# Trade Shocks and Credit Reallocation

Stefano Federico
Bank of Italy

Fadi Hassan
Bank of Italy, CEPR

Veronica Rappoport
LSE, CEPR

NBER and Banco Central de Chile
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# Starting point: a classical question in economics

- How does trade liberalization affect welfare and economic activity?
- Gains from trade depend on the reallocation of resources across sectors and firms.
- Extensive evidence of frictions for labor mobility across regions and sectors that hinder gains from trade.
- This paper: frictions in the reallocation of credit upon trade liberalization.

→ Credit does not freely adjust to changing patterns of comparative advantage

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# Research question

- What happens to credit allocation in the aftermath of a trade shock and how does this relate to the reallocation channel?
- There is going to be an effect
  - on the demand of credit
  - on the supply of credit as the trade shock can affect banks through the firms they are related to.
- Credit matters both for working capital and investments, so it contributes to the reallocation of both labor and physical capital.
- Looking at banks and credit is key to better understand short-medium term frictions that may harm gains from trade.

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# What we do (in a nutshell):

- We take the entry of China into the WTO as an exogenous shock to Italy.
- We measure firms' exposure to import competition from China according to the sector they operate, as in Autor et al. (2013).
- We define banks' exposure to the China shock according to the portfolio composition of loans on the onset of the shock.
- We identify the effects on the *supply* of credit distinguishing between firms that should shrink or expand and estimate the real effects of the bank lending channel.

# We find that:

- More exposed banks supply less credit to both expected losers and "winners" from trade liberalization.
- There is an endogenous tightening of financial constraints arising from trade liberalization that we were not aware of and that hinder the reallocation channel.
- The lower credit supply has real effects on firms' employment, investments and revenues and relevant aggregate effects.
- Main channel is the increase in non-performing loans that erodes the core capital of exposed banks, undermining their lending capacity.

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# Related literature

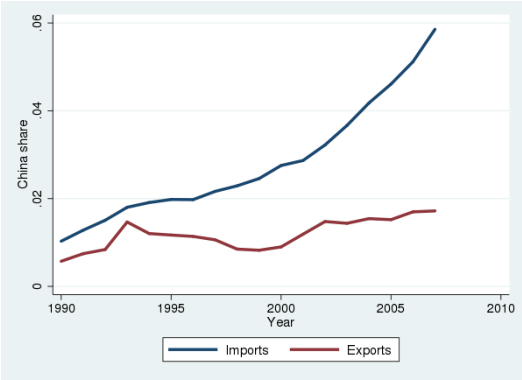
- Adjustment to trade shocks (e.g. 'China shock' or trade liberalization)
  - Workers: Menezes-Filho and Muendler (2011), Autor et al. (QJE 2014), Dix-Carneiro (ECTA 2014), Pierce and Schott (AER, 2016), Acemoglu et al. (JLE 2016), Utar (REStat 2018).
  - Local markets: Topalova (AEJ-AE 2010), Kovak (AER 2013), Hakobyan and McLaren (REStat 2016), Dix-Carneiro and Kovak (AER 2017).
  - "Capital": Antras and Caballero (JPE 2009), Lanteri et al. (2019).
- Credit and trade
  - Credit constraints and exports: Manova (JIE 2008), Amiti and Weinstein (QJE 2011), Minetti and Zhu (JIE 2011), Manova (REStud 2012), Chor and Manova (JIE 2012), Paravisini et al. (REStud 2015), Antras and Foley (JPE 2015).
- Credit shocks and real outcomes
  - From banks to firms: Khwaja and Mian (AER 2008), Paravisini (JF 2008), Amiti and Weinstein (QJE 2011), Schnabl (JF 2012), Chodorow-Reich (QJE 2014), Paravisini et al. (REStud 2015), Cingano et al. (RFS 2016), Amiti and Weistein (JPE 2017).
  - Trasmission of liquidity shocks across markets: Gilje et al. (JF 2016), Romero Cortees and Strahan (JFE 2017), Bustos et al. (2017).
- Banking
  - Loan portfolio management by banks: Froot et al. (JF 1993), Froot and Stein (JFE 1998), Holmstrom and Tirole (QJE 1998), Deyoung et al. (JF 2015).

# Outline

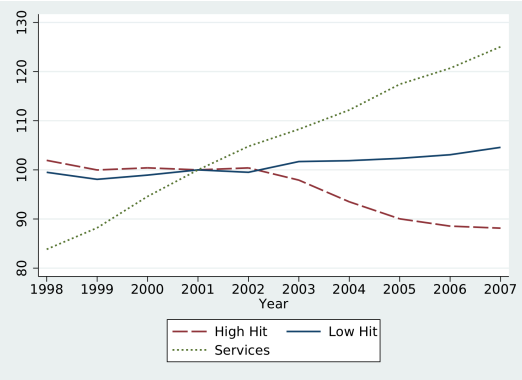
1. Background and Measurement
2. Identification
3. Results
4. Economic relevance
5. Mechanism

# Background & Measurement

# The China Shock in Italy




(a) Trade Shock




(b) Employment

# Measurement: firms and banks' exposure to China

- Sectoral (4-digit) measure of exposure to the China shock, change in imports 2002-07 vs. 1994-2001 (Autor et al., 2013):

$$China\ Exposure_s^{IT} = \frac{\Delta M_s^{IT-CH}}{L_{s,1991}^{IT}}$$

- We measure bank exposure to the China shock as the weighted average of its borrowers' exposure:

$$Exposure_b^{IT} = \frac{\sum_i C_{ib} China_{is}^{IT}}{\sum_i C_{ib}}$$

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◂ How banks should react

# Measurement: firms and banks' exposure to China, instrument

- Classical instrument based on imports of other advanced countries:

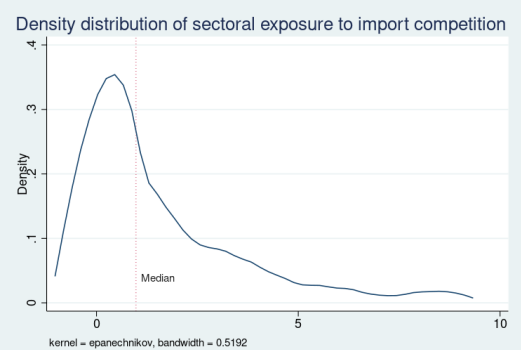
$$China\ Exposure_s^{OC} = \frac{\Delta M_s^{OC-CH}}{L_{s,1991}^{IT}}$$

- Instrumented bank exposure:

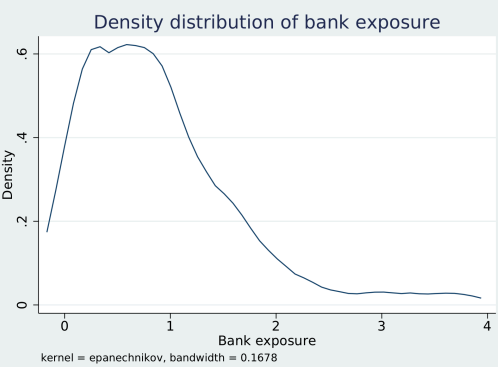
$$Exposure_{-ib}^{OC} = \frac{\sum_{j \neq i} C_{jb} China_{js}^{OC}}{\sum_{j \neq i} C_{jb}}$$

# China Shock: From Sector to Bank Exposure

Figure: Density Distributions




(a) Sector Exposure




(b) Bank Exposure

# Data source: Bank of Italy

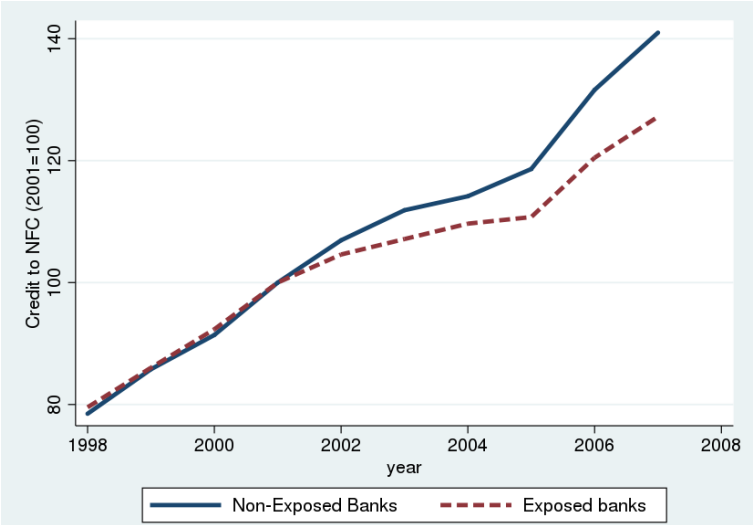
- Credit registry (matched bank-firm data): it covers the universe of loans between Italian banks and firms - as well as households - above 75,000Euro.
- Banks' accounts (Matrice dei Conti): it provides detailed data about banks' liabilities and assets.
- Firm level data: it is the universe of incorporated firms. It includes balance sheet data such as revenues, investment, employment, wage-bill, etc.

Descriptive Statistics

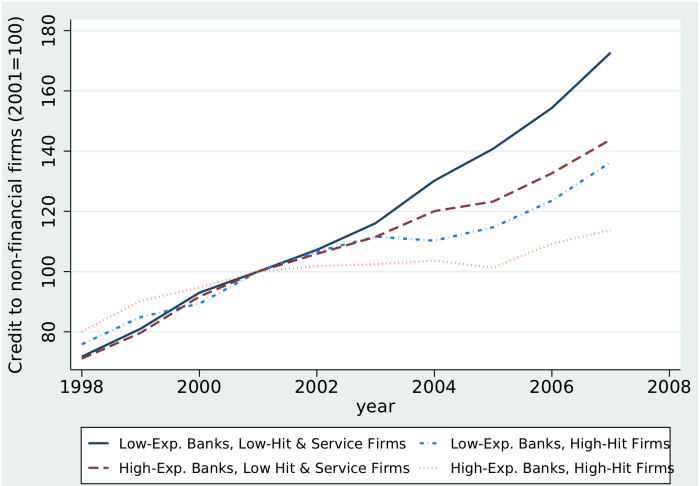
# Sample summary

| | |
|---|---|
| # Banks per year | 504 |
| # Firms per year | 170,265 |
| # Manuf. firms | 70,339 |
| Share of firms with multiple banking | 73% |
| # Banking relations per firm | 4.3 |
| Median outstanding credit per firm | 700k |
| Share of credit to NFCs by type of bank: | |
| Private | 69% |
| Foreign | 5% |
| Cooperative | 23% |
| Mutual | 3% |

# Aggregate credit, exposed vs. non-exposed banks



# Aggregate credit, exposed vs. non-exposed banks & HighHit vs. LowHit firms



# Identification

# Empirical strategy

1. Identifying the effect of bank exposure on the supply of credit:
   - Intensive margin (credit between existing bank-firm relations)
   - Extensive margin (probability to start/end a new bank-firm relation)
   - Aggregate credit (combining both margins and looking at total credit by firm)

# Baseline specification: intensive margin

$$\ln C_{ibt} = \beta_1 \; Exp^{IT}_{-i,b} \times Post_t + \beta_2 \; Spec_{bst} + X_b' \delta \times Post_t + \gamma_{ib} + \alpha_{it} + \epsilon_{ibt}$$

- $\gamma_{ib}$ is a set of firm-bank fixed effects to capture any time-invariant aspect that affects credit (e.g. relational banking).
- $\alpha_{it}$ is a set of firm-year fixed effect that capture any factor that can affect the demand of credit.
- $Spec_{bst}$ is a dummy equal to 1 if a firm operates in a sector where a bank is specialized in. This accounts for the fact that that demand shocks may not be equally distributed (in expectation) across banks (Paravisini et al. 2017)
- $X_b$: is a set of bank controls including log-assets, share of NPLs, share of core funding, and capital ratio, 1998-2000 average.
- Errors double-clustered at the bank-sector (2 digits) level.

# Baseline specification: intensive margin across winners and losers

$$\ln C_{ibt} = \sum_d \beta_{1d}\ D_{di} \times\ Exposure^{IT}_{-i,b} \times Post_t + \beta_2\ Spec_{ibt} + X'_b\delta \times Post_t + \alpha_{it} + \gamma_{ib} + \epsilon_{ibt}$$

Alternative groups definition:

- Low- and High-hit firms defined by sectoral exposure to China (below and above median).
- Revealed comparative advantage (by high- and low-hit).
- High and low productivity firms (high- and low-hit).
- Services vs. manufacturing.

Extensive margin

# Identification challenges

- Italy's exposure to the trade shock
- Isolating credit supply and demand
- Endogeneity and shock randomness
- Confounding factors

# Results

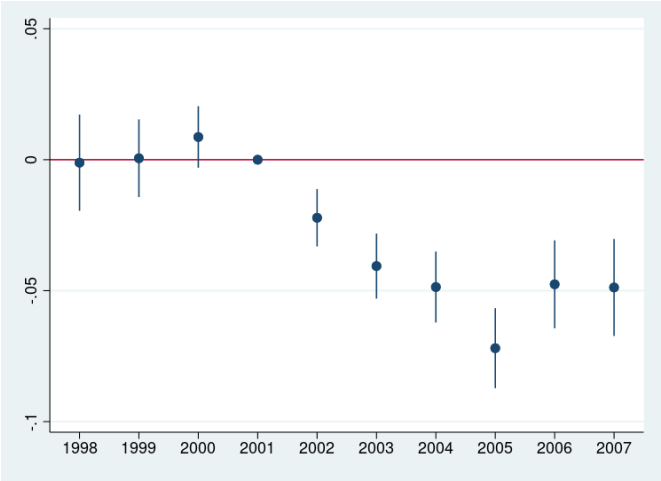
# Baseline Results: Within-Firm Specification

| Dep. Variable: | ln $C_{ibt}$ | | $i_{ibt}$ | |
|---|---|---|---|---|
| | OLS | 2SLS | OLS | 2SLS |
| | (1) | (2) | (3) | (4) |
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.068*** | -0.074*** | 0.0048*** | 0.0053*** |
| | (0.0046) | (0.0062) | (0.0004) | (0.0005) |
| | | *First stage* | | |
| $Exposure^{OC}_{-i,b} \times Post_t$ | | 0.80*** | | 1.01*** |
| | | (0.01) | | (0.02) |
| Observations | 3,499,092 | | 2,492,506 | |
| $Adj.R^2$ | 0.832 | 0.832 | 0.627 | 0.627 |

Additional controls: firm-bank FE, firm-time FE, bank controls

# Dynamic effects

Dynamic diff-in-diff (2SLS, 95% C.I.)



# Heterogeneous Effects: Within-Firm Specification

- Effect of China-shock on bank lending did not discriminate by sector

| Dep Var: | ln $C_{ibt}$ |
|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t \times ...$ | |
| $... \times Manuf\ \ LowHit_i$ | -0.078*** |
| | (0.010) |
| $... \times Manuf\ \ HighHit_i$ | -0.068*** |
| | (0.013) |
| $... \times Services_i$ | -0.073*** |
| | (0.008) |
| Obs | 3,499,092 |

Additional controls: firm-bank FE, firm-time FE, bank controls
Sector definitions (High and Low Hit) taken pre-2000

# Baseline Results

- Exposed banks reduced supply of credit Go
  - For potential "winners" of trade liberalization (revealed comparative advantage & low-hit sectors)
  - For firms with high productivity (in low-hit sectors)
  - For firms in Services
- Regional dimension: transmission across regional markets Go
  - Banks transmit shocks across regions
  - But lower reduction in credit supply for firms in regions with lower exposure to competition from China

# Robustness: alternative measurements and specifications

- Input-output linkages Go
- Confounding factors Go
- Exposure defined over total assets Go
- Exposure defined leaving out firms' sector Go
- Dummy measure of firms' treatment Go
- Instrument using US or ANJ imports only Go
- Specification in first difference Go
- Alternative clustering Go
- Weighted least squares Go

# Economic relevance

# Economic Relevance: firm-wide effects on real outcomes

- So far: real economy shock triggered credit-supply shock by *exposed* banks
- Even in partial equilibrium, economic relevance depends on...
  - How costly is for the firm to substitute sources of funding?
  - How elastic are firm's real outcomes to credit?

$$\ln Y_{it} = \gamma_i + \gamma_{st} + (\hat{\alpha}_{it}) + \beta \; ExpFirm_i \times Post_t$$

  - $\gamma_{st}$: absorbs (4-digit) sector shocks (i.e. China shock)
  - $\hat{\alpha}_{it}$: firm-time FE from within-firm effect of bank-exposure on credit
  - $ExpFirm_i$ weighted average exposure of related banks (pre-2000)

$$ExpFirm_i = \sum_b Exposure_{-i,b} \frac{Credit_{ib}}{TotalCredit_i}$$

# Economic impact: Can firms' substitute sources of credit?

- Total effect on firms' credit:

$$\ln C_{it} = \gamma_i + \gamma_{st} + \hat{\alpha}_{it} + \beta \; ExpFirm_i \times Post_t$$

| Dep Var: | $\ln C_{it}$ | |
|---|---|---|
| | coeff. | s.d. |
| Full Sample | -0.0468 | (0.009) |
| Manuf HighHit | -0.0532 | (0.012) |
| Manuf LowHit | -0.0756 | (0.012) |
| Services | -0.0332 | (0.011) |
| RCA LowHit | -0.0490 | (0.013) |
| High-TFP LowHit | -0.0801 | (0.013) |

Additional controls: firm FE, sector-time FE, firm-time FE from within-firm credit regression

$\rightarrow$ Firms cannot substitute exposed banks

# Economic impact: Are firms' outcomes elastic to credit shock?

- Total effect on firms' outcome:

$$\ln Y_{it} = \gamma_i + \gamma_{st} + \beta \; ExpFirm_i \times Post_t$$

| Dep Var: | $\ln C_{it}$ | | $\ln Empl_{it}$ | | $\ln Inv_{it}$ | |
|---|---|---|---|---|---|---|
| | coeff. | s.d. | coeff. | s.d. | coeff. | s.d. |
| Full Sample | -0.047 | (0.009) | -0.049 | (0.009) | -0.059 | (0.016) |
| Manuf HighHit | -0.053 | (0.012) | -0.053 | (0.011) | -0.041 | (0.019) |
| Manuf LowHit | -0.076 | (0.012) | -0.090 | (0.015) | -0.134 | (0.022) |
| Services | -0.033 | (0.011) | -0.032 | (0.010) | -0.039 | (0.019) |
| RCA LowHit | -0.049 | (0.013) | -0.049 | (0.017) | -0.058 | (0.023) |
| High TFP LowHit | -0.080 | (0.013) | -0.104 | (0.017) | -0.149 | (0.022) |

Additional controls: firm FE, sector-time FE

→ Elasticity to credit most important for *presumably* expanding firms

# Aggregate impact

- Partial Equilibrium
  - Firms cannot freely substitute sources of funding
  - Credit constrains firm-level employment and investment
- Idea of magnitude: Partial Equilibrium Aggregation
  - As in Chodrow-Reich (2014)
  - Exercise accounts for elasticity of firms' outcomes to credit
  - And joint distribution of firms' exposure to credit shock and employment size
- Cannot account for GE effects
  - How do wages and prices react? How does it feed back into demand?
  - Do unconstrained firms substitute for constrained ones in goods or employment markets?

# Partial Equilibrium Aggregation: Shift of the Curve

- Counterfactual growth of $Y$ in sector $s$: bottom 10% of exposure

$$g_s^Y = \alpha_s^Y + \beta_s^Y \underbrace{E[Exposure_i | Exposure_i < Exposure_{P10}]}_{\overline{X}_s}$$

- Effect of lending channel:

$$\Delta \ln Y_s = g_s^Y + \beta_s^Y \sum_{i \in s} \omega_{is}^Y \left( Exposure_i - \overline{X}_s \right)$$

$\omega_i^Y$: firm-$i$'s share in sector-s' output $Y_s$

| | Employment | | Credit | | |
|---|---|---|---|---|---|
| | Growth | Number | Growth | Bn | |
| High-Hit Manuf. | -2.9% | -79,804 | -2.3% | -1.8 | Amplification |
| Low-Hit Manuf. | -1.4% | -29,841 | -1.4% | -1.0 | Transmission |
| Services | -1.3% | -58,340 | -1.3% | -1.6 | |

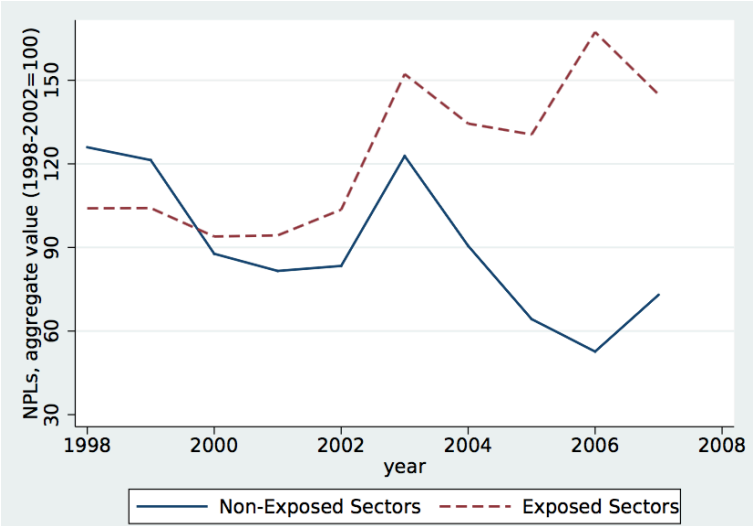
Total job losses in manufacturing in the data: 220,000 (-335k in HighHit, +112k in LowHit)

# Mechanism

# The underlying mechanism: the role of NPLs



# The underlying mechanism: the role of NPLs



# Mechanism: Bank exposure and balance sheet effects

- Effect of exposure on bank's balance sheet:

$$Y_{bt} = \beta\ Exposure_b \times Post_t + X_b'\delta \times Post_t + \gamma_b + \alpha_t + \epsilon_{bt}$$

| Dependent variable: (2SLS) | NPLs | Deposits | Provisions | Core capital |
|---|---|---|---|---|
| $Exposure_b \times Post_t$ | 0.003*** | -0.000 | 0.001** | -0.003*** |
| | (0.001) | (0.002) | (0.000) | (0.001) |
| Additional controls: bank FE, time FE, bank controls | | | | |

- Increase in NPL was not offset by additional funding → drop in core capital
  Consistent with Froot et al (...), Holmstrom & Tirole (97), Deyoung et al. (15)
- No effect on deposits: Asymmetric upside and downside risk
  Different from findings in Bustos et al (2020)

# Mechanism: Bank exposure and credit supply - Core capital

- Does erosion of core capital explain effect on credit supply?

$$\ln C_{ibt} = \alpha_{bi} + \alpha_{it} + \beta_1 Exp_{-ib} \times Post_t + \beta_2 Exp_{-ib} \times Tier1_b \times Post_t + Tier1_b \times Post_t + ... + \epsilon_{ibt}$$

| Dep variable: ln $C_{ibt}$ | Full Sample | Manuf Low Hit | Manuf High Hit | Services |
|---|---|---|---|---|
| Baseline | | | | |
| $Exposure_{-i,b} \times Post_t$ | -0.074*** | -0.078*** | -0.068*** | -0.073*** |
| $Exposure_{-i,b} \times Post_t$ | -0.118*** | -0.131*** | -0.089*** | -0.125*** |
| | (0.014) | (0.018) | (0.012) | (0.015) |
| $Exposure_{-i,b} \times Post_t \times Tier1_b$ | 0.517*** | 0.642*** | 0.098 | 0.677*** |
| | (0.150) | (0.203) | (0.203) | (0.167) |
| Additional controls: $Tier1_b \times Post_t$, firm-time FE, firm-bank FE, bank controls-time | | | | |

→ No effect on firms for banks in top quintile Tier1 (5% of total credit)

# Conclusions

- There are negative spillovers between losers from trade and other firms in the economy that go through banks.
- This is a novel effect and it has important consequence for the reallocation channel of gains from trade.
- We still need to understand better the interaction of trade shocks and financial frictions in the economy and think about policy solutions that may mitigate its impact.
- We hope to motivate further theoretical and empirical research on this issue.

*Thank You!*

# The reallocation channel: winners and losers

- Which firms should shrink?
  - Firms and sectors exposed to competition from China (Autor et al., 2013).
- Which firms should expand? (or at least not being negatively affected)
  - Firms in non-exposed sectors (Ricardo-Viner).
    - ⋆ In particular firms in exporting sectors.
  - More productive firms within sectors (Melitz, 2003).

# How should banks reallocate credit? Some theoretical consideration

*Case 1*:

- Assumption: we are in a world without frictions
  - Banks can hedge all the risk associated to a loan in the capital markets.
  - Banks have no costs in raising funds.
- Implication: the MB and the MC of financing a given firm are the same across banks.
- Prediction: we should observe no differential lending behavior between exposed and non-exposed banks.

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# How should banks reallocate credit? Some theoretical consideration (2)

*Case 2*:

- Assumptions:
  - Loans are illiquid (not all risk can be hedged in the capital markets).
  - Once the China shock materialises, there is uncertainty about firms' adjustment process.
- Implication: banks shift away from assets positively correlated with their net worth.
- Predictions:
  - Exposed banks *move away from treated firms* more strongly than non-exposed banks.
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# How should banks reallocate credit? Some theoretical consideration (2)

*Case 2*:

- Assumptions:
  - Loans are illiquid (not all risk can be hedged in the capital markets).
  - Once the China shock materialises, there is uncertainty about firms' adjustment process.
- Implication: banks shift away from assets positively correlated with their net worth.
- Predictions:
  - Exposed banks *move away from treated firms* more strongly than non-exposed banks.
  - Exposed banks *move into non-treated firms* more strongly than non-exposed banks.

# How should banks reallocate credit? Some theoretical consideration (3)

*Case 3*:

- Assumption: banks face costly external funding.
  - We are in standard banking models as in Froot et al. (1993); Froot and Stein (1998); Deyoung et al. (2015); Holmstrom and Tirole (1997).
- Implication: if exposed banks that suffer losses cannot rebuild capital without costs and this may harm their lending capacity.
- Prediction: exposed banks may supply less credit to both treated and control firms.

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*Case 3*:

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# Summary statistics

| | Unit | Mean | S.D. | p25 | p50 | p75 |
|---|---|---|---|---|---|---|
| **Bank characteristics** | | | | | | |
| Total Assets | Millions | 4,701 | 36,002 | 109 | 229 | 535 |
| Liquid Assets | % Assets | 30.5 | 14.1 | 21.8 | 27.9 | 37.9 |
| Nonperforming Loans | % Assets | 2.6 | 2.6 | 1.1 | 1.9 | 3.3 |
| Credit to Firms | % Assets | 37.6 | 13.1 | 28.8 | 39.3 | 47.3 |
| Profits | % Assets | 1 | 0.5 | 0.7 | 1 | 1.2 |
| Core capital | % Assets | 1.4 | 3.2 | 0.01 | 0.2 | 1.5 |
| Core Funding | %Liabilities | 52.5 | 17.7 | 44.4 | 51.9 | 64.4 |
| Bank exposure to China | % Loans | 35.8 | 21.8 | 21.8 | 35 | 48 |
| **Firm characteristics** | | | | | | |
| Bank Credit | Millions | 0.82 | 3.74 | 0.27 | 0.38 | 0.57 |
| Revenues | Thousands | 4,173 | 5,673 | 743 | 1,751 | 4,708 |
| Fixed Assets | Thousands | 870 | 1,388 | 71 | 258 | 928 |
| Gross operating margin | % Revenues | 7.9 | 2.4 | 7.1 | 7.6 | 8.3 |
| Credit Score | Units | 5.4 | 0.6 | 5.1 | 5.4 | 5.7 |

**Note:** The table reports the relevant statistics (1998-2007, average) of banks and firms in the firm-bank matched sample. Bank balance sheet data are from the Supervisory Reports submitted by banls to the Bank of Italy. Credit data are from the Italian Credit Register. Firm balance sheet data are from CERVED. Liquid assets include cash, interbank deposits, and bond holdings. Core funding refers to deposits. Firm's credit score is computed by CERVED based on past defaults and firms balance sheet information.

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# Balancing tests

| | | *Exposed Banks* | | *Non-exposed banks* | | Normalized |
|---|---|---|---|---|---|---|
| | Unit | Mean | S.D. | Mean | S.D. | difference |
| **Bank characteristics** | | | | | | |
| Total Assets | Millions | 5,780 | 3,671 | 3,430 | 1,228 | 0.22 |
| Liquid Assets | % Assets | 18.5 | 11.7 | 19.9 | 11.9 | -0.12 |
| Nonperforming Loans | % Assets | 3.2 | 4.9 | 3.3 | 3.5 | -0.02 |
| Credit to Firms | % Assets | 39.9 | 13.9 | 38.0 | 14.2 | 0.13 |
| Profits | % Assets | 1.5 | 0.8 | 1.8 | 2.4 | -0.16 |
| Core capital | % Assets | 2.1 | 5.1 | 1.6 | 5.9 | 0.09 |
| Core Funding | %Liabilities | 55.5 | 19.4 | 60.3 | 18.2 | -0.25 |
| **Borrower characteristics** | | | | | | |
| Bank Credit | Millions | 0.80 | 2.1 | 0.84 | 4.8 | -0.01 |
| Revenues | Thousands | 5,230 | 3,780 | 4,864 | 3,942 | 0.09 |
| Fixed Assets | Thousands | 1,337 | 1,050 | 1,387 | 1,070 | -0.04 |
| Gross operating margin | % Revenues | 7.9 | 6.9 | 8.3 | 2.5 | -0.07 |
| Credit Score | Units | 5.3 | 0.6 | 5.4 | 0.7 | -0.09 |

**Note:** The table reports the relevant statistics to compute the balance of banks and firms characteristics (1998-2000, average pre China entrance in the WTO) by exposed and non-exposed banks. The last column shows the Normalized difference between the two groups as specified in Imbens and Woolridge (2008); an absolute value above 0.25 indicates an imbalance between the two groups. Exposed (non-exposed) banks have a share of loans to firms subject to competition from China above (below) median over the period 1998-2000.

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# Baseline results: comparative advantage

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t \times Comp.\ Advantage_i$ | -0.075*** | -0.11*** | | |
| | (0.01) | (0.018) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Comp.\ Adv.\ Control_i$ | | | -0.061*** | -0.092*** |
| | | | (0.011) | (0.018) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Comp.\ Adv.\ Treated_i$ | | | -0.083*** | -0.095*** |
| | | | (0.016) | (0.03) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Comp.\ Disadvantage_i$ | -0.086*** | -0.093*** | -0.085*** | -0.092*** |
| | (0.013) | (0.024) | (0.013) | (0.02) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | |
| AR-Wald test, F | | 22 | | 15.8 |
| Observations | 1,740,734 | 1,740,734 | 1,740,734 | 1,740,734 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Baseline results: productivity

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t \times High\ Productivity_i$ | -0.078*** | -0.11*** | | |
| | (0.01) | (0.018) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times High\ Prod.\ Control_i$ | | | -0.066*** | -0.115*** |
| | | | (0.011) | (0.018) |
| $Exposure^{IT}_{-i,b} \times Post_t \times High\ Prod.\ Treated_i$ | | | -0.092*** | -0.124** |
| | | | (0.016) | (0.03) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Low\ Productivity_i$ | -0.078*** | -0.095*** | -0.078*** | -0.095*** |
| | (0.009) | (0.018) | (0.009) | (0.018) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | |
| AR-Wald test, F | | 24.8 | | 18.6 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Baseline results: services

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS |
|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t \times Services_i$ | -0.061*** | -0.06*** |
| | (0.005) | (0.009) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Manufacturing_i$ | -0.068*** | -0.086*** |
| | (0.006) | (0.01) |
| Bank-firm specialization | ✓ | ✓ |
| Bank controls | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ |
| Instrument | | *First stage* |
| AR-Wald test, F | | 18.2 |
| Observations | 3,584,419 | 3,584,419 |
| $Adj.R^2$ | 0.83 | 0.83 |

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# Extensive margin

$$Entry_{ib}^{post} = \beta_1 \ Exposure_b + \beta_2 \ Spec_{bs} + X_b'\delta + \gamma_i + \epsilon_{ib}$$

$$Exit_{ib}^{post} = \beta_1 \ Exposure_b + \beta_2 \ Spec_{bs} + X_b'\delta + \gamma_i + \epsilon_{ib}$$

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# Firms entry and exit (2SLS)

| Dependent: $Entry_{ib}$ & $Exit_{ib}$ | *Entry* | | *Exit* | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.059*** | | -0.011* | |
| | (0.008) | | (0.005) | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | -0.037*** | | -0.002 |
| | | (0.01) | | (0.006) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | -0.086*** | | -0.021** |
| | | (0.01) | | (0.009) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm F.E. | ✓ | ✓ | ✓ | ✓ |
| Time F.E. | ✓ | ✓ | ✓ | ✓ |
| | | *First stage* | | |
| AR-Wald test, F | 44.8 | 24.1 | 3.6 | 2.5 |
| Observations | 416,549 | 416,549 | 416,549 | 416,549 |
| $Adj.R^2$ | 0.14 | 0.14 | 0.12 | 0.12 |

# Accounting for input-output linkages

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.056*** | -0.072*** | | |
| | (0.007) | (0.016) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.053*** | -0.080*** |
| | | | (0.009) | (0.020) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.061*** | -0.059** |
| | | | (0.012) | (0.024) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | |
| AR-Wald test, F | | 19.2 | | 10.1 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Robustness to confounding factors

| Dependent variable: ln $C_{ibt}$ | (1) Baseline | (2) Foreign funding | (3) Recession | (4) Securitization | (5) All |
|---|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.11*** | -0.116*** | -0.108*** | -0.109*** | -0.105*** |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) |
| $Foreign\ Funding\ Share_b \times Post_t$ | | 0.24*** | | | 0.10** |
| | | (0.06) | | | (0.05) |
| $Recession\ Share_b \times Post_t$ | | | -0.11** | | -0.20*** |
| | | | (0.05) | | (0.05) |
| $Securitization\ Share_b \times Post_t$ | | | | -0.96*** | -1.01*** |
| | | | | (0.08) | (0.09) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ | ✓ |
| Firm.bank F.E. | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | | |
| AR-Wald test, F | 32.1 | 73.2 | 55.9 | 62.7 | 51.5 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.82 | 0.82 | 0.83 | 0.83 | 0.83 |

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# Baseline results: bank exposure relative to total assets

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.064*** | -0.066*** | | |
| | (0.004) | (0.004) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.059*** | -0.061*** |
| | | | (0.004) | (0.005) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.068*** | -0.070*** |
| | | | (0.005) | (0.005) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{OC}_{-i,b} \times Post_t$ | | | *First stage* | |
| F-Stat | | 261.1 | | 132.6 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Baseline results: bank exposure leaving out firm's sector

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.078*** | -0.103*** | | |
| | (0.008) | (0.015) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.078*** | -0.100*** |
| | | | (0.012) | (0.009) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.078*** | -0.105*** |
| | | | (0.024) | (0.015) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{OC}_{-i,b} \times Post_t$ | | | *First stage* | |
| F-Stat | | 47.3 | | 26.6 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Baseline results: continuos measure of firms' treatment

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.050*** | -0.049*** | | |
| | (0.008) | (0.014) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.073*** | -0.088*** |
| | | | (0.011) | (0.016) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.026** | -0.015 |
| | | | (0.012) | (0.021) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{OC}_{-i,b} \times Post_t$ | | | *First stage* | |
| $Exposure^{OC}_{-i,b} \times Post_t$ | | 1.04*** | | |
| | | (0.09) | | |
| $Exposure^{OC}_{-i,b} \times Post_t \times Control_i$ | | | | 1.23*** |
| | | | | (0.02) |
| $Exposure^{OC}_{-i,b} \times Post_t \times Treated_i$ | | | | 0.92*** |
| | | | | (0.12) |
| F-Stat | | 8.5 | | 15.4 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.83 | 0.83 | 0.83 | 0.83 |

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# Baseline results: instrument using US imports only

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.078*** | -0.089*** | | |
| | (0.008) | (0.014) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.075*** | -0.084*** |
| | | | (0.009) | (0.014) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.082*** | -0.088** |
| | | | (0.012) | (0.023) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{US}_{-i,b} \times Post_t$ | | | *First stage* | |
| F-Stat | | 36.4 | | 21.3 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.84 | 0.83 | 0.83 | 0.83 |

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# Baseline results: first difference

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b}$ | -0.077*** | -0.093*** | | |
| | (0.007) | (0.014) | | |
| $Exposure^{IT}_{-i,b} \times Control_i$ | | | -0.073*** | -0.08*** |
| | | | (0.011) | (0.024) |
| $Exposure^{IT}_{-i,b} \times Treated_i$ | | | -0.081*** | -0.102*** |
| | | | (0.01) | (0.016) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{OC}_{-i,b} \times Post_t$ | | | *First stage* | |
| AR-Wald test, F | | 12.1 | | 7.3 |
| Observations | 188,664 | 188,664 | 188,664 | 188,664 |
| $Adj.R^2$ | 0.19 | 0.41 | 0.19 | 0.41 |

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# Baseline results: shift-share clustering (OLS and 2SLS)

| Dependent : ln $C_{ibt}$ | Full sample | | Treated | | Control | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| $Exposure_b^{IT} \times Post_t$ | -0.088*** | -0.109** | -0.099*** | -0.119* | -0.007*** | -0.094* |
| | (0.010) | (0.049) | (0.016) | (0.070) | (0.010) | (0.049) |
| Observations | 2,080 | 2,080 | 2,080 | 2,080 | 2,080 | 2,080 |
| $Adj.R^2$ | 0.10 | 0.10 | 0.10 | 0.09 | 0.05 | 0.05 |

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# Baseline results: weighted least squares

| Dependent : ln $C_{ibt}$ | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.078*** | -0.11*** | | |
| | (0.009) | (0.016) | | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Control_i$ | | | -0.076*** | -0.10*** |
| | | | (0.01) | (0.026) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Treated_i$ | | | -0.081*** | -0.11*** |
| | | | (0.014) | (0.02) |
| Bank-firm specialization | ✓ | ✓ | ✓ | ✓ |
| Bank controls | ✓ | ✓ | ✓ | ✓ |
| Firm-time F.E. | ✓ | ✓ | ✓ | ✓ |
| Firm-bank F.E. | ✓ | ✓ | ✓ | ✓ |
| Instrument: $Exposure^{OC}_{-i,b} \times Post_t$ | | | *First stage* | |
| F-Stat | | 12.1 | | 12.3 |
| Observations | 1,945,334 | 1,945,334 | 1,945,334 | 1,945,334 |
| $Adj.R^2$ | 0.84 | 0.83 | 0.83 | 0.83 |

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# Real effects on firms: investment

| Dependent: ln $I_{it}$ | (1) Full-sample | *(2)* Control | Treated | (3) Comparative Adv. Control | (4) High Product. Control | (5) Services |
|---|---|---|---|---|---|---|
| $Exposure_i^{IT} \times Post_t$ | -0.11*** | -0.075*** | -0.17*** | -0.09** | -0.15*** | -0.026 |
| | (0.02) | (0.02) | (0.04) | (0.03) | (0.03) | (0.02) |
| Firm-F.E. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sector-time F.E. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | | | |
| AR-Wald test, F | 26.1 | 11.8 | | 6.4 | 31.3 | 14.2 |
| Observations | 451,145 | 451,145 | | 400,886 | 451,145 | 899,397 |
| $Adj.R^2$ | 0.96 | 0.987 | | 0.88 | 0.88 | 0.87 |

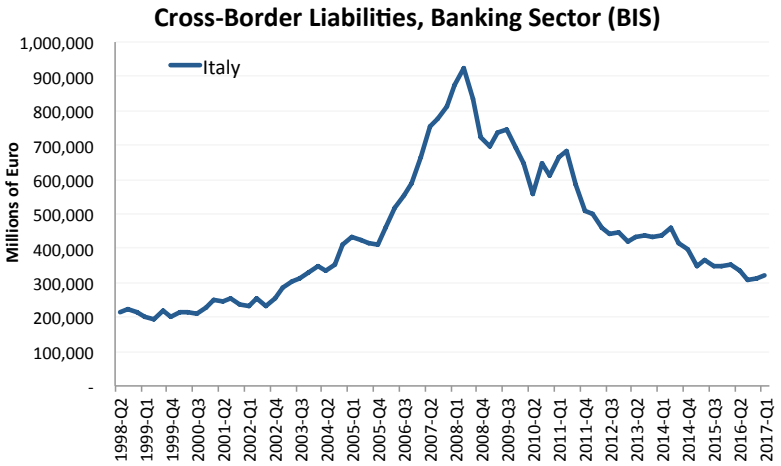
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# Real effects on firms: revenues

| Dependent: ln $R_{it}$ | (1) Full-sample | (2) Control | (2) Treated | (3) Comparative Adv. Control | (4) High Product. Control | (5) Services |
|---|---|---|---|---|---|---|
| $Exposure_i^{IT} \times Post_t$ | -0.10*** | -0.06** | -0.16*** | -0.076** | -0.13*** | -0.034 |
| | (0.02) | (0.02) | (0.03) | (0.03) | (0.03) | (0.03) |
| Firm-F.E. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sector-time F.E. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | *First stage* | | | |
| AR-Wald test, F | 25.8 | | 13.8 | 8.6 | 35.7 | 12.4 |
| Observations | 451,145 | | 451,145 | 400,886 | 451,145 | 899,397 |
| $Adj.R^2$ | 0.96 | | 0.96 | 0.88 | 0.88 | 0.84 |

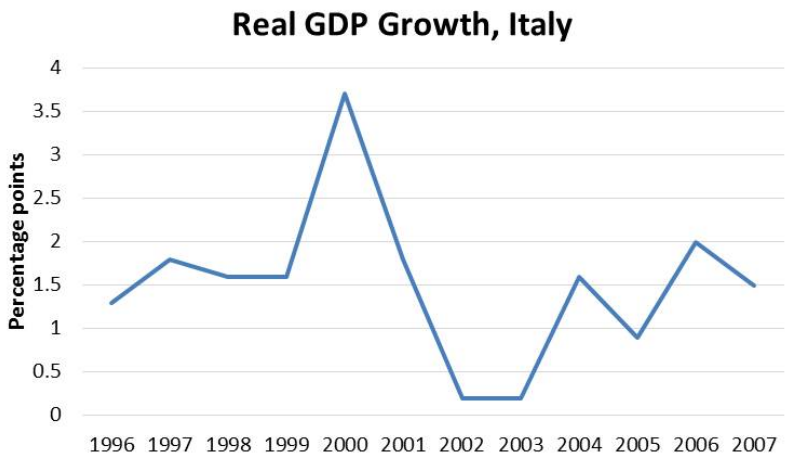
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# Possible confounding factor: cross-border capital flows




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# Possible confounding factor: slowdown of GDP growth

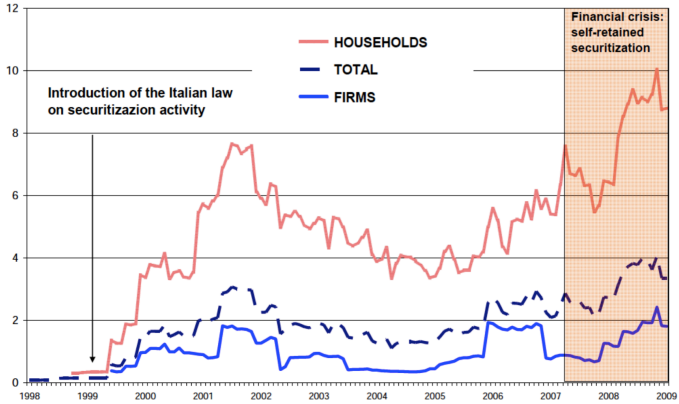



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# Possible confounding factor: slowdown of GDP growth

**SECURITIZED LENDING IN ITALY BY SECTOR OF ECONOMIC ACTIVITY**

*(annual flows as a percentage of the stock of lending at the beginning of the period)*




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# Heterogeneous Effects: Within-Firm Specification

| Dep Var: ln $C_{ibt}$ | | | |
|---|---|---|---|
| Interaction with | $Exposure^{IT}_{-i,b} \times Post_t \times ...$ | | |
| $RCA\ LowHit_i$ | -0.078*** | $HighTFP\ LowHit_i$ | -0.087*** |
| | (0.014) | | (0.018) |
| $RCA\ HighHit_i$ | -0.078*** | $HighTFP\ HighHit_i$ | -0.067*** |
| | (0.014) | | (0.021) |
| $NonRCA_i$ | -0.096*** | $LowTFP_i$ | -0.085*** |
| | (0.017) | | (0.009) |

Sample of manufacturing firms
Additional controls: firm-bank FE, firm-time FE, bank controls
Sector and firm definitions taken pre-2000

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# Geographical Dimension: Within-Firm Specification

- Regional Exposure defined as in Autor et al (2013)
- Low and High exposure according to median

| Dependent variable: ln $C_{ibt}$ | *High exposed provinces* | | *Low exposed provinces* | |
|---|---|---|---|---|
| (2SLS) | (1) | (2) | (3) | (4) |
| $Exposure^{IT}_{-i,b} \times Post_t$ | -0.083*** | | -0.056*** | |
| | (0.008) | | (0.009) | |
| $Exposure^{IT}_{-i,b} \times Post_t \times Manuf.\ HighHit_i$ | | -0.078*** | | -0.048*** |
| | | (0.017) | | (0.019) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Manuf.\ LowHit_i$ | | -0.078*** | | -0.083*** |
| | | (0.014) | | (0.014) |
| $Exposure^{IT}_{-i,b} \times Post_t \times Services_i$ | | -0.088*** | | -0.047*** |
| | | (0.011) | | (0.013) |
| Observations | 2,118,046 | | 1378456 | |

Additional controls: firm-bank FE, firm-time FE, bank controls

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