

The Impact of Government-backed Lending to Corporates: The Role of Firm Size, Age and Regional Development

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JFSR - Zurich | 12 June 2024

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Introduction

Introduction – SMEs' limited access to finance

- SMEs' activities have long been affected by credit constraints (Ferrando and Mulier, 2015),
 - facing a lack of sufficient collateral (Beck and Demirguc-Kunt, 2006)
 - comparatively more asymmetric information problems (Berger and Udell, 2006; Rauh, 2006; Hadlock and Pierce, 2010)
- Troublesome, as financing constraints have been shown to hamper SMEs' growth (Rahaman, 2011; Moscalu et al., 2020), employment (Cornille et al., 2017) and likelihood to invest (Gerlach-Kristen et al., 2015)
- Small firms benefit most from financial and institutional development (Beck et al., 2005)

Introduction – Public support to alleviate constraints

- MDBs' financing support to SMEs:
 - contributes to productivity gains by reducing misallocations due to financial frictions
 - contributes to the creation of financial markets in the absence of private intervention
- Assessing the impact of public support programmes is key to fine-tune the design of products, to increase accountability and to assess performance
- Following Brown and Earle (2017) for the US SBA's loan guarantee programme, European evidence on positive employment, firm growth and investment impact
 - direct lending (e.g. Erhardt, 2017)
 - loan guarantees (e.g. Bertoni et al., 2019)
 - VC (e.g. Pavlova and Signore, 2019) and venture debt (Gatti et al., 2022)
 - intermediated lending (e.g. Gereben et al., 2019; Amamou et al., 2023)

Introduction – Support for regional development

- Firm-level evidence shows that Cohesion Policy promotes firms' growth, employment and productivity (Benkovskis et al., 2019; Bachtrögler et al., 2020)
- Studies have shown that the European Structural and Investment Funds had a positive and significant effect on regional economic growth
 - e.g. Dall'erba (2005), Becker et al. (2012), Cerqua and Pellegrini (2016) and Barbero et al. (2023)
- Some found more conditional support for the funds efficacy, depending on regional development, institutions and human capital
 - e.g. Cappellen et al. (2003), Ederveen et al. (2006), Arbolino et al. (2020) and San Juan Mesonada and Sunyer Manteiga (2021)

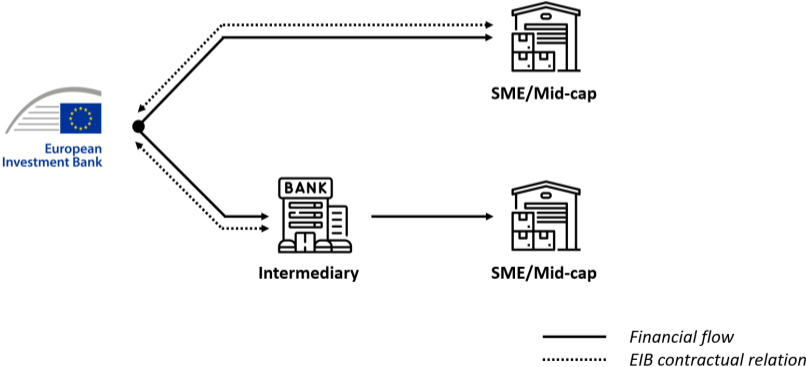
This paper in a nutshell

- **Question:** Does publicly subsidized lending support SME performance and contribute to regional convergence?
- **Data:** EIB-backed intermediated loans to circa 100,000 SMEs in the EU over the period 2008-2018
- **Methodology:** Stacked DiD, propensity score matching
- **Findings:**
 - Positive effect on employment, firm growth and investment
 - Larger effects for smaller firms
 - Stronger effects in less developed regions

Data

Data – EIB lending to SMEs and midcaps

Figure 1: EIB multi-beneficiary intermediated loans (MBIL)

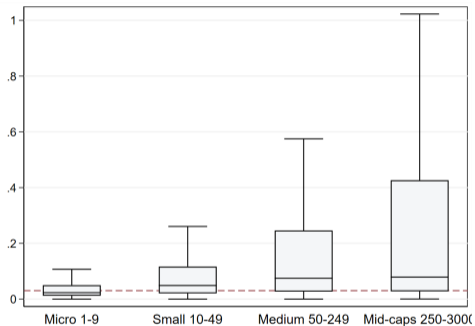


- Match allocation data to Bureau van Dijk's Orbis records
- Coverage: circa 80% of allocated volumes and around 50% of beneficiary firms
- Clean data following Kalemli-Ozcan et al. (2015) and winsorize by year at the 1%
- Analysis requires the availability of data for a three-year window post the loan receipt, limiting the analysis to 2017 allocations
- Lack Orbis coverage in some countries (Cyprus, Estonia, Ireland, Lithuania, UK)
- Left with 96,830 treated firms (for EUR 30.5 bn)

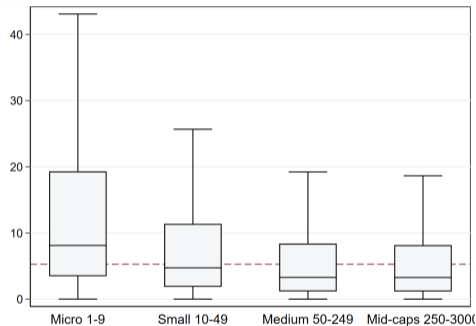
Table 1: Summary statistics of MBIL beneficiaries

| | <i>Obs.</i> | <i>Mean</i> | <i>Median</i> | <i>St.dev.</i> | <i>Min.</i> | <i>Max.</i> |
|---------------------------------|-------------|-------------|---------------|----------------|-------------|-------------|
| Firm age | 221,004 | 15.51 | 13.00 | 11.75 | 0.00 | 65.00 |
| Number of employees | 183,691 | 25.69 | 10.00 | 44.13 | 1.00 | 398.00 |
| Total assets (m EUR) | 218,537 | 3.41 | 1.05 | 6.94 | 0.01 | 67.42 |
| Tangible fixed assets (m EUR) | 216,970 | 1.05 | 0.24 | 2.39 | 0.00 | 23.23 |
| Tangible assets ratio | 216,422 | 0.32 | 0.28 | 0.25 | 0.00 | 0.95 |
| Leverage ratio | 216,503 | 0.70 | 0.71 | 0.27 | 0.05 | 2.18 |
| Earnings (m EUR) | 196,314 | 0.32 | 0.08 | 0.73 | -0.36 | 7.23 |
| Profitability | 204,362 | 0.14 | 0.09 | 0.45 | -2.97 | 2.92 |
| Value added (m EUR) | 140,798 | 4.17 | 1.30 | 8.39 | 0.03 | 78.53 |
| Intangible fixed assets (m EUR) | 214,759 | 0.06 | 0.00 | 0.21 | 0.00 | 2.55 |
| Patent filings, dummy | 224,341 | 0.01 | 0.00 | 0.07 | 0.00 | 1.00 |

Data – MBILs' relative importance



(a) Loan size (m EUR)



(b) Loan intensity (Loan/TA)

Figure 2: Distribution of loan characteristics by size class

Empirical Strategy

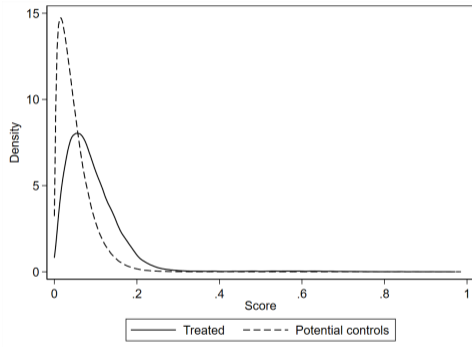
Empirical strategy – Approach

- Setting with staggered intervention: loans issued at different years
- Stacked difference-in-differences (Cengiz et al., 2019 QJE)
 - 10 cohorts of treated firms (2008, 2011, ..., 2017)
 - Control group defined for each cohort of treated firms via PSM
 - Cohort-specific control groups stacked together
- Static staggered DiD estimates
 - TWFE model run on the stacked dataset
- Dynamic staggered DiD estimates
 - Event study on stacked dataset
 - 3-year window around loan issuance
 - Pre-trends test to back PT assumption

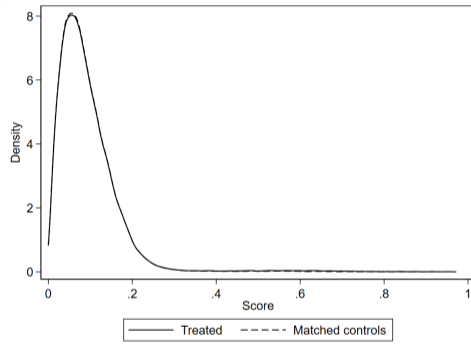
Empirical strategy – Control group

- In theory, the pool of potential counterfactuals should contain all EU SMEs that have been active between 2008 and 2017
- To better reflect the characteristics of the treated firms, we create a control group by stratified sampling, along country, year of allocation, firm size class and industry
- Drawing for each stratum a random sample from the full Orbis, which is approx. twenty times bigger than the number of treated firms
- We select 96,830 control firms by strata using propensity score matching (PSM)
- Based on probit model with (squared/cubic) lags of number of: [▶ Annex](#)
 - number of employees, total assets, leverage ratio, cash ratio, current ratio, asset turnover ratio, tangible fixed assets over total assets, sales growth and patent

Empirical strategy – Control group



(a) Pre matching



(b) Post matching

Figure 3: Probability density of propensity scores

► Annex

Empirical strategy – Control group

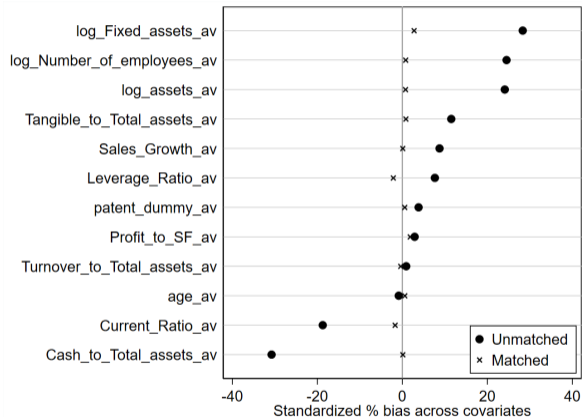


Figure 4: Performance of the matching

► Annex

Empirical strategy – Stacked DiD model

We estimate the following TWFE model on the stacked dataset

$$y_{it} = \alpha I_{t \geq 0} + \beta (T_i \times I_{t \geq 0}) + \gamma_i + \delta_{cts} + \varepsilon_{it} \quad (1)$$

where

- y_{it} the outcome variable of interest for firm i in year t
- T_i a dummy equal to 1 for the firms that received an MBIL
- $I_{t \geq 0}$ a dummy equal 1 when $t \geq 0$ and 0 otherwise
- γ_i firm fixed effects
- δ_{cts} country-year-sector fixed effects
- ε_{it} white-noise residuals

Empirical strategy – Dynamic TWFE model

Next, we estimate the following dynamic TWFE model

$$y_{it} = \sum_{\tau=-3}^3 \alpha_{\tau} I_{t=\tau} + \sum_{\tau=-3}^3 \beta_{\tau} T_i I_{t=\tau} + \gamma_i + \delta_{cts} + \varepsilon_{it} \quad (2)$$

where β_{τ} are the time-varying coefficients estimated separately for each point in time.

The coefficient at time $t = -1$, β_{-1} , is normalized equal to zero so that the other coefficients can be interpreted as the cumulative impact with respect to this baseline

Results

Results – Static stacked TWFE estimates

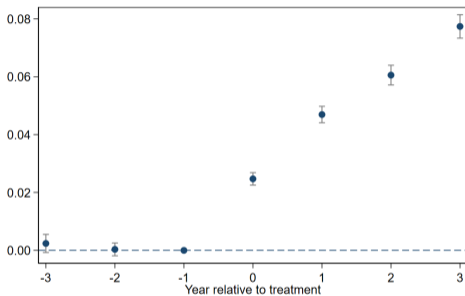
Table 2: Static stacked TWFE estimates

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Profit to shareholder funds ratio | (5) Leverage ratio | (6) Earnings (log) | (7) Value added (log) |
|----------------------------|----------------------------|------------------------------|--|--|--------------------------|--------------------------|-----------------------------|
| Post | -0.065*** (0.001) | -0.090*** (0.001) | -0.174*** (0.003) | 0.006*** (0.002) | -0.010*** (0.001) | -0.067*** (0.003) | -0.069*** (0.002) |
| Treated x Post | 0.054*** (0.002) | 0.060*** (0.002) | 0.153*** (0.004) | -0.001 (0.002) | 0.018*** (0.001) | 0.047*** (0.004) | 0.053*** (0.002) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.949 | 0.971 | 0.924 | 0.268 | 0.821 | 0.880 | 0.964 |
| Observations | 1,296,337 | 1,302,480 | 1,285,955 | 1,300,327 | 1,301,386 | 1,133,915 | 977,528 |

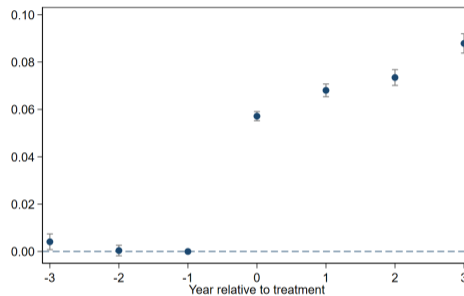
Note: Estimation results of the main treatment effects model. Standard errors, clustered at the firm level, in parentheses:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results – Dynamic stacked TWFE estimates



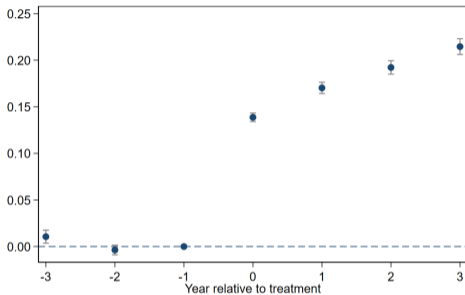
(a) Employment



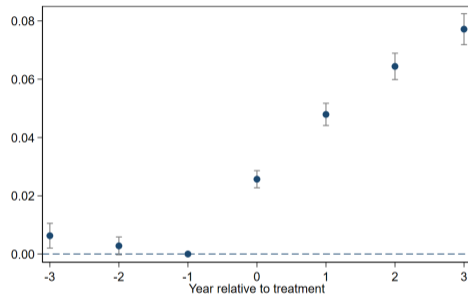
(b) Total assets

Figure 5: Impact of government-backed loan on firm growth

Results – Dynamic stacked TWFE estimates



(a) Investment



(b) Value added

Figure 6: Impact of government-backed loan on investment and productivity

Results – Regional development

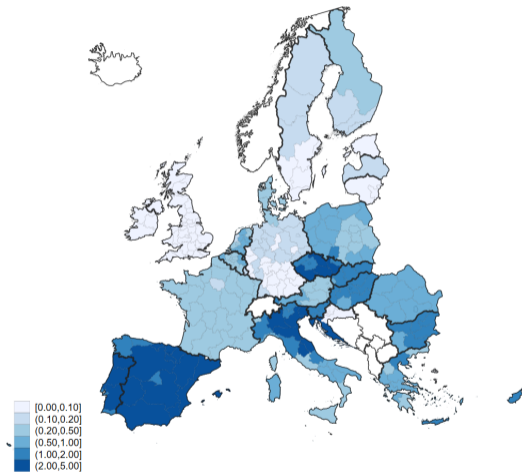


Figure 7: Allocated volumes by region (as % of GDP)

To decompose the impact, we extend the model to include interactions:

$$y_{it} = \alpha I_{t \geq 0} + \beta (T_i \times I_{t \geq 0}) + \sum_{j \in J} \theta_j (I_{t \geq 0} \times \mathbb{1}_j) + \sum_{j \in J} \zeta_j (T_i \times I_{t \geq 0} \times \mathbb{1}_j) + \gamma_i + \delta_{cts} + \varepsilon_{it} \quad (3)$$

where the indicator function ($\mathbb{1}_j$) takes the value 1 if the firm belongs to group j , and 0 otherwise, with $j \in \{less\ developed, transition\}$, i.e. taking firms in more developed regions as the base group.

Results – Regional development

Table 3: Static stacked TWFE estimates - By Cohesion region

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Leverage ratio | (5) Earnings (log) | (6) Value added (log) |
|---------------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------------|
| Post | -0.062*** (0.002) | -0.090*** (0.002) | -0.179*** (0.003) | -0.010*** (0.001) | -0.065*** (0.004) | -0.069*** (0.002) |
| Treated x Post | 0.044*** (0.002) | 0.049*** (0.002) | 0.147*** (0.005) | 0.019*** (0.001) | 0.042*** (0.004) | 0.046*** (0.003) |
| Post x Less developed | -0.017*** (0.004) | -0.012*** (0.004) | -0.007 (0.008) | 0.002 (0.002) | -0.015** (0.007) | -0.005 (0.005) |
| Post x Transition | 0.003 (0.004) | 0.017*** (0.004) | 0.045*** (0.008) | -0.004** (0.002) | 0.004 (0.008) | 0.005 (0.005) |
| Treated x Post x Less developed | 0.037*** (0.005) | 0.048*** (0.005) | 0.034*** (0.009) | -0.006** (0.002) | 0.020** (0.009) | 0.029*** (0.006) |
| Treated x Post x Transition | 0.016*** (0.005) | 0.004 (0.005) | -0.007 (0.011) | 0.005* (0.002) | 0.003 (0.010) | 0.008 (0.007) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.949 | 0.971 | 0.924 | 0.821 | 0.88 | 0.964 |
| Observations | 1,296,076 | 1,302,216 | 1,285,691 | 1,301,122 | 1,133,660 | 977,435 |

Note: Estimation results of the main treatment effects model. Beneficiaries located in more developed regions are the reference group. Standard errors, clustered at the firm level, in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results – Regional development [WORK IN PROGRESS]

- Firms' finance constraints vary across different cohesion regions
- Finance constraints act differently on firms in less developed and more developed regions
 - preventing firms from undertaking capital and labour investments in less developed regions, hampering productivity growth
 - preventing firms in more developed regions to expand their business by investing in working capital
- Intermediated lending helps firms in less developed regions to invest in labour and capital and become more productive

Results – Firm size

- SMEs' activities have long been affected by credit constraints, which pose a significant barrier to their activity and to their growth
 - See e.g., Kaplan and Zingales (1997), Beck and Demirguc-Kunt (2006), Ferrando and Muller (2015) and Ayyagari et al. (2021)
- Evidence from the EIB Investment Survey (EIBIS) shows that larger firms are less likely to be financially constrained than SMEs [▶ Annex](#)
- Own preliminary estimates show that beneficiaries considered financially constrained (cf. Kaplan-Zingales) grow faster upon receiving government-backed loan [▶ Annex](#)

Results – Firm size

Table 4: Static stacked TWFE estimates - By firm size class

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Leverage ratio | (5) Earnings (log) | (6) Value added (log) |
|------------------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------------|
| ... | | | | | | |
| Post x Size class 5-9 | -0.034*** (0.007) | -0.030*** (0.009) | -0.055*** (0.017) | -0.022*** (0.004) | -0.055*** (0.019) | -0.089*** (0.010) |
| Post x Size class 10-49 | 0.004 (0.007) | -0.018** (0.009) | -0.028* (0.017) | -0.017*** (0.004) | -0.035* (0.019) | -0.051*** (0.010) |
| Post x Size class 50-249 | 0.011* (0.007) | -0.026*** (0.009) | -0.024 (0.017) | -0.010** (0.004) | -0.039** (0.019) | -0.033*** (0.010) |
| Treated x Post x Size class 5-9 | 0.029*** (0.009) | 0.067*** (0.012) | 0.105*** (0.022) | 0.022*** (0.005) | 0.101*** (0.024) | 0.066*** (0.013) |
| Treated x Post x Size class 10-49 | 0.030*** (0.009) | 0.070*** (0.011) | 0.093*** (0.022) | 0.016*** (0.005) | 0.090*** (0.023) | 0.061*** (0.012) |
| Treated x Post x Size class 50-249 | 0.020** (0.009) | 0.063*** (0.012) | 0.056** (0.022) | 0.012** (0.005) | 0.083*** (0.024) | 0.052*** (0.013) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.966 | 0.973 | 0.926 | 0.823 | 0.882 | 0.967 |
| Observations | 1,296,337 | 1,295,837 | 1,279,857 | 1,294,805 | 1,129,414 | 974,432 |

Note: Estimation results of the main treatment effects model. Midcap-sized beneficiaries are the reference size class. Standard errors, clustered at the firm level, in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results – Firm size

Table 5: Static stacked TWFE estimates - By firm size class (excl. Midcaps)

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Leverage ratio | (5) Earnings (log) | (6) Value added (log) |
|-----------------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------------|
| Post | -0.021*** (0.002) | -0.086*** (0.003) | -0.151*** (0.006) | -0.002 (0.001) | -0.058*** (0.007) | -0.032*** (0.003) |
| Treated x Post | 0.027*** (0.003) | 0.052*** (0.004) | 0.110*** (0.008) | 0.012*** (0.002) | 0.034*** (0.008) | 0.037*** (0.004) |
| Post x Size class 5-9 | -0.046*** (0.003) | -0.003 (0.004) | -0.030*** (0.008) | -0.012*** (0.002) | -0.016** (0.008) | -0.056*** (0.004) |
| Post x Size class 10-49 | -0.008*** (0.003) | 0.008** (0.003) | -0.004 (0.007) | -0.007*** (0.002) | 0.004 (0.007) | -0.018*** (0.004) |
| Treated x Post x Size class 5-9 | 0.008** (0.004) | 0.004 (0.005) | 0.050*** (0.010) | 0.010*** (0.002) | 0.017 (0.010) | 0.014** (0.006) |
| Treated x Post x Size class 10-49 | 0.010*** (0.003) | 0.007 (0.004) | 0.038*** (0.009) | 0.003* (0.002) | 0.006 (0.009) | 0.009* (0.005) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.962 | 0.971 | 0.923 | 0.823 | 0.876 | 0.964 |
| Observations | 1,275,924 | 1,275,457 | 1,259,524 | 1,274,435 | 1,111,320 | 957,260 |

Note: Estimation results of the main treatment effects model. Medium-sized beneficiaries are the reference size class. Standard errors, clustered at the firm level, in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Static stacked TWFE estimates - By firm age

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Leverage ratio | (5) Earnings (log) | (6) Value added (log) |
|--------------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------------|
| Post | -0.091*** (0.001) | -0.127*** (0.001) | -0.212*** (0.003) | -0.006*** (0.001) | -0.098*** (0.003) | -0.097*** (0.002) |
| Treated x Post | 0.051*** (0.002) | 0.055*** (0.002) | 0.143*** (0.004) | 0.016*** (0.001) | 0.041*** (0.004) | 0.051*** (0.002) |
| Post x Age class 0-4 | 0.264*** (0.012) | 0.406*** (0.014) | 0.413*** (0.026) | -0.021*** (0.006) | 0.428*** (0.023) | 0.331*** (0.017) |
| Post x Age class 5-9 | 0.121*** (0.004) | 0.168*** (0.004) | 0.169*** (0.008) | -0.021*** (0.002) | 0.126*** (0.007) | 0.127*** (0.005) |
| Treated x Post x Age class 0-4 | 0.008 (0.018) | 0.032 (0.021) | 0.079** (0.038) | 0.021** (0.009) | 0.025 (0.033) | 0.018 (0.024) |
| Treated x Post x Age class 5-9 | 0.024*** (0.005) | 0.034*** (0.006) | 0.063*** (0.011) | 0.008*** (0.003) | 0.040*** (0.010) | 0.022*** (0.007) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.949 | 0.971 | 0.925 | 0.821 | 0.88 | 0.964 |
| Observations | 1,296,337 | 1,302,480 | 1,285,955 | 1,301,386 | 1,133,915 | 977,528 |

Note: Estimation results of the main treatment effects model. Age groups are defined based on the beneficiaries' age at the time of loan allocation. Older beneficiaries (i.e. with 10 or more years of age) are the reference age class. Standard errors, clustered at the firm level, in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Conclusion

Conclusion

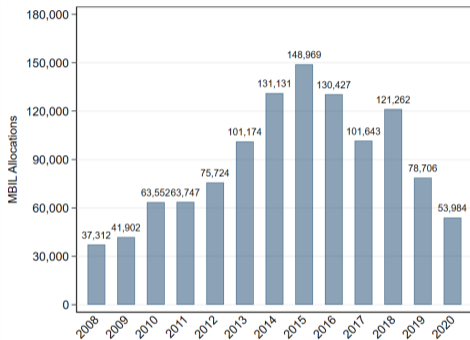
Assessing the impact on firms' performance of EIB-backed intermediated loans to circa 100,000 SMEs in the EU over the period 2008-2018, we find that

- relative to their peers, beneficiaries of the publicly backed loans experience significantly higher employment growth, firm growth, earnings and investment
- firms in less developed regions benefit substantially more from the lending, relative to beneficiaries located in more developed regions
- additionality is significantly higher for micro, small and medium-sized enterprises

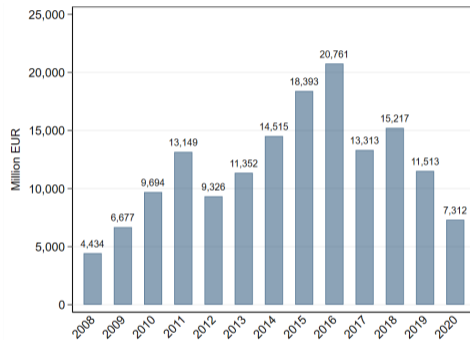
Results support the role for publicly backed lending as a tool to enhance regional development through firm performance

Questions?

ANNEX

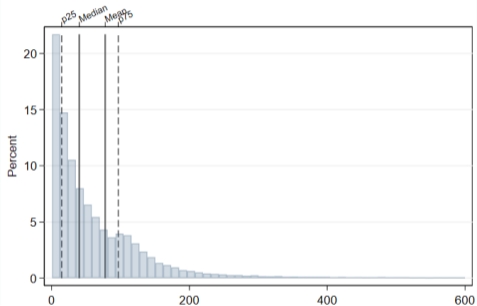


(a) Number of signatures

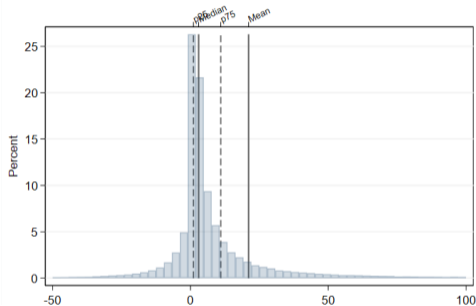


(b) Allocation volumes (mEUR)

Figure 8: MBIL signatures and volumes over time

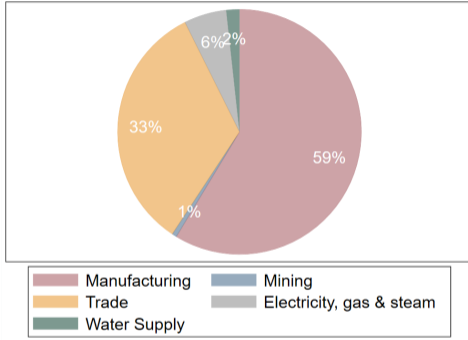


(a) Loan intensity (in %)

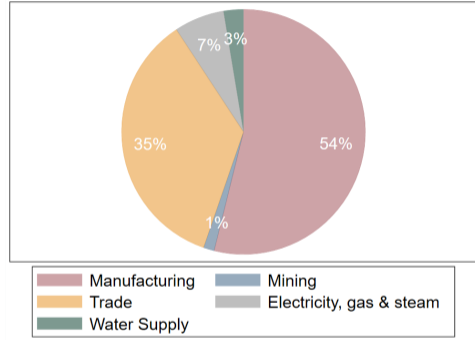


(b) Interest coverage ratio (in %)

Figure 9: Beneficiaries' loan intensity and interest coverage ratio

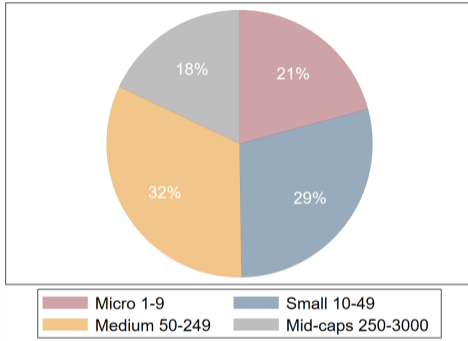


(a) MBILs – Allocation volumes by sector

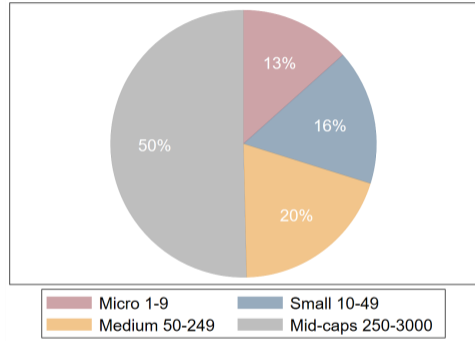


(b) Eurostat – Value added by sector

Figure 10: Representativeness of MBILs by sector

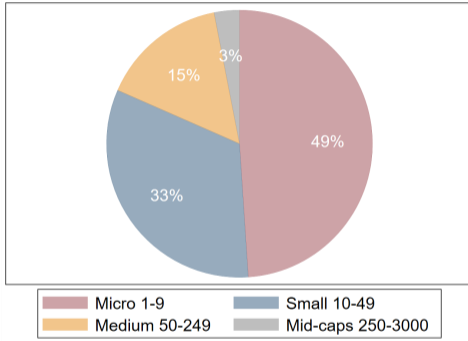


(a) MBILs – Allocation volumes by size

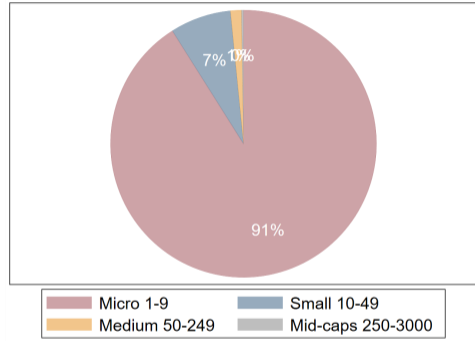


(b) Eurostat – Value added by size

Figure 11: Representativeness of MBILs by firm size



(a) MBILs – Number of beneficiaries by size



(b) Eurostat – Number of firms by size

Figure 12: Representativeness of MBILs by firm size

Table 7: Allocated volumes by firm size

| | Population (mEUR) | With BvD ID (mEUR) | (in %) | With required data (mEUR) | (in %) |
|--------------------|----------------------|-----------------------|--------|------------------------------|--------|
| Micro (1-9) | 33,298 | 17,754 | 53.32 | 3,455 | 10.38 |
| Small (10-49) | 34,808 | 25,996 | 74.68 | 8,286 | 23.8 |
| Medium (50-249) | 34,007 | 25,173 | 74.02 | 7,236 | 21.28 |
| Mid-cap (250-3000) | 16,293 | 13,487 | 82.78 | 2,642 | 16.22 |
| Very large (3000-) | 28 | 21 | 75 | 0 | 0 |
| Total | 118,435 | 82,430 | 69.6 | 21,619 | 18.25 |

Table 8: Allocated volumes by year

| | Population (mEUR) | With BvD ID (mEUR) | (in %) | With required data (mEUR) | (in %) |
|-------|----------------------|-----------------------|--------|------------------------------|--------|
| 2008 | 4,434 | 1,608 | 36.26 | 774 | 17.46 |
| 2009 | 6,677 | 2,887 | 43.24 | 1,310 | 19.62 |
| 2010 | 9,694 | 4,555 | 46.99 | 1,819 | 18.76 |
| 2011 | 13,149 | 6,492 | 49.37 | 3,010 | 22.89 |
| 2012 | 9,326 | 4,960 | 53.18 | 2,516 | 26.98 |
| 2013 | 11,352 | 6,682 | 58.86 | 3,732 | 32.88 |
| 2014 | 14,515 | 12,404 | 85.46 | 6,277 | 43.25 |
| 2015 | 18,393 | 15,848 | 86.16 | 4,719 | 25.65 |
| 2016 | 20,761 | 18,059 | 86.99 | 4,414 | 21.26 |
| 2017 | 13,313 | 10,028 | 75.32 | 1,880 | 14.12 |
| Total | 121,614 | 83,523 | 68.68 | 30,453 | 25.04 |

Table 10: Unmatched controls

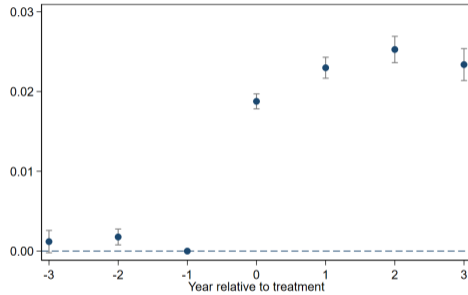
| | Obs. | Mean | Median | St.dev. | Min. | Max. |
|---------------------------|-----------|-------|--------|---------|-------|-------|
| Firm age | 2,060,966 | 18 | 16 | 14 | 1 | 897 |
| Number of employees (log) | 2,063,184 | 2.40 | 2.26 | 1.24 | 0.69 | 6.17 |
| Total assets (log) | 2,063,901 | 13.84 | 13.71 | 1.82 | 9.86 | 18.5 |
| Tangible assets ratio | 2,063,892 | 0.28 | 0.20 | 0.25 | 0.00 | 0.95 |
| Leverage ratio | 2,063,891 | 0.64 | 0.63 | 0.37 | 0.02 | 2.41 |
| Cash ratio | 2,063,897 | 0.15 | 0.09 | 0.16 | 0.00 | 0.81 |
| Current ratio | 2,063,492 | 3.10 | 1.49 | 6.10 | 0.09 | 61.14 |
| Turnover ratio | 1,970,715 | 1.60 | 1.29 | 1.28 | 0.02 | 7.45 |
| Sales growth | 1,947,592 | 0.08 | 0.02 | 0.47 | -0.76 | 4.17 |

Table 11: Matched controls

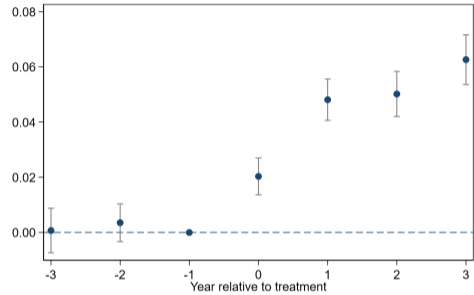
| | Obs. | Mean | Median | St.dev. | Min. | Max. |
|---------------------------|--------|-------|--------|---------|-------|-------|
| Firm age | 90,653 | 18 | 16 | 13 | 1 | 226 |
| Number of employees (log) | 90,701 | 2.66 | 2.55 | 1.15 | 0.69 | 6.17 |
| Total assets (log) | 90,701 | 14.17 | 14.15 | 1.61 | 9.86 | 18.5 |
| Tangible assets ratio | 90,701 | 0.30 | 0.25 | 0.23 | 0.00 | 0.95 |
| Leverage ratio | 90,701 | 0.68 | 0.68 | 0.28 | 0.02 | 2.41 |
| Cash ratio | 90,701 | 0.11 | 0.06 | 0.13 | 0.00 | 0.81 |
| Current ratio | 90,701 | 2.18 | 1.36 | 3.85 | 0.09 | 61.14 |
| Turnover ratio | 90,701 | 1.63 | 1.41 | 1.13 | 0.02 | 7.45 |
| Sales growth | 90,701 | 0.12 | 0.04 | 0.47 | -0.76 | 4.17 |

Table 12: Matched treated

| | Obs. | Mean | Median | St.dev. | Min. | Max. |
|---------------------------|--------|-------|--------|---------|-------|-------|
| Firm age | 97,619 | 18 | 16 | 13 | 1 | 682 |
| Number of employees (log) | 97,663 | 2.68 | 2.56 | 1.15 | 0.69 | 6.17 |
| Total assets (log) | 97,663 | 14.22 | 14.18 | 1.59 | 9.86 | 18.5 |
| Tangible assets ratio | 97,663 | 0.30 | 0.26 | 0.23 | 0.00 | 0.95 |
| Leverage ratio | 97,663 | 0.67 | 0.68 | 0.26 | 0.02 | 2.41 |
| Cash ratio | 97,663 | 0.10 | 0.06 | 0.12 | 0.00 | 0.81 |
| Current ratio | 97,663 | 2.08 | 1.36 | 3.46 | 0.09 | 61.14 |
| Turnover ratio | 97,663 | 1.62 | 1.36 | 1.11 | 0.02 | 7.45 |
| Sales growth | 97,663 | 0.12 | 0.04 | 0.47 | -0.76 | 4.17 |

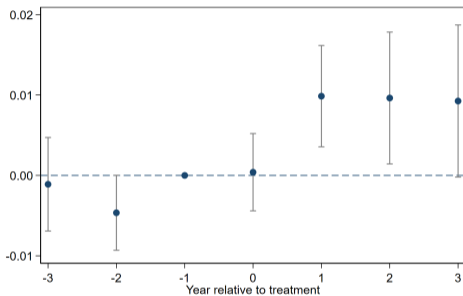


(a) Leverage

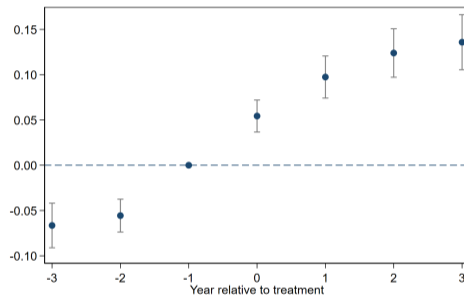


(b) Earnings

Figure 13: Impact of government-backed loan on firm performance



(a) Patent applications



(b) Intangibles

Figure 14: Impact of government-backed loan on innovation

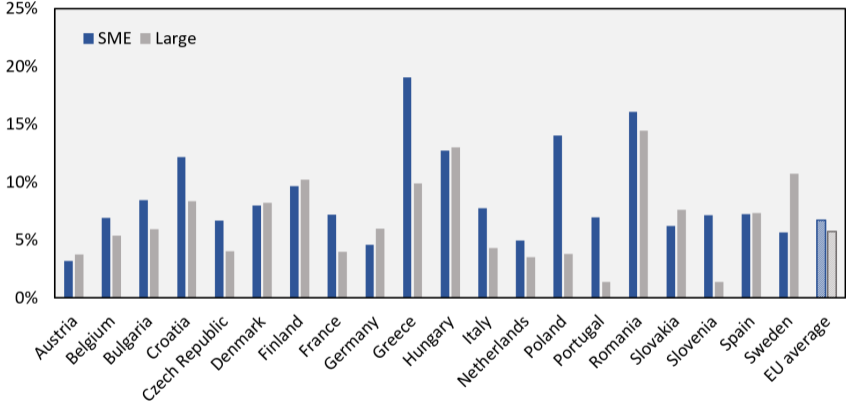


Figure 15: Share of finance constrained firms in the EU

Table 13: Estimation results - By finance constraint

| | (1) Employment (log) | (2) Total assets (log) | (3) Tangible fixed assets (log) | (4) Leverage ratio | (5) Earnings (log) | (6) Value added (log) |
|----------------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------------|
| Post | -0.055*** (0.002) | -0.062*** (0.002) | -0.169*** (0.004) | -0.031*** (0.001) | -0.062*** (0.004) | -0.063*** (0.002) |
| Treated x Post | 0.044*** (0.003) | 0.052*** (0.003) | 0.151*** (0.006) | 0.023*** (0.001) | 0.039*** (0.006) | 0.047*** (0.003) |
| Post x Fin. constraint | -0.015*** (0.003) | -0.052*** (0.003) | -0.015*** (0.006) | 0.040*** (0.001) | -0.011** (0.006) | -0.014*** (0.004) |
| Treated x Post x Fin. constraint | 0.011*** (0.004) | 0.016*** (0.004) | -0.007 (0.008) | -0.013*** (0.002) | 0.013* (0.007) | 0.010** (0.005) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Year x Sector | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.952 | 0.972 | 0.926 | 0.826 | 0.883 | 0.965 |
| Observations | 1,096,467 | 1,101,844 | 1,091,788 | 1,101,552 | 970,504 | 859,342 |

Note: Estimation results of the main treatment effects model. Non-constrained beneficiaries are the reference group. Standard errors, clustered at the firm level, in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.