Data and empirical strategy

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Evaluating credit guarantees for SMEs: evidence from Italy

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Annual DNB Research conference: The Impact of Credit on the Dynamics of SMEs - 17, 18 October 2013

Outline	Motivation	and	research	questio
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Data and empirical strategy

Results and robustness

Conclusions

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Outline

- Motivation and research question
- Data and empirical strategy
- Results and robustness checks
- Conclusions and what's next

Data and empirical strategy

Results and robustness

Conclusions

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Firm subsidies: a long debate ...

Large amount of public money devoted to firm subsidies
in EU, around 0.5% of GDP

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Conclusions

State aids to Industry and service in Europe

as a % of GDP (EU27) [source: EC]



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State aids to Industry and service in Europe in 2011

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Firm subsidies: a long debate ...

• Large amount of public money devoted to firm subsidies

- in EU, around 0.5% of GDP
- What about Italy?

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Motivation and research question

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In Italy...



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Firm subsidies: a long debate ...

- Large amount of public money devoted to firm subsidies
 - in EU, around 0.5% of GDP
 - $\bullet\,$ What about Italy? \to Around 10 billion euro per year
- In many cases we lack solid evidence on the "value for money"
 - especially for policies targeting SMEs

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Conclusions

... and a pressing emergency: SMEs funding

- 21 million SMEs in Europe, accounting for the bulk of jobs (85% of the new ones). Relevance even larger in Italy
- In all Europe and particularly in Italy they struggle to get funding

Data and empirical strategy

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Conclusions

ECB survey

The most pressing problems faced by Euro area SMEs [Source: ECB]



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Conclusions

... and a pressing emergency: SMEs funding

- 21 million SMEs in Europe, accounting for the bulk of jobs (85% of the new ones). Relevance even larger in Italy
- In all Europe and particularly in Italy they struggle to get funding
 - higher cost of small-scale lending
 - opacity (unaudited balance sheet)
 - lack of collateral
 - asymmetric information

Need to revitalize the credit market for SMEs \Rightarrow Many advocate the mobilization of **public guarantees**

- In Italy,
 - in July 2013 the criteria to access the National Guarantee Fund were eased;
 - this week the national guarantee fund has been refinanced for €1.6 billion

Public Guarantee Schemes (PGS)

- Private (commercial banks) lending is backed by a public fund (partially) covering insolvency losses
- Guarantee schemes are widespread in both developed and developing countries
- Often funded by public institutions, their popularity is due to
 - multiplicative effects
 - capability to mobilize private capitals
 - possibility to recover a large share of the fund at the end of the program
- Scant empirical evidence on their effectiveness

In this paper we provide a counterfactual evaluation of a Public Guarantee Scheme (PGS)

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Credit guarantee schemes: pros

- In the case of firms unable to meet the collateral requirements of the bank, a PGS can lead to more credit being granted to the firm
- Moreover, by reducing the informational asymmetries, a guarantee can lead to lower interest rates
 - hence reducing moral hazard and adverse selection problems
- Credit guarantees can lead to a learning process, where banks discover that borrowers benefiting from the guarantee are not as risky and unprofitable as initially expected (Meyer and Nagarajan, 1996)

Credit guarantee schemes: cons

- A PGS might equally lead to riskier behavior by both the entrepreneur and the bank
- If banks can only rely on a PGS, then the firm might be willing to adopt riskier strategies
- On the bank's side, if the share of the loan covered by the guarantee is too large, the incentive to undertake a tough screening might become smaller (Benavente et al., 2006)
- Banks might be induced to be too quick in writing off loans

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Public Credit Guarantee programs: empirical evidence

- Lelarge et al. (2008): program Sofaris, France [diff-in-diff]
 - credit additionality holds in the intensive margin only
 - no effects on the extensive margin
 - more risk taking from benefiting firms
- Kang and Heshmati (2008): two PGS implemented in Korea [PSM]
 - weak evidence, PGS mainly employed to support financially unconstrained firms
- Zecchini and Ventura (2009): Law 662 Guarantee fund [lags as IVs]
 - results similar to the Korean program

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Our approach: counter-factual analysis

- We improve on the existing literature by implementing a counter-factual analysis
 - pushing forward the causal interpretation of our results
- We exploit some peculiar characteristics of the evaluated scheme to reach causality using IVE
- Results: the PGS leads to an improved firms' financial structure and lower rates, at the cost of slightly higher default rate. No effect on real outcome.
 - Results survive through robustness tests

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Our focus: a regional PGS in Italy

- PGS devised in 2005 in one of the biggest Italian regions; started operating in 2007.
- Endowment of €20 million per year.
- In the case of a 'credit event', the Region covers up to 80 per cent of the losses
- 4 waves: year 2007 (70 firms); 2008 (508); 2009 (306); 2010
- Many similar programs implemented in other Italian regions

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Conclusions

The policy in detail/1



Data and empirical strategy

Results and robustness

Conclusions

The policy in detail/2



Data and empirical strategy

Results and robustness

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The policy in detail/3

- Loans backed by the guarantee typically have a 5 years amortization schedule
- Loans are not formally restricted to firms already lent by covenant banks, but these had a first-mover and information advantage which increased their probability of enrolling in the program
- Eligible firms include all SMEs headquartered in the region undertaking the policy, with a total turnover of between €1 M and €43 M in 2007, or of under 50 million and less than 250 employees (EU definition)
- One covenant commercial bank only managing the 2008 wave of the program

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Outcome variables

- Did the measure
 - lead to an increase in the amount of credit?
 - Iower interest rates?
 - improve the financial structure of the beneficiary firms?
 - increase the default rate?
 - lead to an increase in the level of output, investments and employment?
- Both banks and firms could benefit from the program
 - we focus on firms, since they were the target of the policy maker

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Data: merge 3 datasets

- Official data maintained by the regional authority (funded firms only,...)
- Central credit register: bank-firm level information
- Balance sheet information up to 2010 (from Cerved)
- Dependent variables: total loans; long term loans; interest rate; default dummy; turnover; investments; trade debts.
- Controls (t-1): rating dummies; no. of banks; age; [turnover; total assets].

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Empirical strategy

$$y_{itmr} = \alpha + \beta T_{it} + X_{it}\gamma + \delta_i + \mu_{mt} + \rho_{rt} + \epsilon_{it}$$
(1)

- controlling for firm, time*region and time*bank FE + turnover, total assets, rating dummy, no. of funding banks, age.
- Treatment dummy T likely to be correlated with the error term.
 - Covenant bank may have been selected because of its special attitude towards SMEs or its portfolio of firms
 - (Self)selected firms may be different from the average firm, e.g.:
 - riskier
 - better informed
 - politically connected

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Motivation and research question

Data and empirical strategy

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Conclusions

Identification/1



Data and empirical strategy

Results and robustness

Conclusions

Identification/2

- We exploit two aspects of Italian credit markets
 - M&A operation affecting the covenant bank A initially involved in the policy wave under analysis. A acquired by B a few months before the program was implemented.
 - Stickiness of bank-firm relationships
 - Firms lent by covenant banks have a first-mover and information advantage, increasing their probability of enrolling in the program

 \Rightarrow firms which were funded by bank *B* before the policy was even planned became *randomly* very likely to enrol the program.

Outline	Motivation and research question	Data and empirical strategy ○○○○○○○○●○○	Results and robustness	Conclusions
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Data and empirical strategy

Results and robustness

Conclusions

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Identification/4

• Following Wooldridge (2002), we estimate the exogenous treatment propensity:

$$Pr(T_{iT}) = \alpha + \phi_1 BankB_{t-3} + E_{it-3}\phi_2 + X_{i0}\phi_3 + \varepsilon_{iT}$$
(2)

which becomes the IV in the 2SLS estimation of (1). Robustness using simpler binary instrument (firm borrowing from bank B at t-3)

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Summary of results

The average targeted firm, as compared to what would had happened without PGS:

- Long term loans: +
- Total loans: =
- Interest rate: -
- Bad loans (+)
- Investments: =
- Turnover: =
- Trade debt: =

Data and empirical strategy

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Long term loans

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	OLS	IV	OLS	IV	OLS	IV
Dep. variable			Long terr	n loans		
Treated 1 year	0.363*** (0.052)	0.403** (0.158)				
Treated 2 years			0.328*** (0.053)	0.229* (0.130)		
Treated 3 years					0.295*** (0.056)	0.212 (0.131)
Bank*year FE	yes	yes	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes	yes	yes
Observations	12633	12633	16805	16805	20923	20923
F-stat excl. instr.		94.12		207.2		234.9

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Total loans

	OLS	IV	OLS	IV	OLS	IV
Dep. variable			Total	loans		
Treated 1 year	0.166*** (0.034)	-0.048 (0.108)				
Treated 2 years			0.140*** (0.036)	-0.105 (0.090)		
Treated 3 years					0.122*** (0.037)	-0.126 (0.088)
Bank*year FE	yes	yes	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes	yes	yes
Observations	12633	12633	16805	16805	20923	20923
F-stat excl. instr.		94.12		207.2		234.9

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Interest rate

	OLS	IV	OLS	IV
Dep. variable		Intere	est rate	
Treated 2 years	-0.453*** (0.077)	-0.866** (0.350)		
Treated 3 years			-0.526*** (0.081)	-1.264*** (0.349)
Bank*year FE	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes
Observations	7215	7215	8793	8793
F-stat excl. instr		65.61		73.27

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Probability to default

	OLS	IV	OLS	IV	OLS	IV
Dep. variable	Bad Loan dummy					
Treated 1 year	0.009 (0.008)	0.025* (0.015)				
Treated 2 years			0.008 (0.006)	0.025* (0.014)		
Treated 3 years					0.006 (0.006)	0.022 (0.014)
Bank*year FE	yes	yes	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes	yes	yes
Observations	9956	9934	14940	14930	19868	19851
F-stat excl. instr.		68.54		90.38		87.31

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Investments

	OLS	IV	OLS	IV	OLS	IV
Dep. variable			Inve	stments		
Treated 1 year	0.081** (0.036)	0.220* (0.128)				
Treated 2 years			0.034 (0.027)	0.121 (0.093)		
Treated 3 years					0.032 (0.023)	0.114 (0.083)
Bank*year FE	yes	yes	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes	yes	yes
Observations	11062	11062	14221	14221	17306	17306
F-stat excl. instr.		46.46		88.18		97.16

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Validating strategy: Falsification test A

- Create a placebo treatment simulating the policy in an adjacent region
- Treatment dummy equal to 1 in year 2008 if firms were funded by covenant bank 'B' in 2005 and were eligible in 2007
- In all other respects, the regressions are identical to the baseline ones.
- If placebo treatment is significant, then IV analysis is biased
- Results ok

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Results: falsification test A

Dep. var	Long-term debt	Total debt	Prob of default	Interest rate	Investments
Treated	0.027 (0.041)	-0.014 (0.029)	-0.089 (0.055)		-0.036 (0.036)
Treated 2 years	0.046	-0.013	-0.079	-0.000	-0.030
	(0.041)	(0.028)	(0.062)	(0.004)	(0.026)
Treated 3 years	0.064	-0.012	-0.082	0.004	-0.024
	(0.042)	(0.029)	(0.066)	(0.006)	(0.023)

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Validating strategy: Falsification test B

- Testing the validity of the exclusion restrictions of the 2SLS estimates.
- Regress (OLS) the output variables on the instrumental variables and other controls, limiting the sample to the group of untreated eligible firms.
- Under standard exclusion restrictions, the instrument should not have any direct effect on the output variables.
- Results ok

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Results: falsification test B

Dep. var	Long-term debt	Total debt	Prob of default	Interest rate	Investments
IV 1 year	0.091 (0.207)	-0.107 (0.126)	0.017 (0.014)		0.070 (0.129)
IV 2 year	-0.109	-0.175	0.015	-0.230	0.015
	(0.213)	(0.136)	(0.011)	(0.340)	(0.083)
IV 3 year	-0.060	-0.167	0.011	-0.408	0.044
	(0.222)	(0.138)	(0.014)	(0.406)	(0.071)

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Robustness I: alternative IV

IV = firms funded by Bank B at t - 3 and headquartered in the treatment region.

Dep. variable	LT lo	ans	Total	loans	Interes	t rate	Bad	loans
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Treated 3 years	0.282*** (0.053)	0.177 (0.224)	122*** (0.035)	0.095 (0.145)	-0.413*** (0.077)	-1.007** (0.401)	0.010 (0.007)	0.108** (0.045)
Bank*year FE	yes	yes	yes	yes	yes	yes	yes	yes
Region*year FE	yes	yes	yes	yes	yes	yes	yes	yes
Firm char.	yes	yes	yes	yes	yes	yes	yes	yes
Observations	25401	25377	25401	25377	11251	11137	20409	20390
F-stat excl. instr.		126.8		126.8		47.85		

Data and empirical strategy

Results and robustness

Conclusions

Robustness II: DID model

- Treatment group: firms that benefited from the guarantee in 2008 and were borrowing from bank *A* or *B* before 2008.
- Eligible firms: untreated firms borrowing from bank A or B before 2008.
- Control group by nearest neighbor matching (location, sector, pre-treatment dynamics of loans, pre-treatment amount of borrowed funds)

 $y_i = \beta_0 + \beta_1 dguarantee_i + \beta_2 post + \delta dguarantee_i \cdot post + \epsilon_{i,t}$ (3)

Data and empirical strategy

Results and robustness

Conclusions

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Robustness II: DID model (cont.)

VARIABLES	Tot. debt	LT debt	Int. rate	bad loans	Investments
Treated	0.072	-0.049	0.018	-0.001	-0.089
	(0.104)	(0.142)	(0.076)	(0.003)	(0.205)
Post	0.067**	-0.039	-1.273***	0.010*	0.314***
	(0.033)	(0.055)	(0.079)	(0.006)	(0.076)
Treated*Post	0.080	0.291***	-0.240**	0.012	0.154
	(0.057)	(0.086)	(0.111)	(0.012)	(0.113)
Observations	1894	1894	1651	1894	1511

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Outline	Motivation	and	research	question
		2000		

Conclusions

- Public guarantee schemes are an extremely popular policy instrument.
- However, both economic theory and empirical evidence are not conclusive on the net effect of PCG on firms finance.
- We try to fill this gap using data about a program implemented in Italy in 2008
- We find that the program let to
 - no impact on the volume of total loans
 - increase in the volume of long term loans
 - lower interest rates
 - no real outcomes

Data and empirical strategy

Results and robustness

Conclusions

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Limits and caveats

- LATE: should be generalized to the case in which covariates are included in the regression; weighted average of covariate-specific LATEs, more likely to approximate the real value (Angrist and Pischke, 2008)
 - reassuring similarity of 2SLS results with DID
- External validity: one region and extraordinary circumstances
- The results consider the intensive margin only
 - To avoid a selection bias, we use a closed panel: excluded firms with a total bank debt < €75k before 2005
 - However, the policy itself was implicitly targeting incumbent firms, by requiring a turnover > €1M in 2007: 95 per cent of targeted firms were lent by banks in 2005

Outline	Motivation and research question	Data and empirical stra

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What's next

- New data on almost the universe of firms whose bank loans were backed by the Italian public guarantee fund
- Pushing forward the analysis
 - bank-level
 - better identification (better data)
 - more generality
 - very small firms too