.034)	(0.098)
Total assets * Shock on sales 5% (0/1)			0.023
			(0.029)
Age * Shock on sales 5% (0/1)			0.000
			(0.001)
Family * Shock on sales 5% (0/1)			0.044
			(0.072)
Corporation * Shock on sales 5% (0/1)			-0.108
			(0.077)
ROE * Shock on sales 5% (0/1)			0.653
			(0.464)
Business group * Shock on sales 5% (0/1)			-0.068
			(0.106)
Sector dummies	Y	Y	Y
Province dummies	Y	Y	Y
Observations	1,102	1,098	1,098
R-squared	0.161	0.174	0.183

Note: The table shows estimates of the equation (1) using the sample of firms observed in the EFIGE survey. The dependent variable is measured by the yearly percentage change of the number of employees in the last year of each survey wave. The main explanatory variables are Shock on sales 5%, a dummy variable that takes the value equal to 1 if the yearly percentage change of sales in the last year of the survey is less than 5% and 0 otherwise, and Relationship length (ln), the natural logarithm of the years of relationship between the firm and its main bank. The other explanatory variables are defined in the data appendix. Robust standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A2. IV Regressions: First Stage

Dependent variable	(1) Relationship length (ln)	(2) Rel length * Shock on sales 5% (0/1)	(3) Relationship length (ln)	(4) Rel length * Shock on sales 5% (0/1)
Local branches 1936	-0.149**	0.003	-0.117*	0.003
	(0.059)	(0.005)	(0.063)	(0.007)
Total branches 1936	0.002**	-0.000*	0.002***	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Local branches * Shock on sales 5% (0/1)	-0.159	-0.298***	-0.129*	-0.241***
	(0.110)	(0.098)	(0.068)	(0.059)
Total branches 1936 * Shock on sales 5% (0/1)	-0.000	0.002	-0.000	0.002
	(0.002)	(0.002)	(0.002)	(0.001)
Firm controls	N	N	Y	Y
Firm controls * Shock on sales 5% (0/1)	N	N	Y	Y
Observations	13,482	13,482	13,036	13,036

Note: The table shows first stage estimates from the IV regression analysis. We use the following instrumental variables for the Relationship lenght (ln): Local branches 1936 (the number of branches of local banks in 1936 in the province where the firm operates per 100,000 inhabitants) and Total branches 1936 (the number of bank branches in 1936 in the province where the firm operates per 100,000 inhabitants). Moreover, we use as instrumental variables the interactions among Local branches 1936 and Total branches 1936 with Shock on sales 5% for the variable Relationship lenght (ln) interacted with the Shock on sales 5%. The firm-level controls in columns 3 and 4 include: Total assets (ln), Age, Family, Corporation, ROE and Business group. In columns 3 and 4, firm-level controls are interacted with the shock. The control variables are defined in the data appendix. Robust standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A3. IV regressions: Second Stage

Dependent variable	(1) Growth rate (employment)	(2) Growth rate (employment)
Relationship length (ln)	-0.082	-0.051
	(0.062)	(0.082)
Rel length * Shock on sales 5% (0/1)	0.160*	0.142*
	(0.088)	(0.075)
Shock on sales 5% (0/1)	-0.455**	-0.402**
	(0.226)	(0.171)
Firm controls	N	Y
Firm controls * Shock on sales 5% (0/1)	N	Y
Year * Area dummies	Y	Y
Year * Sector dummies	Y	Y
Observations	13,482	13,036
F instruments	4.058	4.190
Overident (test)	0.638	0.713
Overident (P-value)	0.727	0.700

Note: The table shows second stage estimates from the IV regression analysis. The dependent variable is the yearly percentage change in the number of employees in the last year of each survey wave. The main explanatory variables are Shock on sales 5%, a dummy variable that takes the value equal to 1 if the yearly percentage change of sales in the last year of the survey is less than 5% and 0 otherwise, and Relationship length (ln), the natural logarithm of the years of relationship between the firm and its main bank. Relationship length (ln) is instrumented with the variables Local Branches 1936 and Total Branches 1936 (estimates of the first stage regressions are reported in Table A2). The firm-level controls in column 2 include: Total assets (ln), Age, Family, Corporation, ROE and Business group. In column 2, firm-level controls are interacted with the shock. The control variables are defined in the data appendix. Robust standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A4. Heterogeneity analysis using capital expenditure

Panel A: Sub-sample estimations				
	High-skilled workers		Judicial efficiency	
	High-Tech	No High-Tech	Below median (pending trials)	Above median (pending trials)
Dependent variable	Capital expenditure	Capital expenditure	Capital expenditure	Capital expenditure
Relationship length (ln)	0.007	-0.012**	-0.004	-0.010*
	(0.008)	(0.005)	(0.006)	(0.006)
Rel length * Shock on sales 5% (0/1)	-0.018	0.008	-0.010	0.013
	(0.016)	(0.011)	(0.013)	(0.012)
Shock on sales 5% (0/1)	0.089	-0.138*	-0.066	0.023
	(0.119)	(0.074)	(0.080)	(0.097)
Firm controls	Y	Y	Y	Y
Firm controls * Shock on sales 5% (0/1)	Y	Y	Y	Y
Year * Province dummies	Y	Y	Y	Y
Year * Sector dummies	Y	Y	Y	Y
Observations	3,972	8,878	6,016	6,836
R-squared	0.221	0.186	0.244	0.113

Panel B: Interactions		
Dependent variable	Capital expenditure	Capital expenditure
Relationship length (ln)	-0.012***	-0.005
	(0.004)	(0.006)
Rel length * Shock on sales 5% (0/1)	0.011	-0.009
	(0.010)	(0.012)
Shock on sales 5% (0/1)	-0.072	-0.006
	(0.062)	(0.066)
Rel length * High Tech * Shock on sales 5% (0/1)	-0.029*	
	(0.016)	
Rel length * High Tech	0.016***	
	(0.004)	
High Tech * Shock on sales 5% (0/1)	0.057	
	(0.044)	
Rel length * Pend. trials above median (0/1) * Shock on sales 5% (0/1)		0.020
		(0.017)
Rel length * Pend. trials above median (0/1)		-0.005
		(0.008)
Pend. trials above median (0/1) * Shock on sales 5% (0/1)		-0.066
		(0.046)
Firm controls	Y	Y
Firm controls * Shock on sales 5% (0/1)	Y	Y
Year * Province dummies	Y	Y
Year * Sector dummies	Y	Y
Observations	12,850	12,852
R-squared	0.185	0.184

Note. Panel A shows estimates of the equation (1) on different subsamples. Estimates in column (1) display baseline results considering the subsample of companies that operate in the high-tech sector; estimates in column (2) display baseline results considering the subsample of companies that operate in sectors other than high-tech. Estimates in column (3) display baseline results considering the subsample of companies operating in provinces where the normalized number of pending labor-related trials is below the national median value, while estimates in column (4) display baseline results considering the subsample of companies operating in provinces where the normalized number of pending labor-related trials is above the national median value. Panel B shows estimates from a regression model that includes a triple interaction term between the Shock on sales 5%, Relationship length (ln) and different dimensions of firms' heterogenity. In column (1) the dimension of heterogenity regards firms' sector, and the triple interaction is with the variable High-tech, a dummy variable that takes value equal to 1 if companies operate in the high-tech sector and 0 otherwise. In column (3) the dimension of heterogenity regards judicial efficiency, and the triple interaction is with the variable Pending trials (above), a dummy variable that takes value equal to 1 if companies operate in a province where the number of pending labor-related trials is above the national median value and 0 otherwise. In Panel A and Panel B, the dependent variable is measured by capital expenditure scaled by tangible assets in the last year of each survey wave. The main explanatory variables are Shock on sales 5%, a dummy variable that takes the value equal to 1 if the yearly percentage change of sales in the last year of the survey is less than 5% and 0 otherwise, and Relationship length (ln), the natural logarithm of the years of relationship between the firm and its main bank. The firm-level controls include: Total assets (ln), Age, Family, Corporation, ROE and Business group. These explanatory variables are defined in the data appendix. Robust standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A5. Baseline regression including capital expenditure

Dependent variable	(1) Growth rate (employment)	(2) Growth rate (employment)
Relationship length (ln)	-0.007***	-0.006***
	(0.002)	(0.002)
Rel length * Shock on sales 5% (0/1)	0.013***	0.010***
	(0.003)	(0.004)
Shock on sales 5% (0/1)	-0.071***	-0.090***
	(0.009)	(0.027)
Capital expenditure	0.032***	0.033***
	(0.004)	(0.005)
Capital expenditure * Shock on sales 5% (0/1)		-0.006
		(0.008)
Firm controls	Y	Y
Firm controls * Shock on sales 5% (0/1)	N	Y
Year * Province dummies	Y	Y
Year * Sector dummies	Y	Y
Observations	12,852	12,852
R-squared	0.091	0.092

Note: The table shows estimates of the equation (1) including capital expenditure scaled by tangible assets in the last year of each survey wave as additional control (column 1) and its interaction with the shock (column 2). The dependent variable is measured by the yearly percentage change of the number of employees in the last year of each survey wave. The main explanatory variables are Shock on sales 5%, a dummy variable that takes the value equal to 1 if the yearly percentage change of sales in the last year of the survey is less than 5% and 0 otherwise, and Relationship length (ln), the natural logarithm of the years of relationship between the firm and its main bank. The firm-level controls include: Total assets (ln), Age, Family, Corporation, ROE and Business group. These explanatory variables are defined in the data appendix. Robust standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.