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# Promoting Small Businesses' Access to Credit and Innovation through a Reform of the Bankruptcy System: Evidence from Slovenia

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**Abstract**

This study examines the impact of a bankruptcy system reform process implemented in Slovenia on access to credit conditions and investments in innovation by small businesses. The reform process increased the recovery rate and reduced the time to resolve insolvency procedures, thus improving the efficiency of the bankruptcy system. Leveraging a dataset of 1,245 Slovenian micro-, small-, and medium-sized enterprises, our results document an increase in innovation investments by small businesses after the reform process due to more accommodating access to credit conditions.

**Keywords**: Access to credit, Innovation, Bankruptcy system, MSMEs, Slovenia.

**JEL codes:** G20, G33, L25, O30.

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## 1. Introduction

Small businesses face challenges in innovating and securing external financing. As they are usually confronted with a paucity of internal resources, lower access to knowledge, and higher risks of bankruptcy (e.g., Bonnet et al., 2016; Cowling and Sclip, 2023), micro-, small-, and medium-sized enterprises (MSMEs) substantially rely on external credit to pursue innovative projects (Hall, 2010) and are highly sensitive to bankruptcy systems (White, 2016). Despite the growing interest in MSMEs (e.g., Audretsch et al., 2020; Baumann and Kritikos, 2016) and the links between bankruptcy systems and firm performance (e.g., Armour and Cumming, 2008; Berkowitz and White, 2004; Van Stel et al., 2007), scholarly attention has predominantly focused on new venture creation, thereby neglecting the connection between bankruptcy systems and small businesses' access to credit and innovation investments. Farè et al. (2024) provide a pioneering contribution in this direction. They propose three theoretical propositions, stating that a more efficient bankruptcy system, resulting in higher recovery rates, promotes small businesses' investment in innovation through easier access to credit conditions.

In this paper, we extend Farè et al. (2024) to provide more rigorous empirical evidence of their theoretical propositions by leveraging a quasi-natural experimental setting. We take advantage of a reform process implemented in Slovenia to examine whether an exogenous change in the bankruptcy system promoted access to credit and innovation investments for small businesses. Corporate insolvencies and bankruptcy reorganization have received significant attention in Slovenian policy debates (e.g., Cepec and Grajzl, 2021), making it an intriguing case study. To the best of our knowledge, we provide the first evidence of the impact of this specific reform process on MSME activity. We document that, after the reform process, which improved the bankruptcy system efficiency, Slovenian small businesses increased investments in innovation due to more accommodating access to credit conditions. Our findings contribute to the recent literature on the enabling factors of MSME financing and innovation (e.g., Cowling et al., 2018; Farè et al., 2022) and the impact of bankruptcy system reforms on firms' behavior (e.g., Cepec and Grajzl, 2020; Ghosh, 2023; Gómez and Sánchez, 2018). We document that policies aimed at improving the effectiveness of the bankruptcy system help promote access to credit and innovation for small businesses, thereby reducing their liability of smallness.

## 2. Institutional background

The global financial crisis of 2008 has accentuated a dramatic situation for many highly indebted Slovenian companies, a situation marked by very long corporate restructuring procedures and the absence of preventive procedures. To address this situation, the Slovenian government started a reform process of the legal restructuring framework in 2013.[1] However, as the changes took some time to produce results, particularly concerning the time to resolve insolvency procedures and recovery rate[2], the government took new measures to accelerate the sanitation process. At the end of 2015, the Bank Association of Slovenia adopted Restructuring Guidelines for MSMEs prepared with the Bank of Slovenia. In 2016, new insolvency legislation was adopted to shorten the judicial part of the personal bankruptcy procedure and extend preventive restructuring procedures to small businesses. Thus, the middle of the decade is a significant turning point (OECD, 2017).[3]

To assess the impact of the bankruptcy system reform process, we examine the evolution of three resolving insolvency indicators from the World Bank-Doing Business database: *Recovery rate*, *Resolving insolvency score*, and *Time to resolve insolvency*.[4] Figure 1 shows that the reform process began producing effects in 2015. After this year, the recovery rate and the resolving insolvency score improved markedly, while the time to resolve insolvency procedures reduced drastically. This evidence strengthens our confidence in using the Slovenian reform process as a quasi-natural experiment to evaluate how improving the quality of the bankruptcy system impacts innovation investments and access to credit for MSMEs.

[1] The changes introduced can be summarized in three points: creation of a pre-insolvency procedure for medium and large-sized enterprises in distress, opening the possibility of restructuring their financial claims; new simplified compulsory settlement procedure for micro and small businesses to provide a reorganization option; modification of the existing compulsory settlement procedure so that the company's creditors can initiate its reorganization for the first time (World Bank, 2018).

[2] Slovenia, a Member State of the European Union since 2004, is a signatory to the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union (or Fiscal Stability Treaty, 2012), as it was a signatory to its predecessor, the Stability and Growth Pact. As such, Slovenia produces a National Reform Program in which it specifies how its policy fits into efforts to coordinate and converge economic policies. Reading the successive National Reform Program plans as well as the opinions of the European Commission staff and the Council of the EU which follow the publication of the National Reform Programs allows access to more detailed information reflecting the period examined. https://commission.europa.eu/content/archive-european-semester-documents-slovenia_en (May 2024)

[3] We thank members of the Doing Business Panel of Slovenia for providing us with thoughtful guidance on the Slovenian bankruptcy system reform process.

[4] Doing Business data were revised up to 2020 to correct for data irregularities. We used the revised and corrected version of the data. For further details, we refer to https://archive.doingbusiness.org/en/doingbusiness (May 2024).

[Figure 1 here]

## 3. Research design

### *3.1 Data and Sample*

We retrieved data from the Survey of the Access to Finance of Enterprises (SAFE), which contains unique information about innovation and financing activities for a large number of MSMEs in European countries, including Slovenia. The companies interviewed are randomly selected from the Dun and Bradstreet database, and top-level executives (general manager, financial director, or chief accountant) are interviewed. The final sample includes 1,245 observations of Slovenian MSMEs interviewed once each between 2014 and 2020.[5]

### *3.2 Variable definitions*

#### *3.2.1 Dependent variables*

In line with Farè et al. (2024), we first identify firms investing in innovation with the following question: *"For what purpose was financing used by your enterprise during the past six months?"*. The dichotomous variable *Innovation* is equal to one if the firm replies *"Developing and launching of new product and services"* and zero otherwise. Second, we detect enterprises that are credit constrained because of the excessive cost of borrowing with the following question: *"You mentioned that bank loans are not relevant for your enterprise. What is the main reason for this?"*. The dichotomous variable *Constraints* is equal to one if the declared reason is *"Interest rate or price too high"* and zero otherwise.[6]

[5] For further details, we refer to https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html (May 2024). Questions employed to build the dependent variables were included in SAFE for the first time in 2014, determining the sample's starting year. Different enterprises were surveyed each year, such that 1,245 coincides with the total number of firms included in the sample.

[6] The lack of information on interest rates prevents us from assessing interest rate dispersion and testing Farè et al. (2024) third proposition.

*3.2.2 The bankruptcy system reform in Slovenia*

As 2015 marked a turning point in the Slovenian bankruptcy system (Figure 1), we construct a dichotomous variable (*Reform*) equal to one after and zero before 2015 to distinguish firms interviewed before and after the end of the reform process.

*3.2.3 Control variables*

We consider several firm-level controls possibly affecting the MSMEs' financing and innovation activities, including firms' size, sector of activity, age, ownership type, legal status, and turnover. As the increase in innovation investments could be connected to public incentives aimed at strengthening the emergence of startups and technological innovation, we control for firms obtaining public subsidies. Table A1 in the Appendix A in the Online Supplementary Material summarizes and defines the variables employed in our analysis.

*3.3 Empirical model*

We perform the following probit model:

$$Y_{i.s} = \beta_0 + \beta_1 Reform + \beta_j X_{i,s} + \eta_s + \varepsilon_{i,s}$$

$Y_{i,s}$ is either *Innovation* or *Constraints* for firm *i* in sector *s*. *Reform* is the treatment variable, and its coefficient measures the change in *Innovation* and *Constraints* pre- to post-reform (Greene, 2003); $X_{i,s}$ the controls vector, while $\eta_s$ includes sector dummies. We expect $\beta_1$ to be positive with *Innovation* and negative with *Constraints*. Given the limited number of observations, we estimate the model by pooling MSMEs together.

## 4. Results

In this section, we present the main results of our econometric analysis. We report additional data description and stylized facts in the Appendix B in the Online Supplementary Material.

### *4.1. Bankruptcy system and MSMEs' innovation investment*

Table 1 reports the results when using *Innovation* as the outcome variable. Model (1) is our baseline specifications and includes firm-level controls only. To test the effect of the reform process on innovation investments, we add our treatment variable *Reform* in Model (2) and (3), without and with firm controls, respectively. The relationship between the treatment and the outcome variable is positive and statistically significant at the 5% (Model 2) and the 1% level (Model 3). Models (2) and (3) document an increase in MSMEs' likelihood to invest in innovation after the implementation of the reform. Among the control variables, industry, turnover, and subsidy have a statistically significant relationship with the dependent variable.

[Table 1 here]

### *4.2. Bankruptcy system and MSMEs' credit constraints*

Table 2 reports the results when using *Constraints* as the outcome variable. Model (1) is the baseline specification, while in Models (2) and (3) we add the treatment variable without and with firm controls, respectively. The relationship between the treatment and the outcome variable is negative and statistically significant at the 5% level in both Models (2) and (3), documenting that the reform has reduced the share of Slovenian MSMEs that do not access bank loans because of the high cost of borrowing.[7] Firm turnover and subsidy are also associated with the likelihood of constraints. Table 2 suggests that easier access to credit

[7] The smaller number of observations compared to Table 1 is due to the fewer answers to the question we use to build our variable *Constraints*. We discuss this issue in the Appendix D in the Online Supplementary Material.

conditions has been a potential driving factor of the increase in MSMEs' innovation investment documented in Table 1. Combined, Tables 1 and 2 also suggest that firms with lower turnover have higher investments in innovation and, at the same time, higher financial constraints. While the fact that they face higher financing constraints is in line with prior research, their higher investment in innovation is more surprising. However, recent literature has highlighted the vibrant innovation activity of small businesses, including micro ones, particularly in Europe (e.g., Audretsch et al., 2020; Baumann and Kritikos, 2016; Farè, 2022). The notable innovation propensity of small businesses emerging from our findings supports the growing evidence that European MSMEs are active players in promoting innovation. We report robustness tests of our results in the Appendix C in the Online Supplementary Material.

[Table 2 here]

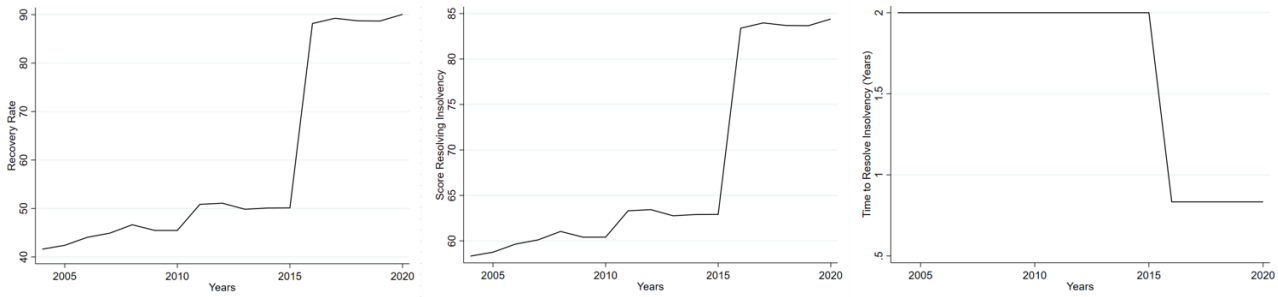
## 5. Conclusion

This paper investigates the impact of a Slovenian bankruptcy system reform process on MSMEs' innovation investments and access to credit. We subject Farè et al. (2024)'s theoretical findings to empirical scrutiny by exploiting a quasi-natural experimental setting. Our results document that the reform process promoted MSME investment in innovation and their access to finance. We expand the literature on small business innovation and financing by showing that an effective bankruptcy system can reduce their credit constraints and promote their investment in innovation.

The present study informs policymakers that national policies improving bankruptcy systems are practical tools to facilitate access to credit and innovation for MSMEs. Governments are highly concerned with promoting small business innovation. Slovenia is a virtuous example of how to achieve this goal. As our single-country setting may limit the generalizability of our findings, we encourage future scholarly efforts to examine the impact of similar reform processes in different contexts.

## Figures and Tables

Figure 1: Evolution of Resolving Insolvency Indicators.




Notes: The figure illustrates the evolution of Doing Business resolving insolvency indicators.

Table 1: Bankruptcy system reform and investment in innovation.

| DV: Innovation | (1) | (2) | (3) |
|---|---|---|---|
| Reform | | 0.072** | 0.083*** |
| | | (0.032) | (0.031) |
| Small | 0.066 | | 0.064 |
| | (0.041) | | (0.041) |
| Micro | 0.046 | | 0.037 |
| | (0.057) | | (0.057) |
| Construction | -0.240*** | | -0.238*** |
| | (0.051) | | (0.051) |
| Trade | -0.045 | | -0.046 |
| | (0.040) | | (0.040) |
| Services | -0.093*** | | -0.095*** |
| | (0.032) | | (0.032) |
| 5 <= Age < 10 | 0.032 | | 0.042 |
| | (0.045) | | (0.044) |
| 2 <= Age < 5 | 0.029 | | 0.046 |
| | (0.073) | | (0.073) |
| Age < 2 | 0.153 | | 0.208 |
| | (0.204) | | (0.205) |
| 10mln< T <=50mln | 0.302** | | 0.303** |
| | (0.125) | | (0.126) |
| 2mln< T <=10mln | 0.307** | | 0.312** |
| | (0.124) | | (0.124) |
| 1mln< T <=2mln | 0.261** | | 0.269** |
| | (0.133) | | (0.133) |
| 500k< T <=1mln | 0.321** | | 0.329** |
| | (0.135) | | (0.136) |
| T <= 500K | 0.296** | | 0.307** |
| | (0.138) | | (0.138) |
| Family | -0.034 | | -0.021 |
| | (0.091) | | (0.091) |
| Other Firm | -0.070 | | -0.061 |
| | (0.095) | | (0.095) |
| Individual | -0.058 | | -0.049 |
| | (0.090) | | (0.090) |
| Other | 0.014 | | 0.032 |
| | (0.107) | | (0.106) |
| Autonomous | 0.050 | | 0.047 |
| | (0.043) | | (0.043) |
| Subsidy | 0.087** | | 0.087** |
| | (0.039) | | (0.039) |
| Observations | 1,072 | 1,092 | 1,072 |
| Pseudo R-Squared | 0.044 | 0.005 | 0.051 |

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table reports probit average partial effects (APEs), and all the specifications use sampling weights. “Medium” is the reference category for firm size; “Industry” is the reference category for the firm sector; “Age ≥ 10” is the reference category for firm age; “T > 50mln” is the reference category for firm turnover; “Public shareholders” is the reference category for firm ownership.

Table 2: Bankruptcy system reform and constrained firms.

| DV: Constraints | (1) | (2) | (3) |
|---|---|---|---|
| Reform | | -0.079** | -0.083** |
| | | (0.031) | (0.032) |
| Small | -0.001 | | 0.010 |
| | (0.061) | | (0.062) |
| Micro | 0.042 | | 0.056 |
| | (0.073) | | (0.073) |
| Construction | 0.046 | | 0.044 |
| | (0.057) | | (0.058) |
| Trade | -0.018 | | -0.022 |
| | (0.056) | | (0.057) |
| Services | -0.011 | | -0.008 |
| | (0.040) | | (0.040) |
| 5 <= Age < 10 | 0.059 | | 0.053 |
| | (0.043) | | (0.043) |
| 2 <= Age < 5 | 0.040 | | 0.001 |
| | (0.066) | | (0.070) |
| Age < 2 | 0.000 | | 0.000 |
| | (0.000) | | (0.000) |
| 10mln< T <=50mln | 0.592*** | | 0.585*** |
| | (0.097) | | (0.101) |
| 2mln< T <=10mln | 0.682*** | | 0.658*** |
| | (0.100) | | (0.106) |
| 1mln< T <=2mln | 0.665*** | | 0.637*** |
| | (0.115) | | (0.122) |
| 500k< T <=1mln | 0.684*** | | 0.670*** |
| | (0.116) | | (0.126) |
| T <= 500K | 0.649*** | | 0.631*** |
| | (0.122) | | (0.131) |
| Family | 0.005 | | -0.012 |
| | (0.111) | | (0.109) |
| Other Firm | -0.101 | | -0.106 |
| | (0.110) | | (0.107) |
| Individual | 0.016 | | 0.008 |
| | (0.109) | | (0.106) |
| Other | 0.112 | | 0.106 |
| | (0.140) | | (0.137) |
| Autonomous | -0.023 | | -0.021 |
| | (0.055) | | (0.054) |
| Subsidy | 0.119** | | 0.125** |
| | (0.060) | | (0.061) |
| Observations | 485 | 501 | 485 |
| Pseudo R-Squared | 0.062 | 0.019 | 0.082 |

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table reports probit average partial effects (APEs), and all the specifications use sampling weights. “Medium” is the reference category for firm size; “Industry” is the reference category for the firm sector; “Age ≥ 10” is the reference category for firm age; “T > 50mln” is the reference category for firm turnover; “Public shareholders” is the reference category for firm ownership.

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## Online Supplementary Material

## Appendix A: Variable definitions

Table A1: Variable definitions.

| Variable | Definition |
|---|---|
| *Panel A: Dependent variables* | |
| Innovation | Dummy equal to 1 if the firm used financing to develop or launch new products or services. |
| Constraints | Dummy equal to 1 if the firm is constrained because of too high interest rates. |
| *Panel B: Explanatory variable* | |
| Reform | Dummy equal to one after 2015 and zero otherwise. |
| *Panel C: Control variables* | |
| Firm size dummies | Micro (from 1 to 9 employees); Small (from 10 to 49); Medium (from 50 to 249). |
| Sector dummies | Industry (if industry is the main activity); Construction (if construction is the main activity); Trade (if trade is the main activity); Services (if services is the firm's main activity). |
| Age dummies | Age < 2; 2 ≤ Age < 5; 5 ≤ Age < 10; Age ≥ 10. |
| Turnover (T) dummies | T ≤ €500k; €500k < T ≤ €1mln; €1mln < T ≤ €2mln; €2mln < T ≤ €10mln; €10mln < T ≤ €50mln; T > €50mln. |
| Ownership type dummies | Public shareholders; family; business associate; venture capital (VC) or business angel (BA); single owner; others. |
| Autonomous | Dummy equal to one if the firm is an autonomous profit-oriented enterprise and zero otherwise. |
| Subsidy | Dummy equal to one the firm received grants or subsidies and zero otherwise. |

## Appendix B: Data description and stylized facts

Table B1 reports descriptive statistics of the variables employed in our analysis. 22% of the Slovenian MSMEs invested in innovation[8], and 10% is credit constrained because of too high interest rates. Regarding size, 36% are medium, 28% small, and 36% micro, signaling a good representativeness of the MSMEs population, including micro businesses. The majority of surveyed enterprises operate in the industry (29%) and services (42%) sectors; are ten or more years old (86%); have turnover between €2 and €10 million (30%), or up to €500K (26%); are either owned by family (31%) or by individual (46%); are autonomous (83%). Table B2 reports correlation coefficients among variables included in the econometric analysis.

[Tables B1 and B2 here]

Figure B1 shows that, after the reform process, the share of Slovenian MSMEs investing in innovation has markedly increased (Panel A), while that declaring to be credit constrained has decreased (Panel B). Figure B2 compares the post-pre 2015 differences in variables *Innovation* and *Constraints* (in absolute value) between Slovenia and neighboring countries that did not implement a similar reform (i.e., Austria, Croatia, Hungary, Italy). Standard deviation among neighboring countries differences is reported. Slovenia experienced a greater increase in the number of MSMEs investing in innovation (6.8 *versus* 2.0 percentage points) and a more sizeable reduction of constrained firms (8.8 *versus* 4.9 percentage points) compared to neighboring countries. These facts suggest that the reform was relevant in fostering MSMEs' investment in innovation and that easier access to credit might have been a major driving factor.

[Figures B1 and B2 here]

[8] According to the Community Innovation Survey 2018, the sum of product innovators with and without market novelties in Slovenia was around 26%, which is in line with our statistics. For further details, we refer to https://ec.europa.eu/assets/rtd/eis/2023/ec_rtd_eis-country-profile-si.pdf (May 2024).

Table B1: Descriptive Statistics.

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Innovation | 1,092 | 0.221 | 0.415 | 0 | 1 |
| Constraints | 501 | 0.110 | 0.313 | 0 | 1 |
| Reform | 1,245 | 0.711 | 0.454 | 0 | 1 |
| Medium | 1,245 | 0.365 | 0.482 | 0 | 1 |
| Small | 1,245 | 0.276 | 0.447 | 0 | 1 |
| Micro | 1,245 | 0.359 | 0.480 | 0 | 1 |
| Industry | 1,245 | 0.292 | 0.455 | 0 | 1 |
| Construction | 1,245 | 0.108 | 0.311 | 0 | 1 |
| Trade | 1,245 | 0.180 | 0.384 | 0 | 1 |
| Services | 1,245 | 0.420 | 0.494 | 0 | 1 |
| Age >= 10 | 1,244 | 0.859 | 0.349 | 0 | 1 |
| 5 <= Age < 10 | 1,244 | 0.098 | 0.298 | 0 | 1 |
| 2 <= Age < 5 | 1,244 | 0.035 | 0.183 | 0 | 1 |
| Age < 2 | 1,244 | 0.009 | 0.094 | 0 | 1 |
| T > 50mln | 1,224 | 0.025 | 0.155 | 0 | 1 |
| 10mln< T <=50mln | 1,224 | 0.181 | 0.385 | 0 | 1 |
| 2mln< T <=10mln | 1,224 | 0.302 | 0.459 | 0 | 1 |
| 1mln< T <=2mln | 1,224 | 0.118 | 0.322 | 0 | 1 |
| 500k< T <=1mln | 1,224 | 0.110 | 0.313 | 0 | 1 |
| T <= 500K | 1,224 | 0.264 | 0.441 | 0 | 1 |
| Public shareholder | 1,238 | 0.018 | 0.132 | 0 | 1 |
| Family | 1,238 | 0.306 | 0.461 | 0 | 1 |
| Other Firm | 1,238 | 0.173 | 0.378 | 0 | 1 |
| Individual | 1,238 | 0.460 | 0.499 | 0 | 1 |
| Other | 1,238 | 0.044 | 0.204 | 0 | 1 |
| Autonomous | 1,245 | 0.827 | 0.379 | 0 | 1 |
| Subsidy | 1,245 | 0.096 | 0.294 | 0 | 1 |

Table B2: Correlation Matrix.

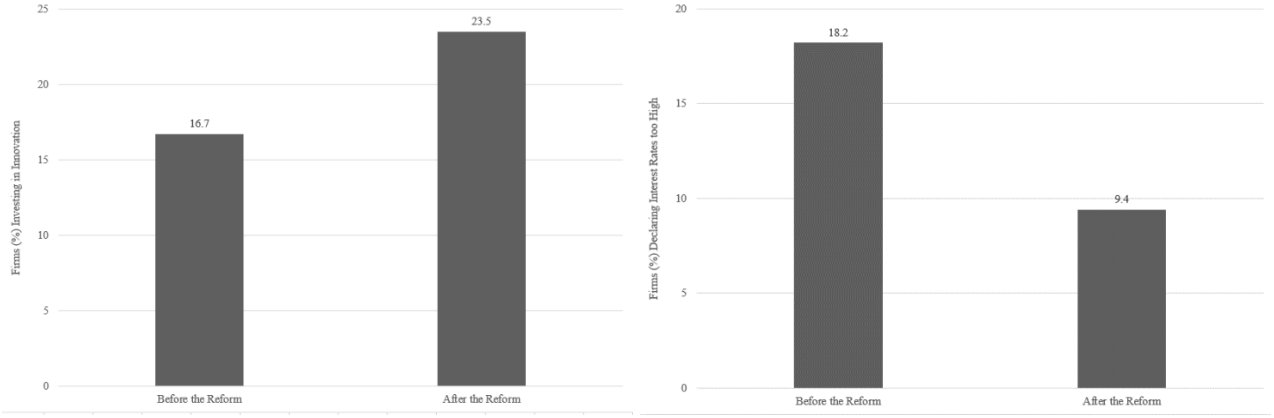
| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Innovation | 1.000 | | | | | | | | | | | | | |
| (2) Constraints | 0.024* | 1.000 | | | | | | | | | | | | |
| (3) Reform | 0.079* | -0.125* | 1.000 | | | | | | | | | | | |
| (4) Medium | -0.027* | -0.069* | 0.006* | 1.000 | | | | | | | | | | |
| (5) Small | 0.030* | -0.048* | -0.003* | -0.468* | 1.000 | | | | | | | | | |
| (6) Micro | -0.000* | 0.105* | -0.003* | -0.568* | -0.462* | 1.000 | | | | | | | | |
| (7) Industry | 0.114* | -0.023* | 0.023* | 0.287* | -0.016* | -0.274* | 1.000 | | | | | | | |
| (8) Construction | -0.103* | 0.048* | -0.034* | -0.045* | 0.005* | 0.041* | -0.224* | 1.000 | | | | | | |
| (9) Trade | 0.007* | -0.020* | 0.008* | -0.130* | 0.062* | 0.072* | -0.300* | -0.163* | 1.000 | | | | | |
| (10) Services | -0.045* | 0.006* | -0.006* | -0.136* | -0.037* | 0.170* | -0.546* | -0.297* | -0.399* | 1.000 | | | | |
| (11) Age >= 10 | -0.012* | -0.123* | 0.107* | 0.160* | 0.085* | -0.239* | 0.134* | -0.096* | 0.033* | -0.089* | 1.000 | | | |
| (12) 5 <= Age < 10 | 0.011* | 0.104* | -0.028* | -0.144* | -0.064* | 0.204* | -0.117* | 0.059* | 0.008* | 0.064* | -0.812* | 1.000 | | |
| (13) 2 <= Age < 5 | 0.002* | 0.059* | -0.102* | -0.061* | -0.038* | 0.097* | -0.063* | 0.061* | -0.065* | 0.071* | -0.466* | -0.062* | 1.000 | |
| (14) Age < 2 | 0.006* | 0.013* | -0.110* | -0.018* | -0.039* | 0.055* | -0.004* | 0.050* | -0.022* | -0.011* | -0.233* | -0.031* | -0.018* | 1.000 |
| (15) T > 50mln | -0.071* | -0.053* | 0.008* | 0.152* | -0.039* | -0.118* | -0.032* | -0.038* | 0.213* | -0.113* | 0.033* | -0.017* | -0.030* | -0.011* |
| (16) 10mln< T <=50mln | 0.010* | -0.075* | 0.042* | 0.532* | -0.209* | -0.341* | 0.218* | -0.020* | -0.030* | -0.166* | 0.129* | -0.114* | -0.067* | 0.028* |
| (17) 2mln< T <=10mln | 0.006* | -0.019* | 0.011* | 0.270* | 0.124* | -0.388* | 0.049* | -0.051* | 0.003* | -0.015* | 0.101* | -0.088* | -0.039* | -0.021* |
| (18) 1mln< T <=2mln | -0.006* | -0.005* | -0.025* | -0.216* | 0.331* | -0.091* | 0.043* | 0.012* | 0.044* | -0.082* | 0.008* | -0.003* | -0.015* | 0.011* |
| (19) 500k< T <=1mln | 0.028* | 0.040* | 0.017* | -0.264* | 0.127* | 0.147* | -0.078* | 0.046* | 0.016* | 0.030* | 0.014* | 0.013* | -0.039* | -0.025* |
| (20) T <= 500K | -0.006* | 0.063* | -0.044* | -0.454* | -0.265* | 0.706* | -0.207* | 0.043* | -0.095* | 0.238* | -0.245* | 0.191* | 0.148* | 0.011* |
| (21) Public shareholder | 0.022* | 0.006* | 0.059* | 0.101* | -0.014* | -0.088* | 0.048* | 0.013* | -0.031* | -0.028* | 0.055* | -0.045* | -0.026* | -0.013* |
| (22) Family | 0.070* | 0.024* | -0.044* | -0.062* | 0.049* | 0.016* | 0.028* | -0.038* | -0.018* | 0.012* | 0.084* | -0.072* | -0.021* | -0.044* |
| (23) Other Firm | -0.051* | -0.122* | 0.028* | 0.273* | -0.016* | -0.259* | 0.096* | -0.069* | 0.003* | -0.048* | 0.064* | -0.051* | -0.028* | -0.021* |
| (24) Individual | -0.036* | 0.070* | 0.006* | -0.248* | 0.006* | 0.243* | -0.119* | 0.114* | 0.034* | 0.012* | -0.167* | 0.141* | 0.055* | 0.068* |
| (25) Other | 0.010* | 0.023* | -0.003* | 0.174* | -0.086* | -0.094* | 0.019* | -0.074* | -0.028* | 0.050* | 0.064* | -0.057* | -0.019* | -0.020* |
| (26) Autonomous | 0.071* | 0.088* | 0.007* | -0.216* | -0.026* | 0.241* | -0.075* | 0.017* | -0.001* | 0.059* | -0.046* | 0.037* | 0.005* | 0.043* |
| (27) Subsidy | 0.106* | 0.091* | 0.031* | 0.131* | 0.014* | -0.145* | 0.187* | -0.072* | -0.056* | -0.083* | 0.049* | -0.027* | -0.033* | -0.031* |

Table B2: Correlation Matrix – Continued.

| Variables | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) | (25) | (26) | (27) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Innovation | | | | | | | | | | | | | |
| (2) Constraints | | | | | | | | | | | | | |
| (3) Reform | | | | | | | | | | | | | |
| (4) Medium | | | | | | | | | | | | | |
| (5) Small | | | | | | | | | | | | | |
| (6) Micro | | | | | | | | | | | | | |
| (7) Industry | | | | | | | | | | | | | |
| (8) Construction | | | | | | | | | | | | | |
| (9) Trade | | | | | | | | | | | | | |
| (10) Services | | | | | | | | | | | | | |
| (11) Age >= 10 | | | | | | | | | | | | | |
| (12) 5 <= Age < 10 | | | | | | | | | | | | | |
| (13) 2 <= Age < 5 | | | | | | | | | | | | | |
| (14) Age < 2 | | | | | | | | | | | | | |
| (15) T > 50mln | 1.000 | | | | | | | | | | | | |
| (16) 10mln< T <=50mln | -0.075* | 1.000 | | | | | | | | | | | |
| (17) 2mln< T <=10mln | -0.104* | -0.310* | 1.000 | | | | | | | | | | |
| (18) 1mln< T <=2mln | -0.058* | -0.172* | -0.240* | 1.000 | | | | | | | | | |
| (19) 500k< T <=1mln | -0.056* | -0.166* | -0.232* | -0.129* | 1.000 | | | | | | | | |
| (20) T <= 500K | -0.095* | -0.282* | -0.394* | -0.219* | -0.211* | 1.000 | | | | | | | |
| (21) Public shareholder | 0.058* | 0.128* | -0.036* | -0.011* | -0.009* | -0.081* | 1.000 | | | | | | |
| (22) Family | -0.048* | -0.066* | -0.002* | 0.063* | 0.093* | -0.036* | -0.089* | 1.000 | | | | | |
| (23) Other Firm | 0.150* | 0.152* | 0.172* | -0.073* | -0.093* | -0.246* | -0.061* | -0.304* | 1.000 | | | | |
| (24) Individual | -0.103* | -0.121* | -0.149* | 0.016* | 0.007* | 0.280* | -0.124* | -0.613* | -0.422* | 1.000 | | | |
| (25) Other | 0.044* | 0.077* | 0.070* | -0.040* | -0.050* | -0.091* | -0.029* | -0.142* | -0.098* | -0.197* | 1.000 | | |
| (26) Autonomous | -0.177* | -0.169* | -0.086* | 0.028* | 0.073* | 0.227* | -0.084* | 0.191* | -0.522* | 0.219* | 0.055* | 1.000 | |
| (27) Subsidy | -0.035* | 0.135* | 0.038* | -0.010* | -0.038* | -0.111* | 0.079* | 0.127* | -0.036* | -0.093* | -0.044* | 0.037* | 1.000 |

Notes: The table reports correlation coefficients between the variables employed in the econometric analysis, * $p < 0.01$.

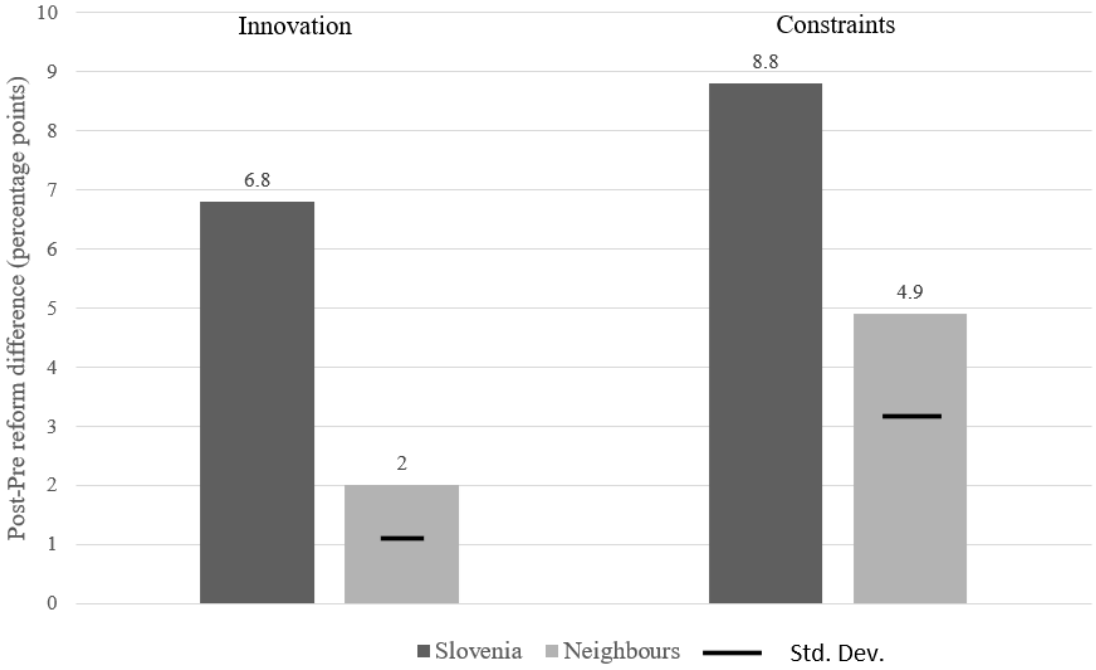
Figure B1: Firms (%) investing in innovation and credit constrained.




(A) (B)

Notes: The figure illustrates the percentage of firms that invest in innovation (Panel A) and that are credit constrained (Panel B) before and after the reform.

Figure B2: Post-Pre reform differences in innovation and constraints. Slovenia *versus* neighboring countries.




Notes: The figure illustrates the post-pre 2015 difference in innovation and constraints (absolute value) between Slovenia (dark grey column) and neighboring countries that did not implement a similar reform (Austria, Croatia, Hungary, Italy; light grey column). The black line indicates the standard deviation among neighboring countries' differences.

## Appendix C: Robustness tests

We perform additional tests to support the robustness of our results. Estimates of the robustness tests are reported in Table C1. First, we consider the possibility that the larger number of firms investing in innovation and accessing to credit may be directly influenced by economic growth and not by the reform of the bankruptcy system. We control for the effects of economic conditions by enriching our control vector with the GDP per capita and the GDP per capita annual real growth, retrieved from the World Bank database. Models (1) and (2) of Table C1 show that the effect of the reform on the investment in innovation and credit constraints occurs even when controlling for economic conditions.

Second, ensuring that the effect on the outcome is attributable to the reform of interest requires no other events that may affect the same outcome to occur during the same period. According to the World Bank/Doing Business archive, the bankruptcy system reform was the most relevant policy change affecting the business sector over the reference period. The only other reforms implemented regarding doing business concern construction permits (2014) and getting credit (2019). Given the specific application sector, we assume the first policy should not have influenced firms' innovation investments and their access to finance conditions. Conversely, the getting credit reform might have affected the outcomes of interest. To address these issues, we add a dichotomous variable (*Year2019*) equal to one in the year when the getting credit reform was implemented (2019) and zero otherwise. Models (3) and (4) of Table C1 confirm our main findings.

Third, we account for the damaging impact of the COVID-19 pandemic on MSMEs' innovation activities and access to financing. Such an effect might introduce confounding elements in our results. We, therefore, include a dichotomous (*Year2020*) equal to one at the pandemic starting year (2020) and zero otherwise. Models (5) and (6) of Table C1 support our results.

Fourth, our primary measure of *Constraints* refers to high interest rates. This is in line with Farè et al. (2024), who theoretically model the interest rate as a source of credit constraints. However, a high interest rate is not the only reason why firms are constrained from accessing finance (e.g., Stiglitz and Weiss, 1981; Whited and Wu, 2006). Thus, we employ an alternative proxy of *Constraints*. Specifically, the SAFE allows us to identify enterprises that did not apply for bank loans in the past six months "because of possible

rejection". Discouraged borrowers, that is "borrowers that do not apply to bank loans because they feel they will be rejected" (Kon and Storey, 2003: 1), is a relevant phenomenon among MSMEs and represent a major source of their financing constraints (e.g., Ferrando and Mulier, 2022). In Model (7) of Table C1, we operationalize *Constraints* with a dummy equal to one if an enterprise did not apply for bank loans in the past six months "because of possible rejection" and zero otherwise. The results show that, after the reform, the likelihood of not applying to bank loans because of possible rejection decreases, suggesting that the reform also contributed to reducing discouraged borrowers.

Finally, our findings document that the bankruptcy system reform improves MSMEs' access to credit and thus stimulates their investment in innovation. We, therefore, expect that the impact is larger for firms that were constrained before the reform. To test this prediction, we report in Table C2 the fraction of firms that are (i) constrained and invest in innovation, (ii) constrained and do not invest in innovation, (iii) unconstrained and invest in innovation, (iv) unconstrained and not invest in innovation, before and after the reform. The table provides interesting evidence in line with the prediction that the effect of the reform is greater for constrained firms. First, the fraction of firms that are unconstrained and do not invest in innovation is similar before and after the reform, suggesting that the reform has little or no effect on these firms. Second, the fraction of firms that are unconstrained and invest in innovation increases considerably after the reform. Interestingly, the difference between unconstrained firms investing in innovation after and before the reform (22.3 – 12.7 = 9.6) is almost equal to the reduction of constrained firms (9.2 – 17.4 = – 8.2). These two results combined suggest that most of the new unconstrained firms investing in innovation after the reform are firms that were constrained before the reform.

[Tables C1 and C2 here]

Table C1: Robustness tests.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| DV: | Innovation | Constraints | Innovation | Constraints | Innovation | Constraints | Constraints |
| Reform | 0.069** | -0.108*** | 0.072** | -0.087** | 0.084*** | -0.101*** | -0.082*** |
| | (0.035) | (0.040) | (0.032) | (0.034) | (0.032) | (0.035) | (0.018) |
| Small | 0.064 | 0.002 | 0.062 | 0.008 | 0.064 | 0.007 | 0.037 |
| | (0.041) | (0.061) | (0.041) | (0.062) | (0.041) | (0.061) | (0.028) |
| Micro | 0.037 | 0.042 | 0.034 | 0.055 | 0.038 | 0.047 | -0.025 |
| | (0.057) | (0.072) | (0.057) | (0.073) | (0.057) | (0.072) | (0.039) |
| Construction | -0.237*** | 0.040 | -0.238*** | 0.044 | -0.238*** | 0.041 | -0.081** |
| | (0.051) | (0.057) | (0.051) | (0.057) | (0.051) | (0.058) | (0.032) |
| Trade | -0.047 | -0.025 | -0.048 | -0.022 | -0.046 | -0.024 | 0.006 |
| | (0.039) | (0.055) | (0.039) | (0.057) | (0.040) | (0.056) | (0.024) |
| Services | -0.096*** | -0.012 | -0.096*** | -0.008 | -0.095*** | -0.012 | -0.055** |
| | (0.032) | (0.039) | (0.032) | (0.039) | (0.032) | (0.039) | (0.022) |
| 5 <= Age < 10 | 0.045 | 0.063 | 0.044 | 0.054 | 0.042 | 0.058 | 0.001 |
| | (0.044) | (0.043) | (0.044) | (0.042) | (0.044) | (0.043) | (0.028) |
| 2 <= Age < 5 | 0.047 | -0.007 | 0.049 | 0.001 | 0.046 | 0.001 | 0.026 |
| | (0.073) | (0.070) | (0.073) | (0.069) | (0.073) | (0.070) | (0.040) |
| Age < 2 | 0.209 | 0.000 | 0.211 | 0.000 | 0.207 | 0.000 | 0.087 |
| | (0.207) | (0.000) | (0.205) | (0.000) | (0.205) | (0.000) | (0.073) |
| 10mln< T <=50mln | 0.303** | 0.582*** | 0.296** | 0.584*** | 0.303** | 0.577*** | 0.456*** |
| | (0.127) | (0.102) | (0.125) | (0.101) | (0.126) | (0.099) | (0.060) |
| 2mln< T <=10mln | 0.312** | 0.662*** | 0.308** | 0.658*** | 0.312** | 0.657*** | 0.450*** |
| | (0.125) | (0.108) | (0.124) | (0.106) | (0.124) | (0.104) | (0.062) |
| 1mln< T <=2mln | 0.270** | 0.650*** | 0.264** | 0.638*** | 0.268** | 0.639*** | 0.446*** |
| | (0.134) | (0.124) | (0.132) | (0.122) | (0.133) | (0.120) | (0.066) |
| 500k< T <=1mln | 0.329** | 0.672*** | 0.324** | 0.671*** | 0.328** | 0.664*** | 0.467*** |
| | (0.136) | (0.127) | (0.135) | (0.127) | (0.136) | (0.123) | (0.070) |
| T <= 500K | 0.309** | 0.646*** | 0.305** | 0.630*** | 0.307** | 0.636*** | 0.543*** |
| | (0.139) | (0.133) | (0.138) | (0.131) | (0.139) | (0.129) | (0.077) |
| Family | -0.024 | -0.003 | -0.024 | -0.013 | -0.021 | -0.000 | 0.426*** |
| | (0.090) | (0.108) | (0.090) | (0.109) | (0.091) | (0.107) | (0.064) |
| Other Firm | -0.063 | -0.094 | -0.065 | -0.109 | -0.061 | -0.092 | 0.423*** |
| | (0.095) | (0.104) | (0.094) | (0.108) | (0.095) | (0.105) | (0.059) |
| Individual | -0.052 | 0.015 | -0.053 | 0.006 | -0.049 | 0.019 | 0.475*** |
| | (0.089) | (0.105) | (0.089) | (0.107) | (0.090) | (0.105) | (0.066) |
| Other | 0.031 | 0.135 | 0.023 | 0.104 | 0.032 | 0.127 | 0.000 |
| | (0.106) | (0.135) | (0.105) | (0.137) | (0.106) | (0.135) | (0.000) |
| Autonomous | 0.045 | -0.028 | 0.045 | -0.022 | 0.047 | -0.025 | -0.036 |
| | (0.043) | (0.057) | (0.043) | (0.054) | (0.043) | (0.055) | (0.029) |
| Subsidy | 0.086** | 0.117** | 0.087** | 0.127** | 0.087** | 0.114* | -0.032 |
| | (0.039) | (0.059) | (0.039) | (0.061) | (0.039) | (0.059) | (0.030) |
| GDP p.c. | 0.005 | 0.008 | - | - | - | - | - |
| | (0.008) | (0.010) | - | - | - | - | - |
| GDP p.c. growth | -0.000 | -0.008* | - | - | - | - | - |
| | (0.004) | (0.004) | - | - | - | - | - |
| 2019 | - | - | 0.052 | 0.019 | - | - | - |
| | - | - | (0.036) | (0.050) | - | - | - |
| 2020 | - | - | - | - | -0.004 | 0.071* | - |
| | - | - | - | - | (0.035) | (0.038) | - |
| Observations | 1,072 | 485 | 1,072 | 485 | 1,072 | 485 | 814 |
| Pseudo R-Squared | 0.051 | 0.094 | 0.053 | 0.082 | 0.051 | 0.091 | 0.17 |

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table reports probit average partial effects (APEs), and all the specifications use sampling weights. “Medium” is the reference category for firm size;

"Industry" is the reference category for the firm sector; "Age ≥ 10" is the reference category for firm age; "T > 50mln" is the reference category for firm turnover; "Public shareholders" is the reference category for firm ownership. In Model (7), the dependent variable *Constraints* is a dummy equal to one if a firm did not apply to bank loans in the past six months "because of possible rejection" and zero otherwise. We retrieve the GDP per capita and the GDP per capita annual growth from the World Bank database.

Table C2: Fraction of firms constrained, unconstrained, investing, and not investing in innovation.

| | Pre-reform | | | Post-reform | | |
|---|---|---|---|---|---|---|
| | Innovation | No Innovation | Total | Innovation | No Innovation | Total |
| Constrained | 4.6 | 12.8 | 17.4 | 2.4 | 6.8 | 9,2 |
| Unconstrained | 12.7 | 69.9 | 82.6 | 22.3 | 68.5 | 90.8 |
| Total | 17.3 | 82.7 | 100 | 24.7 | 75.3 | 100 |

Notes: The table reports the fraction of firms that are (i) constrained and invest in innovation, (ii) constrained and not invest in innovation, (iii) unconstrained and invest in innovation, (iv) unconstrained and not invest in innovation, pre- and post-reform.

## Appendix D: Discussing potential estimation bias

The reduced sample employed in Table 2 might suggest that there is missing information about financial constraints in the omitted observations, thereby raising potential estimation bias. To address this issue, we compare the descriptive statistics of the sample employed in Table 1 (i.e., descriptive statistics in Table B1) and that employed in Table 2 to ascertain whether the two samples have similar characteristics. Table D1 reports the descriptive statistics of the sample employed in Table 2. According to Tables B1 and D1, the two samples have very similar characteristics for most of the variables. The main differences are the firm size distribution and subsidy. Notably, compared to the sample of Table 1, the sample of Table 2 has a larger fraction of micro firms and fewer subsidized firms. However, as most of the variables have very similar statistics, we are confident that the difference in sampling should not create substantial estimation bias issues.

[Table D1 here]

Table D1: Descriptive statistics of the sample of enterprises employed in Table 2.

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Innovation | 422 | 0.232 | 0.423 | 0 | 1 |
| Constraints | 501 | 0.110 | 0.313 | 0 | 1 |
| Reform | 501 | 0.723 | 0.448 | 0 | 1 |
| Medium | 501 | 0.269 | 0.444 | 0 | 1 |
| Small | 501 | 0.279 | 0.449 | 0 | 1 |
| Micro | 501 | 0.451 | 0.498 | 0 | 1 |
| Industry | 501 | 0.228 | 0.420 | 0 | 1 |
| Construction | 501 | 0.104 | 0.305 | 0 | 1 |
| Trade | 501 | 0.186 | 0.389 | 0 | 1 |
| Services | 501 | 0.483 | 0.500 | 0 | 1 |
| Age >= 10 | 501 | 0.838 | 0.369 | 0 | 1 |
| 5 <= Age < 10 | 501 | 0.108 | 0.310 | 0 | 1 |
| 2 <= Age < 5 | 501 | 0.040 | 0.196 | 0 | 1 |
| Age < 2 | 501 | 0.014 | 0.117 | 0 | 1 |
| T > 50mln | 491 | 0.022 | 0.148 | 0 | 1 |
| 10mln< T <=50mln | 491 | 0.126 | 0.332 | 0 | 1 |
| 2mln< T <=10mln | 491 | 0.265 | 0.442 | 0 | 1 |
| 1mln< T <=2mln | 491 | 0.116 | 0.321 | 0 | 1 |
| 500k< T <=1mln | 491 | 0.112 | 0.316 | 0 | 1 |
| T <= 500K | 491 | 0.358 | 0.480 | 0 | 1 |
| Public shareholder | 498 | 0.016 | 0.126 | 0 | 1 |
| Family | 498 | 0.261 | 0.440 | 0 | 1 |
| Other Firm | 498 | 0.215 | 0.411 | 0 | 1 |
| Individual | 498 | 0.482 | 0.500 | 0 | 1 |
| Other | 498 | 0.026 | 0.160 | 0 | 1 |
| Autonomous | 501 | 0.788 | 0.409 | 0 | 1 |
| Subsidy | 501 | 0.052 | 0.222 | 0 | 1 |

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