Lend Me a Hand
Bank Market Power and Firm Creation in Innovative Industries

Fabrizio Core*

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Abstract

This paper studies how bank market power affects firm creation in innovative industries. Theoretically, I show that the effect of bank market power is ambiguous. I exploit a 2012 policy intervention in Italy, designed to foster firm creation in innovative industries through public bank guarantees. The policy increased firm creation in innovative industries by 50%, but the increase is more than halved in provinces where banking competition is weaker. I use both a difference-in-difference-in-differences (DDD) design and an Instrumental Variables (IV) approach on a dataset of newly incorporated firms in Italy between 2010 and 2015. I document that that what drives the result is a weaker increase in the amount of guaranteed credit extended to innovative industries by banks, and that lower firm creation leads to fewer venture capital deals. I conclude that banking competition is an important factor for the design of policies to foster innovative firm creation and venture capital activity.
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*Erasmus School of Economics, Dept. of Business Economics. *E-mail: core@ese.eur.nl.* I thank Ulf Axelson, Daniel Paravisini, Denis Gromb, Vicente Cuñat, Dirk Jenter, Filippo Mezzanotti, Andrea Polo, Tania Babina, Song Ma, Will Gornall, and Filippo De Marco for their very helpful comments. I also benefited from the comments of participants in the 7th Emerging Scholars in Banking and Finance Conference, 4th Junior Entrepreneurial Finance and Innovation Workshop, the PhD Seminar at the LSE and the HEC PhD in Finance Conference.

1 Introduction

Innovative start-ups and high growth firms account for about 50% of firm-level job creation and contribute significantly to economic growth (Mollica and Zingales (2007), Puri and Zarutskie (2012), Decker et al. (2014),). However, there are significant differences among countries in the contribution and importance of high-growth innovative young firms (Senor and Singer (2011), Henrekson and Sanandaji (2017)).

Importantly, there is no conclusive evidence on the drivers of this heterogeneity. For example, in European countries the contribution of high-growth entrepreneurship is smaller than in the US, a fact often explained with cultural factors like the stigma of failure. Yet, Axelson and Martinovic (2013) show that European entrepreneurs do not seem to suffer from a particularly strong stigma of failure. At the same time, governments and policy makers spend a significant amount of effort and resources to design and promote policies aimed at helping start-ups getting founded from VCs (Gompers and Lerner (2001)), angels (Lerner (1998)) and crowdfunding (Mollick (2014)). It is therefore of paramount importance to asses what factors contribute to the success or failure of such policies, both for future policy design and economic economic growth (Lerner et al. (2018)).

Most policies are aimed at helping firms in R&D and patenting activities on the one hand, and easing financing conditions for both debt and equity providers on the other. While it is common to use tax breaks to foster equity investments (Denes et al. (2020)), a popular way to ease financial constraints for young firms are public guarantees on bank debt and there is a vast literature documenting the importance of banks financing and public guarantees for the success of private firms (Petersen and Rajan (1994), Gonzalez-Uribe and Wang (2020)), and in particular for innovative firms (Robb and Robinson (2014)).

In this paper, I study the role of banking competition for transmission of incentives to innovative firm creation. I exploit a policy intervention of the Italian Government in late 2012, that introduced the possibility for newly incorporated innovative start-ups to get public guarantees on their bank loans, the *Start-Up Italy Act*. Developing a new and parsimonious way to measure bank market power, as proxy for banking competition, I find that in provinces where bank market power is higher the effect of the policy, measured in terms of firm creation in innovative industries, is weaker. On average, the policy intervention increased the number of innovative firms by almost 50%, while in provinces with lower competition of the banking sector the increase has been of only 20%. Therefore the effect of the pol-

icy is more than halved where banking competition is lower. The channel through which bank market power hinders the effect of the policy is that of decreasing banks' incentives to extend guaranteed credit to firms in innovative industries. In fact, I find that following the policy guaranteed credit to innovative industries grows less in less competitive provinces.

In the literature, the seminal papers by Rajan (1992) and Sharpe (1990) conclude, as a corollary, that the ability of banks to build relationships with the entrepreneurs they finance, a behaviour associated with uncompetitiveness by Boot and Thakor (2000), results in more risky ventures being financed. However, I show that the effect of banking competition is theoretically ambiguous. I develop a simple theoretical framework in which banks have market power and can extract rents: depending on the mechanism considered, access to credit of more innovative firms can be hindered or eased by higher rents. Furthermore, the introduction of a public guarantee on debt can incentivize banks toward financing more or less innovative firms, depending on the model considered.

Firstly, I start by documenting the beneficial effect of *Start-Up Italy* on firm creation in innovative industries using a difference-in-difference design. I compare firm creation in innovative and non-innovative industries, before and after the passing of the policy. The idea behind this approach is that the policy affects certain industries, where innovative start-ups are likely to be concentrated, more than others. I define innovative industries as the ones in which firms incorporated under the policy are likely to be concentrated. Importantly, I do not use the number of firms directly incorporated under the policy, as deciding to do so is an endogenous decision of the entrepreneur. I find that *Start-Up Italy* increased firm creation in innovative industries by 50% of the pre-policy mean, and it could therefore be considered a successful policy.

Secondly, to causally identify the effect of bank market power on the success of the policy, I use a difference-in-difference-in-differences (DDD) design. I add a further difference to the previous specification, and I compare firm creation in innovative and non-innovative industries, before and after the passing of the policy, and between low and high-competition provinces. As aforementioned, comparing firms creation in the two groups of industries around the policy allows me to estimate the effect of the policy intervention. The third difference, between competitive and non-competitive local banking markets (provinces), gives me the effect of bank market power on the effect of the policy. Non-competitive provinces are defined as those where the level of bank market power is above median prior to the approval

of the policy. The DDD framework allows me to use a variety of fixed-effects in the estimation, to address the concern of confounders related to the business cycle and province and industry specific factors.

To measure banking competition at the local level, I focus on bank market power, for which I develop a new measure called *Return Distance*. The *Return Distance* measures the difference between the average rate of return of short-term loans in a province and the competitive rate of return, as implied by the average probability of success of loans in the same province. The idea behind my measure is that when loans rates are not reflective of true probabilities of default, banks are imposing a mark-up on the entrepreneurs they finance. While very parsimonious and simple, the *Return Distance* highly correlates with more structured and data intensive measures of banking competition at the local level.

Moreover, I show that lower firm creation in less competitive provinces leads to weaker venture capital activity. In particular, I document that in provinces that are less competitive the number of venture capital deals in innovative industries compared to non-innovative ones is smaller, compared to the same difference in more competitive province. To estimate this effect, I use venture capital activity, proxied by number and volume of deals, as dependent variable of the DDD. This results shows that the banking sector and venture capitalists can affect each other, in particular through the role that the former plays on the investment set of the latter. In fact, lower banking competition leads to weaker firm creation in innovative industries, which in turn depresses venture capital activity.

According to the theoretical framework, bank market power could hinder the success of the policy as it distorts banks' incentives to lend to riskier firms, more so if the debt is publicly guaranteed. To explore this channel, I study the evolution of publicly guaranteed credit extended to innovative and non-innovative industries using the DDD framework. Indeed I find that, following the policy, the amount of guaranteed credit received by firms in innovative industries grows less, compared to credit to firms in non-innovative industries, in provinces where bank market power is higher. The result speaks in favor of a channel for which potential innovative entrepreneurs do not enter the market because of the lack of bank funding.

To strengthen the causal interpretation of my results, I also use an instrumental variable approach. I first estimate the effect of the policy in each province separately, using the aforementioned difference-in-difference strategy. I then regress the effect of the policy in the cross-section of provinces on the *Return Distance*. Since the degree of competition of the local banking market is not randomly assigned and

provinces with different degrees of banking competition tend to be different, the OLS estimation would suffer from omitted variables bias. To circumvent this problem, I instrument my measure of bank market power. I implement and improve the instrument developed by Guiso et al. (2004) for the Italian banking market. This instrument exploits the structure of the banking sector built by the Fascist regime in 1936, following a banking reform. Results of the IV and DDD estimations are consistent, showing that the negative effect of banking competition on the success of the policy is robust to different identification strategies.

My results are in line with Ughetto et al. (2017) and Cowling et al. (2018), who document that in presence of a public guarantee on debt, high-technology firms experience an higher penalty in the cost of debt. My contribution is that lack of banking competition not only imposes a penalty on existing entrepreneurs and firms, but also depresses firm creation and entry in high-technology industries. In light of my results, bank market power helps explaining the lag of certain European countries in developing lively start-up sectors.

My paper joins the large empirical literature about bank market power and private firms investment and innovation (Petersen and Rajan (1994), Petersen and Rajan (1995), Boot and Thakor (2000), Fields et al. (2006), DeYoung et al. (2008), Benfratello et al. (2008), Kerr and Nanda (2009), Dass and Massa (2011), Amore et al. (2013), Robb and Robinson (2014), and Hombert and Matray (2017)). Similarly to Chava et al. (2013) and Cornaggia et al. (2015), who link competitive bank behaviour to more innovation, I find that banking competition helps innovative firm creation. But unlike most of the literature, I study firm creation, focusing on firms that could be innovative, rather than on those who are. In this sense, my analysis is not exposed to a survival bias, for which firms located in less competitive banking sector could have better innovation outcomes in light of being selected ex-ante. My main contribution is showing that the pool of innovative firms in less and more competitive banking markets is different, as the existence of bank market power prevents and harms firm creation.

From a theoretical stand point, I contribute to the literature pioneered by Rajan (1992), Sharpe (1990), Landier (2003), Ueda (2004), Milhaupt (1996) and Diamond (1991), about banking competition and firms' outcomes.

In considering banks market power and its link to innovative firms, my work contributes to the literature on banking competition and innovation. Furthermore, my work builds on the literature estimating banking sector parameters using Italian data, similarly to Guiso et al. (2004), Benfratello et al. (2008) and Bonaccorsi di

Patti and Dell'Ariccia (2004). I consider the policy intervention studied by Finaldi Russo et al. (2016), but focusing on bank market power and mark up, like Coccorese (2008) and Presbitero and Zazzaro (2011).

In developing a new measure to estimate bank market power my paper contributes to the literature on concentration and competition indexes (Dickson (1979) and Feinberg (1980)), the H-Statistic (Panzar and Rosse (1987)), and structural-estimation measures, among others Claessens and Laeven (2003) and Boone (2008). Lastly, my paper gives evidence of the importance of public guarantees for innovative firms and contributes to the literature about the role of public guarantees for SMEs (Ughetto et al. (2017), Cowling et al. (2018), Gonzalez-Uribe and Wang (2020)).

The remainder of the paper proceeds as follows: Section 2 outlines the theoretical ambiguity in a simple framework of bank market power. Section 3 describes the different parts of the empirical investigation: the policy intervention, how I measure bank market power and the *Return Distance*, and the estimation strategy. Section 4 review the data sources and offers summary statistics. Lastly, Section 5 explains and discusses the main results of the paper and their robustness, while Section 6 concludes.

2 Theoretical Framework

I develop a simple theoretical framework to show how higher market power can cause banks to finance more or fewer innovative ventures, depending on the model considered. Furthermore, a policy that gives public guarantees on firms' debt can result in banks financing more or fewer innovative firms when market power is higher, where again the result depends on the model considered.

In the model banks can extract a rent from the entrepreneurs they finance, making a positive profit on the credit relationship. Depending on the design of the rent extraction process, the prediction for the finance of innovative firms differs. The model highlights two opposite effects: on the one hand, more expensive terms of credit limit the borrowing capacity of innovative entrepreneurs if they cannot pledge future cashflows; on the other hand, banks' ability to extract rents allows intermediaries to take more risks by subsidizing present cashflows with future rents, financing more risky and profitable entrepreneurs.

2.1 The General Structure

The model has three periods, *time 0, 1* and *2*. At *time 0* an entrepreneur looks for finance. If funded, the entrepreneur produces an interim risky cashflow at *time 1* (X) with a certain probability ($\frac{1}{\gamma}$), that depends on her type, and zero otherwise. If successful, requires an additional injection of funds (I) at *time 1* to continue the project. Conditionally on the second round of financing being secured, the entrepreneur produces, with probability one, a final cashflow at *time 2* ($\gamma^2 X$), that again depends on her type.

There is a continuum of entrepreneurs, each with an observable type γ that determines how innovative her project is. They are uniformly distributed across types γ on the interval $[1;\ \gamma_{max}]$. In a more innovative project (i.e. higher γ), the first cashflow is riskier, but the second cashflow is bigger. The funding required, both at *time 0* and *1*, does not depend on γ. Figure 1 shows the structure of the project and its relevant cashflows. All projects, for all values of γ, are assumed to be positive *NPV*.

Funding, both at *time 0* and *1*, is provided by banks that can only use short-term (one-period) debt claims. Each bank provides I to a specific entrepreneur at time 0 in exchange of a repayment R_1, due at *time 1*. At *time 0* banks and entrepreneurs are matched and if the entrepreneur does not secure financing for her project she gets a payoff of zero. At *time 1*, the realized cashflow is perfectly observable, so the entrepreneur cannot default strategically on her debt. If the venture is successful, the entrepreneur can refinance it with the same bank or she can switch to another one. If the entrepreneur defaults at *time 1*, the venture is liquidated for a payoff of 0 and the entrepreneur exits the game. Banks exogenously extract rents (Δ) from the entrepreneurs they finance.

The discount rate in the economy is 0 and all agents in the game (entrepreneurs and financiers) are risk neutral. Furthermore, I make the following assumptions:

Assumption 1. $\gamma \in [1;\ \gamma_{max}]$, *where* $\gamma = 1$ *is the least innovative type, the safest but least profitable project.*

Assumption 2. $I > \frac{1}{2}X$, *which ensures that the venture cannot be fully refinanced with the cashflow at time 1.*

Assumption 3. $X > I + \Delta > I$, *which makes all projects positive NPV for every* γ *and rents sufficiently small to always allow the lowest-type entrepreneur to be financed.*

Assumption 4. *Each bank in the economy is endowed with funds to finance only one entrepreneur at a time. Also, each entrepreneur can by financed by only one bank at a time.*

The NPV of each entrepreneur's project is a function of her type γ:

$$NPV(\gamma) = -I + \frac{1}{\gamma}(X - I + \gamma^2 X) = -I + \gamma X + \frac{X - I}{\gamma} > 0 \;\; \forall \gamma \in [1;\, \gamma_{max}]$$

From Assumption 1, $NPV(\gamma)$ is a strictly increasing function of γ:

$$\frac{\partial NPV(\gamma)}{\partial \gamma} = X - \frac{X - I}{\gamma^2} = \frac{X(\gamma^2 - 1) + I}{\gamma^2} > 0$$

In this simple framework, innovators are "better" the higher their type γ. To illustrate the theoretical ambiguity about the effects of banks' rent on the financing of innovative ventures, I model the rent extraction process in two alternative ways.

2.2 Ex Post Rent Extraction

The first rent extraction mechanism follows Rajan (1992), where banks can extract an ex-post rent by holding up the entrepreneur they previously financed, endogenously creating market power. The intuition behind this mechanism is that a lack of competition comes from the existence of a monitoring cost that the bank has to pay at time 0 or of a switching cost at time 1 to be paid by the entrepreneur in order to seek financing from another institution. In my simplified illustration, I call this rent Δ and it can be extracted by banks at time 2 (ex-post rent extraction), after they refinance the entrepreneur.

In the second lending relationship, in which the entrepreneur is always successful with probability 1, repayment is as follows:

$$R_2 = I + \Delta \tag{1}$$

Assuming ex-ante competition in the banking sector, it must be the case that banks do not make profits in expectation:

$$\frac{1}{\gamma}(R_1 + R_2) = I + \frac{1}{\gamma} I \tag{2}$$

By substituting 1 into 2, I obtain the first repayment banks requires from an en-

trepreneur:

$$R_1 = \gamma I - \Delta \tag{3}$$

Comparing 3 and 1 makes clear how banks are extracting rent ex-post to subsidize competitive relationships ex-ante (the hold up problem generated by either relationship lending or a switching cost). For the repayment schedule to be feasible it must hold:

$$R_1 = \gamma I - \Delta < X \;\Rightarrow\; \gamma < \frac{X + \Delta}{I} \tag{4}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I + \Delta}{X}} \tag{5}$$

In the space of parameters delimited by Assumptions 1 and 3, an higher ex-post rent Δ corresponds to more entrepreneurs of more innovative types (i.e. higher γ) that can be funded. The result comes from the higher cashflow at time 2 that more innovative entrepreneurs produce, which allows them to subsidize for the lower repayment at time 1. In other words, when Δ is higher the set of entrepreneurs that can get founding expands to the right, as the condition in 4 is less binding. On the other hand, the inequality in 5 is never binding as the RHS is smaller than one as per Assumption 3. Therfore, according to this mechanism an higher degree of competitiveness in the banking sector should be associated with a smaller number of innovative ventures getting funded, as illustrated by Rajan (1992).

2.3 Ex-Ante Rent Extraction

In the second rent extraction mechanism I study, banks have exogenously a certain degree of market power and they can extract a rent on every single credit relationship, both at *time 1* and *2*. Now banks do not subsidize the first credit relationship with a rent extracted in the second one.

The repayment schedule for a bank that finances an entrepreneur in the first and second rounds are:

$$R_1 = \gamma(I + \Delta) \tag{6}$$

$$R_2 = I + \Delta \tag{7}$$

In this framework each repayment is independent and there is no inter-temporal

profit condition analogous to Equation 2. Feasibility now requires:

$$R_1 = \gamma(I + \Delta) < X \Rightarrow \gamma < \frac{X}{I + \Delta} \tag{8}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I + \Delta}{X}} \tag{9}$$

An higher Δ is now associated with more high-type entrepreneurs (i.e. more innovative ones) excluded from funding. As in the previous case, 9 is never binding, as the right-hand-side is always smaller than one by Assumption 3.

The takeaway of this mechanism is that an higher degree of banking competition results in more innovative entrepreneurs getting funded. When instead competition is weaker, the terms of credit are more expensive and, without being able to pledge future cashflows, more innovative firms do not have enough funds at time 1 to compensate the bank for their riskiness and also pay the additional rent, $\gamma\Delta$.

2.4 Guarantees' Effect

After establishing the theoretical ambiguity between market power and the financing of innovation, I study the impact of a policy that gives a public guarantee on entrepreneurs' debt in the presence of banks' rent extraction.

To model the guarantee, I assume that in case of failure of the project the bank can recover an amount kI, where $k \in (0, 1)$. The guarantee is relevant only in the financing of the first period, as in the second period all surviving projects are certain to be successful.

2.4.1 Guarantees' Effect - Ex-Post Rent Extraction

Implementing the policy in the ex-post rent extraction mechanism yields the analogous of equations 1 and 2:

$$R_2 = I + \Delta \tag{10}$$

$$\frac{1}{\gamma}(R_1 + R_2) + (1 - \frac{1}{\gamma})kI = I + \frac{1}{\gamma}I \tag{11}$$

By substituting 10 into 11, I obtain the first repayment banks ask to a generic entrepreneur:

$$R_1 = \gamma(1 - k)I + kI - \Delta \tag{12}$$

Feasibility of the repayment schedule requires:

$$R_1 = \gamma(1-k)I + kI - \Delta < X \;\Rightarrow\; \gamma < \frac{X + \Delta - kI}{I - kI} = \bar{\gamma} \tag{13}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I+\Delta}{X}} \tag{14}$$

Banks are now able to finance entrepreneurs up to the type $\bar{\gamma}$. Differentiating the quantity with respect to k returns the effect of the policy on the marginal type:

$$\frac{\partial \bar{\gamma}}{\partial k} = \frac{X + \Delta - I}{(1-k)^2 I} > 0 \tag{15}$$

Where the last inequality comes from Assumption 3. Under ex-post rent extraction mechanism, the policy is beneficial to extend credit to more innovative firms as the terms of credit are less expensive. To assess how rent extraction affects the policy's effect I differentiate 15 with respect to Δ:

$$\frac{\partial^2 \bar{\gamma}}{\partial k \partial \Delta} = \frac{1}{(1-k)^2 I} > 0 \tag{16}$$

Equation 16 shows that the effect of the policy should be greater when rents (i.e. market power) are higher and terms of credit more expensive.

2.4.2 Guarantees' Effect - Ex-Ante Rent Extraction

To obtain the effect of the policy under an ex-ante mechanism of rent extraction, I rewrite Equations 6 and 7 introducing the guarantee:

$$R_1 = \gamma(I + \Delta) - k(\gamma - 1)I \tag{17}$$

$$R_2 = I + \Delta \tag{18}$$

Following the previous steps feasibility requires:

$$R_1 = \gamma(I + \Delta) - k(\gamma - 1)I < X \Rightarrow \gamma < \frac{X - kI}{I + \Delta - kI} = \hat{\gamma} \tag{19}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I+\Delta}{X}} \tag{20}$$

Where $\hat{\gamma}$ is the marginal type that banks are willing to finance. To find the effect of the policy on the marginal type, I differentiate $\hat{\gamma}$ with respect to k:

$$\frac{\partial \hat{\gamma}}{\partial k} = \frac{I(X - \Delta - I)}{(I + \Delta - kI)^2} > 0 \tag{21}$$

The last inequality in 21 comes from Assumption 3 and states that the introduction of a partial guarantee on bank debt expands the set of innovative types funded in equilibrium.

Again, I want to find how rents and market power impact on this beneficial effect. Further differentiating 21 by Δ yields:

$$\frac{\partial^2 \hat{\gamma}}{\partial k \partial \Delta} = -\frac{I(X - \Delta - I + X - kI)}{(I + \Delta - kI)^3} < 0 \tag{22}$$

Where Assumption 3 again implies the last inequality. 22 shows that if banks extract rents ex-ante, higher rents make the terms of credit more expensive causing the guarantee to expand the set of innovative types less.

This simple theoretical exercise shows that bank market power (i.e. lower banking competition) can be both beneficial and detrimental for financing more innovative entrepreneurs, depending on the mechanism considered. Furthermore, the effect of a policy introducing a public guarantee on debt can be amplified as well as hindered by an higher degree of market power. The following empirical investigation serves the purpose of solving such theoretical ambiguity.

3 Empirical Framework

The following section describes the parts of the empirical investigation. Subsections 3.1 and 3.2 give an overview of the policy (SIA) and explain how I construct my new measure of bank market power and competition. Subsection 3.3 illustrates my estimation and identification strategies.

3.1 The Policy Intervention

To foster innovative firm creation in Italy, the government launched in December 2012 the *Start-Up Italy Act* (SIA): a series of incentives for new and young firms which qualify as innovative, according to a set of criteria.[1]

[1] in Italian, *Decreto Crescita 2.0.*

To take-up the program, a firm must satisfy all the following conditions at the time of take-up:

1. Being incorporated in Italy as a limited-liability company and be less than 5 years old;
2. Having the development, production and commercialisation of innovative products or services with a clear technological component as main business objective;
3. Having an annual turnover smaller than 5 million Euros as per the last available balance sheet;
4. Not having distributed any dividend in the past;
5. Not being not the result of a company merger or split-up, or of a business or branch transfer.

In addition, at least one of the following conditions must be met:

1. Having R&D expenses accounting for at least 15% of the biggest between turnover and total annual costs;
2. Having a registered patent or an original registered software (or having filed an application for an industrial property right);
3. Having at least one third of the total workforce holding a PhD or having been researchers in accredited institutions, or at least two thirds holding a master degree.

Once a firm takes up the program, it has access to the following benefits:

- Preferential access to government's guarantees on 80% its bank debt (*Fondo di Garanzia per le PMI*);
- A favorable employment law to incentivize the use of stock options and work for equity as means of compensation;
- Tax breaks for private and public investors in the start-up's equity;
- An easier and faster procedure for filing for bankruptcy and being liquidated;
- Exemption to several bureaucratic duties and red tape (e.g. subscribing to the registry usually entails a fee but it is free for start-ups taking up the program).

The access to the public guarantee is given preferentially and always for 80% of bank debt to start-ups under the program. This is the policy feature I exploit in my analysis. The public guarantee must be obtained at the moment in which the bank grants credit to the start-up. Importantly, the guarantee must be requested by the bank, not the firm, and if it is approved the bank cannot require further guarantees from the firm. The *Italian Guarantee Fund for SMEs*, financed by the Italian Ministry of Economic Development, pays the bank in case of default of the borrower up to a percentage, depending on the type of operation and counter-party (as aforementioned, for innovative start-ups the percentage is always 80%). Both short-term and long-term loans are eligible for the guarantee.

3.2 Measuring Bank Market Power

The literature in banking and finance frequently rely on the Herfindahl-Hirschman Index, usually calculated on loans, deposits or branches, as a synthetic measure of banking competition. Albeit its popularity, several studies underline HHI limitations in the banking context, especially if used cross-sectionally. Among others, Rhoades (1995) show that HHI does not fully account for inequality of market shares and the number of firms in the local banking market and Hannan (1997) notice that this problem is more relevant when explaining loan rates.

For these reasons, I develop a new measure of bank market power called Return Distance (RD). My measure stems from the observations that when banks have market power the terms of credit are too expensive, in the sense that the rate at which a loan is given does not reflect the true probability of the entrepreneur repaying it. A risk-neutral competitive bank should price loans to make zero profits in equilibrium:

$$p(1+r) - 1 = 0 \quad \Rightarrow \quad r^\star = \frac{1-\bar{p}}{\bar{p}} \tag{23}$$

Where $\bar{p}$ is the true probability of success and $r^\star$ is the (net) rate of return that a competitive lender sets to lend one unit of funds for one period of time to the average borrower. If the observed average rate of return on loans ($\bar{r}$) is bigger than $r^\star$ banks could be extracting rents in equilibrium and making a profit. The bigger the difference between the observed and the competitive average rate, the higher the rents and market power. I define the Return Distance (RD) as:

Definition 1. $RD = \bar{r} - r^\star$

The RD measures rents for loans that are homogeneous in maturity, not col-

lateralized and given by risk-neutral intermediaries.[2] Furthermore, my synthetic measure does not account for other fixed costs. For my empirical analysis this is not an invalidating concern, as long as such costs do not vary by province.

The Return Distance must be estimated in the local banking market, where banks should on average make zero profits. I choose the province as a unit of observation as an established literature in banking indicates that the province is the appropriate local banking market in Italy (see Herrera and Minetti (2007), Alessandrini et al. (2009), and Presbitero and Zazzaro (2011)).[3]

To calculate RD, I focus on short term loans, defined by the Bank of Italy as *Finanziamenti per Cassa*. These are non-collateralized loans with maturities shorter than 12-months, the products for which the return distance is more likely to be a good indicator of bank market power.

To calculate the average probability of repayment I use the rate of delinquencies. The Bank of Italy defines delinquencies, called *Sofferenze Rettificate*, as loans for which the borrower experiences a judicial or substantial state of default and the lender cannot expect the loan to be repaid, either partially or in full. They are recorded by the type of the counter-party: limited and unlimited liability partnerships (the latter also called *Productive Families*). Loans to limited liability companies account on average for 92.6% of the total Euro-value. For every province I calculate a weighted average of the delinquency rates, using as weights the total Euro amounts (L_i) of short term loans given to these two types of counter-parties:

$$\bar{d} = \frac{d_{pf} L_{pf} + d_{nfc} L_{nfc}}{L_{pf} + L_{nfc}} \tag{24}$$

Given the average rate of delinquency, $\bar{d}$, I furthermore obtain $r^\star$, the competitive average rate of return, as $\frac{\bar{d}}{1-\bar{d}}$ analogous of Equation (23), where $\bar{d} = 1 - \bar{p}$.

To obtain RD, I subtract $r^\star$ from the average rate of return of short-term loans, $\bar{r}$. The Bank of Italy collects data on rates offered by banks on short-term loans by category of the loan. There are three main categories of short-term loans:

1. Revocable Loans: loans that can be unilaterally terminated by banks (e.g. credit lines);

2. Fixed-term Loans: unsecured loans that cannot be terminated by either parties before maturity (e.g. unsecured leasing);

[2] According to Nishiyama (2007) banks are close to risk neutrality.
[3] Italy, in 2016, was divided in 20 regions and 105 provinces

3. Self-liquidating Loans: loans given against some form of account receivables (e.g. factoring).

For each of these types of short-term loans, BOI collects the average return rate and the total amount outstanding, in each province in each quarter. Fixed-term loans are the most represented category, accounting on average for 70% of the total Euro-value of loans in a province. Starting from the average rate of each category, I compute a weighted average using the total Euro-value of the respective category (L_j):

$$\bar{r} = \frac{r_R L_R + r_F L_F + r_S L_S}{L_R + L_F + L_S} \tag{25}$$

Subtracting $r^\star$ from $\bar{r}$, as per Definition 1, gives the Return Distance measured in each province.

I calculate the Return Distance for each Italian province from the first quarter of 2010 to the fourth quarter of 2012 (the passing of Start-Up Italy). For each province, I calculate the time-series average RD over the period 2010-2012, which I refer to as the *pre-policy* period.

Lastly, I rank the provinces according to the median RD. Provinces above median are those in which bank market power is higher, and provinces below median are the more competitive. The resulting dummy variable *Rent* constitutes one of the treatment assignments of the empirical analysis.

3.3 Estimation and Identification

The goal of this analysis is to estimate the causal effect of bank market power on the effectiveness of the SIA policy. To estimate the effect of SIA, I study the evolution of incorporations in innovative industries around the passing the policy, in provinces with higher and lower banking competition.

Starting from data about the firms that took up the program, I identify the industries that are over-represented in the sample compared to the distribution of firms in Italy. Industries are defined as two-digits NACE codes. I define over-represented industries as innovative, and the rest as non-innovative (or less innovative). I do not use directly the number of incorporations under the program because taking up the program is an endogenous decision of the firm. The idea behind the industry assignment is to identify industries that are more likely to be exposed to the effects of the policy. The list of innovative industries can be found in Table 1.

Firstly, I use a difference-in-differences (DID) design to estimate the effect of

the policy. I compare the difference in incorporations before and after the policy between innovative and non-innovative industries. I estimate the following equation:

$$y_{piq} = \alpha + \gamma Industry_i \times Policy_q + Q_q + I_i + P_p + \epsilon_{piq} \tag{26}$$

The unit of observation is at the industry×Province×Quarter. $Industry_i$ is a dummy equal to 1 if the industry is innovative and 0 otherwise, $Policy_q$ is dummy equal to 1 after 2012Q4 and 0 before and Q_q, I_i, P_p are quarter, industry and province fixed effects. Quarter fixed effects account for time-varying economic conditions at the national level, while industry and province fixed effects help alleviating the concern of time-invariant confounders.

After estimating the effect of the policy on incorporations of firms in innovative industries, I study whether it differs in provinces where bank market power is higher, compared to provinces where it is lower. According to the theoretical framework, the policy should have a bigger (smaller) effect in provinces where market power is higher, if banks extract rents ex-post (ex-ante).

To causally identify the effect of bank market power on the effect of the policy, I add a further difference to my previous specification, resulting in the following regression equation:

$$\begin{aligned} y_{prisq} = \alpha + \beta Industry_i \times Policy_q \times Rent_p + \\ + PQ_{pq} + IQ_{iq} + PI_{pi} + PQS_{pqs}(+RIQ_{riq}) + \epsilon_{piqs} \end{aligned} \tag{27}$$

Where $Industry_i$ and $Policy_q$ are the dummies previously defined. $Rent_p$ equals one if the province has a pre-policy return distance above the national median and zero otherwise. I fully saturate the regression using Province-Quarter, Industry-Quarter and Province-Industry fixed effects to account, respectively, for time-variant dynamics at the province and industry level, as well as for time-invariant specializations of local economies. Furthermore, I add a Province-Quarter-Sector fixed effect (PQS_{pqs}) to account for differential trends of various sectors in different provinces. Sectors are defined as collections of industries, according to the main NACE codes. In most specifications, I also add a Region-Industry-Quarter fixed effect to account for additional policies introduced at the regional level to foster the Start-Up Italy Act (RIQ_{riq}), and that could result in differential industry-specific trends across regions.[4] y_{prisq} is the dependent variable of interest, corresponding to the number

[4] According to Albanese et al. (2019), between 2012 and 2018 regions launched 75 policies,

of newly incorporated firms, its natural logarithm, and the percentage of incorporations to the total of firms registered 4 quarters before in each industry-province combination. The coefficient β is the DDD estimator, where the three differences are pre and post policy, innovative and non-innovative industries and high and low bank market power provinces. The coefficient β captures the impact of bank market power on the effect of the policy in the two groups of provinces.

In alternative specifications, I assign the treatment $Rent_p$ to provinces within the same region. In these specifications, $Rent_p$ equals one if the province's bank market power is above the median value calculated at the region-level. Regions are collection of provinces and constitute the main level of local administration in Italy. Provinces within the same region share the same local government and parliament. This second specification helps in alleviating concern of least competitive provinces being geographically clustered.

My identification strategy relies on the fact that I am able to control for all those factors, other than the policy, that could affect firm-creation differentially in innovative and non-innovative industries and, at the same time, differentially in the two sets of provinces. In fact, the saturated regression specification in Equation 27 accounts for all those factors that additively interact with the endogenous variable. To take into account potential correlations between observations, in all specifications standard errors are clustered at the province level.

3.4 Instrumental Variable Approach

Alternatively, I estimate the importance of bank market power on the effect of SIA by firstly estimating the policy's effect in every province and then regressing these effects on the cross-section of bank market power at the province level. I estimate the effect of the policy at the province-level by estimating β from Equation 26 for every province separately, and then regress the βs on the return distance in the cross-section of provinces. Since bank market power is endogenous, an OLS regression of the βs on RD would not have a causal interpretation. To circumvent the problem, I instrument bank market power.

To do that, I rely on the instrument developed by Guiso et al. (2004), who exploit the Italian reform of the banking sector, carried out by the Fascist regime in 1936. In particular, they show how the number of bank branches per capita and the number of savings bank branches per capita can be used as instruments for local

totalling 340 million €, to support innovative start-ups.

Italian financial development and degree of competition of the banking sector. The idea behind the instrument is that the 1936 banking reform allowed savings banks to operate and set up branches in all the provinces of the region in which they operated in 1935, whereas it restricted to one province the area of operation of all the other types of banks (e.g. national and cooperative banks). According to Guiso et al. (2004), the Fascist regime favored savings banks because the directors of most saving banks were donors of the Fascist Party. The same instrument has also been used by Cao et al. (2020) for relationship lending in Italy.

While Guiso et al. (2004) use the instrument at the region-level, my analysis is conducted at the level of the province. Therefore, I refine the instruments (i.e. number of banks branches and of savings bank branches per capita) by measuring them at the province level (104 provinces). In particular, I use the same 104-province partition of the main analysis. Since the boundaries of provinces changed since 1936, I reconstruct the population of the 104 provinces in 1936 from the population data of municipalities at that time, digitalizing the 1936 Italian Census.

4 Data

I obtain data from a variety of sources. Data on quantities needed to estimate the return distance is from the Bank of Italy's (BOI) Surveillance database at the province-quarter level. The database, collected by BOI to ensure the stability of the Italian banking sector, contains information on the delinquency rates, rates of return and quantities outstanding of short-term loans at the province-quarter frequency. Data is available for 104 Italian provinces, as BOI does not collect data on *Valle d'Aosta*, situated in the North-West of the country and accounting for 0.21% and 0.22% of the Italian population and GDP, respectively.

Data on the number of new firms incorporated and registered in all of the 99 industries (2-digits NACE codes) is from *Rapporto Movimprese*. *Rapporto Movimprese* is redacted by the statistic department of the Italian Chambers of Commerce (*InfoCamere*), which collects and aggregates data from the business registries all over Italy. The data runs from 1995 to 2017 and comprises information at quarterly frequency about the total number of firms in the registry, the number of firms which are active and the number of firms incorporated and dissolved in that quarter, both for limited-liability companies (LLCs) and non-limited-liability companies

(NLLCs).[5] Data are aggregated by province and by industry. In Italy there were 105 provinces in 2016, and they represent the intermediate administrative level between town councils and regions. Industries are defined according to the Italian ATECO classification, which corresponds to two-digits NACE (European counterpart of NAICS) codes, and there are 99 of them (e.g. *manufacturing of chemical products* or *catering and food services*). Following Bertrand et al. (2004), I use data from eight quarters before (2010Q4) the passing of the policy (2012Q4) to eight quarters after (2015Q1) in the main analysis.

I collect data on venture capital deals in Italy from two sources: Preqin and CB Insight. I consider venture capital deals of all stages taking place between 2010 and 2015. For each venture capital deal, I identify the date and size of the deal, and the target firm. I then manually match the target firm name to the ORBIS database by Bureau Van Dijk, to identify its province and industry (i.e. two-digits NACE code). Lastly, I aggregate deals count and volume by province and industry of the target firms, as well as by quarter. The resulting dataset is a panel of venture capital activity in each two-digits NACE code and Italian province, from the first quarter of 2010 to the fourth quarter of 2015.

In a similar fashion, I collect data on publicly guaranteed loans in Italy from the Guarantee Fund.[6] For each individual loan, I collect information on the date of the loan as well as industry and location of the borrowing firm. I then aggregate the number and volume of guaranteed loans at the quarter-province-industry level. Since data by the Guarantee Fund is not available prior to the third quarter of 2012, I censor my data collection from this point up to the fourth quarter of 2017.

Data for the construction of instrumental variables (i.e. number of all and saving bank branches per capita in 1936) comes from various sources. Data about bank branches in 1936 are extracted by the BOI INFOSTAT database, which collects information about the name and type of the bank, and the location and date of opening and closing of each bank branch in Italy since 1936. Data about population in 1936 comes from ISTAT and from the original 1936 Census. By digitalizing the 1936 census at the municipality-level, I am able to reconstruct the population of Italian provinces in 1936 at their present boundaries. Form the digitalized 1936 census, I also extract information about the share of active population, the share of entrepreneurs in the workforce, as well as the share of the workforce in agriculture. Data about cars per-capita, commonly used as a proxy for wealth in the literature

[5] NLLCs in Italy are mostly unlimited partnerships and sole proprietorships.

[6] Data is publicly available at: https://www.fondidigaranzia.it/amministrazione-trasparente/

of economic history, is from *Automobile Club d'Italia*, a public entity with the goal of promoting and regulating the car sector. As data for 1936 is not available, I use the average of the values in 1933 and 1938 at the province-level. Lastly, data about value added per capita and per worker is not available at the province-level for historical years. I obtain data at the region-level as estimated in Felice (2019).

4.1 Summary Statistics

Panel A of Table 1 lists the industries that are over-represented among firms that took up the Start-Ip Italy (SIA) program. Between the passing of SIA (fourth quarter of 2012) and the end of 2016 6850 start ups took up the program. Panel B of Table 1 compares the distribution across sectors of the start-up sample and all Italian firms from *Movimprese*.[7] Almost 70% of the start-ups belongs to *ICT* and *Professional Services & R&D*, but *Manufacturing* is also over-represented. On the other hand, more traditional sectors like *Agriculture*, *Construction* and *Trade* are heavily under-represented.

According to the data, start-ups incorporated under SIA tend to have a strong preference for bank financing. In fact, the total €-value of public guarantees accessed under the program is more than 10 times the value of outside equity raised in the sample. Between 2013 and 2017, 2,410 start-ups obtained at least one loan with a public guarantee, for a total of €688.5 million. During the same time span, only 137 start-ups obtained venture capital for a total of €64.7 millions. Furthermore, according to Calenda (2017), the public guarantee on debt has been voted the most useful tool of the program by the entrepreneurs who participate. Therefore the Italian setting is ideal to study the importance of bank market power for the financing of young innovative firms.

In terms of geographical dispersion, Figure 2a shows that the policy has stimulated firms creation throughout the country, with a slight prevalence of provinces in the north-east of Italy. On average, provinces in which there are bigger cities (e.g. Rome, Milan and Naples) tend to host a higher number of start-ups. In particular, the province of Milan is a clear outlier, hosting 794 start-ups alone (more than 10% of the total).

Figure 2b plots the treatment assignment of provinces. Provinces with a high level of bank market power tend to be clustered in the South, whereas low-market

[7]Sectors are aggregations of industries, for ease of reporting. According to the Italian classification (ATECO) there are 21 sectors.

power provinces are concentrated in the North, particularly in the North-East. To address the problematic North-South divide, which affects Italy along many dimensions and it can be a confounding factor, I also rank provinces within each region on the region-median RD.[8] Figure 2c shows that ranking provinces in this way results in stronger cross-sectional dispersion within each region, without generating a North-South divide.

I run a series of t-tests for a set of economic indicators at the province level, to investigate the differences between provinces with high and low bank market power. All indicators are measured at the end of 2012, when the policy is passed. When sorting using the national median, column 1 of Panel A in Table 2, the two groups of provinces (low minus high bank market power) are different. Less competitive provinces are poorer, with higher unemployment, produce less patents and have weaker public services (i.e. higher number of blackouts and stronger emigration rates for healthcare). Column 1 of Panel B in Table 2 shows that the two groups also differ in the structure of their banking sectors. In less competitive provinces the banking sector is smaller, both in terms of loans and deposits, with fewer foreign banks and branches per capita.

Column 2 of Table 2, shows that almost all of these differences can be explained by provinces with high bank market power being mostly located in the south of the country, which suggests that differences are not driven by banking competition but by the North-South divide. On the other hand, sorting provinces using regional medians results in groups that are more homogeneous, as shown by column 3 of Table 2. The differences between the groups for most of the indicators become insignificant. Regarding the banking sector, less competitive provinces have slightly fewer loans per branch, consistent with an higher cost of credit, a slightly higher growth rate of financial companies, consistent with intermediaries that can finance growth by extracting rents, and in which the Loan/Deposit ratio is lower, signalling a less efficient intermediation sector.

To give evidence that the return distance can be used as a measure of bank market power and competition, I estimate bank conduct in every province between 2010 and 2012. To do so I replicate the procedure outlined by Coccorese (2008). Bank conduct measures the distance between marginal costs and revenues of loans in each geographic market and it is estimated structurally using non-linear simultaneous equations. To estimate conduct I collect supplementary data on GDP and employees

[8]Each region in Italy comprises more than one provinces, ranging from 2 provinces up to 12, with an average of 5.5.

costs in the banking sector at the province-level, as well as data on government bonds yields. Figure 3a shows that banks' conduct and the return distance are highly and positively correlated in the cross-section of provinces, with an R^2 of 52%. If I rank provinces using conduct, the resulting raking is consistent with the one obtained with the return distance in 78.84% of provinces at the national level and in 70.19% of provinces at the regional level. Conversely, the return distance only marginally correlated with HHI of bank branches, as shown in Figure 3b. The R^2 between the two measure is only 2%, even if the correlation is still positive.

5 Results

I start by documenting a correlation between R&D intensity of local economies and banking competition. Following the theoretical framework, if banks extract rents ex-post then an higher degree of bank market power should be associated with more risky (innovative) firms being financed. On the other hand, an ex-ante rent extraction mechanism is associated with fewer R&D-oriented firms financed.

Figure 4 plots the share of total firms that are active in R&D-oriented industries against the return distance in the cross-section of provinces. The share of R&D firms is obtained as the number of firms registered in industries in Table 1 at quarterly frequency, averaged from the first quarter of 2010 to the third quarter of 2012, the pre-policy period. The correlation between the two variables is negative, both for limited liability companies (LLCs) and unlimited liability partnerships. Notably, the slope is steeper for LLCs, consistent with these firms being riskier. Overall, a lower degree of banking competition (i.e. higher market power) is associated with economic environments less oriented towards R&D and innovation. The evidence, albeit not causal, is consistent with an ex-ante mechanism of rent extraction and a detrimental effect of low banking competition for innovation.

Next, I investigate the effect of SIA in stimulating firm creation in innovative industries using a difference-in-differences (DID) framework. Table 3 collects the estimates of the effect of the policy on incorporations of limited liability companies in innovative industries. The dependent variable is expressed both as numbers, natural logarithm of 1 plus the number of new firms and as percentage of incorporations on the total registered firms in a province-industry combination 4 quarters before. All estimates are positive and significant which is suggestive evidence of the fact that, after the passing of the policy, incorporations in innovative industries grew more than in non-innovative ones. Importantly, this result is robust to non-linear specifications

of the dependent variable using the natural logarithm. Furthermore, figure 5 gives evidence of the identifying assumption of parallel trends for the DID. In terms of magnitudes, the coefficient on the interaction term is 0.249, which corresponds to an increase of almost 50% compared to the pre policy mean of the dependent variable. SIA has therefore been a successful policy in fostering firms' entry in R&D-oreiented industries.

Next, I estimate the causal impact of bank market power on the effect of SIA. To estimate such effect, I use a difference-in-difference-in-differences (DDD) framework. A negative effect of bank's rent on the policy's effect would be further evidence of an ex-ante rent extraction mechanism. Table 4 reports coefficients of the interaction term in Equation 27 for different measures of new incorporations. The coefficient is indeed negative (column 1), meaning that lower banking competition causes the difference between incorporations in innovative and non-innovative industries to grow less. The magnitude of -0.146 accounts for more than half of SIA's effect, which is therefore half-effective in provinces with higher bank market power. The same result holds for incorporations expressed in logs (column 3) and in percentage terms (column 4), and is therefore robust to non-linear or standardized specifications of the dependent variable. The effect of lower banking competition gets bigger in magnitude when the region-industry-quarter fixed-effect is included (column 2), that accounts for additional policies at the regional level.

The identifying assumption of the DDD requires parallel trends in the differences in incorporations between high and low market power provinces for innovative and non-innovative industries, absent the policy. Figure 6 shows absence of pre-trend in the differences between the two groups of provinces and industries, sorting provinces according to both at the national and regional level.

To address concerns about the North-South divide, I estimate Equation 27 specifying the *Rent* dummy using regional medians, rather than the national one. Results are reported in Table 4, columns 5 to 7, and are comparable, both in magnitude and significance, to the ones of the previous specification. The effect on the number of incorporations is negative and significant at the 1% level, comparable in magnitude to the previous specification, and it remains negative and significant when incorporations are expressed as either logs or percentage of registered firms four quarters before.

An important empirical question is whether the excess of firms created in R&D-oriented industries in competitive provinces compared to less competitive ones changes the quality of the marginal firm. Potentially, increasing firm creation may decrease

the quality of firms, if the marginal one entering as a result of the policy stimulus should not have been funded. To explore this dimension, I study whether I observe an increase in the number and volume of venture capital deals in R&D-oriented industries in competitive provinces, compared to less competitive ones. I estimate Equation 27 using three measures of VC activity as dependent variables: number of deals, logarithm of the number of deals, and logarithm of total VC funding. A VC deals is counted in a province-quarter-industry cluster if it took place in quarter q, involving a target firm incorporated in province p and active in industry i .

Results are presented in Table 5, whereas Figure 7 shows graphic evidence of parallel trends and the effect of interest. The coefficient on the triple interaction is always negative for all dependent variables, and in particular it is significant when ranking provinces using regional medians. This result is suggestive of the fact that SIA stimulated creation of viable firms, that are more likely to obtain venture capital after founding. Since VC deals tend to be highly serially correlated, namely the same firm is more likely to obtain VC funding in subsequent rounds, this has important implications for the divergence of VC activity between provinces with high and low bank market power. Furthermore, this result also shows that VCs and banks are interconnected and influence each other. The mechanism through which banking competition affects VC activity is that of firm creation and entrepreneurial choice: by hindering firm creation in innovative industries, a lower level of banking competition shrinks the venture capitalists' investment opportunity set, eventually leading to fewer and smaller VC deals.

According to the model, the channel through which lower banking competition hinders the effect of the policy is that banks are less prone to finance new innovative firms. In order to test for this channel, I study whether the amount of funding and guaranteed loans given to firms in innovative industries increases less compared to credit to firms in non-innovative industries. Data on loans with a public guarantee are publicly available on the website of the Italian Guarantee Fund. I use loan-level data from June 2012 to the end of 2017, and I calculate the natural logarithm of total credit and total guarantees (in €), as well as of the number of loans, extended to each 2-digit NACE industry, in each province, at monthly frequency. Table 6 shows that credit, either measured as total value of loans, public guarantees or number of loans, increased less for innovative industries, compared to non-innovative industries, following the policy stimulus. The evidence presented is consistent with a mechanism for which potential entrepreneurs refrains from starting firms in innovative industries for fear of not getting funded in early stages. Importantly, the results are consistent

in specifying bank market power both at the national and regional level.

Lastly, I also study the effect of bank market power on the success of the policy stimulus through an instrumental variable approach (IV). The need of an IV stems from the non-random assignment of bank market power to different provinces, which would bias the estimation of the effect of the policy on the Return Distance through OLS. Firstly, I estimate the effect SIA in the cross-section of provinces by estimating Equation 26 separately for each province. I then regress the cross-section of coefficients $\gamma_{iq}s$ on the average return distances in the pre-policy period, instrumenting it with the number of bank branches and savings bank branches per capita, following Guiso et al. (2004).

The identifying assumption in the IV estimation is that the instrument satisfies the exclusion restriction. Namely, that the instrument does not affect province characteristics, other than banking competition. A clear violation of this assumption would result from the provinces with most saving bank branches per capita in 1936 being the most (or least) developed or economically vibrant, as economic development tend to be serially correlated even at longer horizons. To rule out this possibility, I run a regression of the number of saving bank branches per capita on several economic indicators in 1936. Table 7 shows that provinces most affected by the banking reform did not have more cars per capita (a proxy frequently used for economic activity in historical settings), nor higher shares of active population or of people working as self-employed rather than factory workers in 1936. Overall, this brief analysis speaks in favor of the exclusion restriction assumption being satisfied for the instrument.

Results of the IV estimation are collected in Table 8. In Panel A of Table 8 the effect of the policy is estimated on the number of incorporations, while in Panel B it is estimated on the number of incorporations as a percentage of registered firms 4 quarters before. Columns 1, 3 and 5 show the first stage of the IVs: the Return Distance has a significant and negative correlation with both instruments, and the F-statistics, when the two instruments are used separately, are always greater than 10. Columns 2, 4 and 6, on the other hand, show the second stage of the IVs. Weaker banking competition has a negative and significant effect on the intensity of the policy. Lastly, column 7 of both tables reports the standard OLS regression of the SIA effect on the Return Distance, showing a comparable, but smaller, magnitude.

The results of the IV approach are consistent with those of the DDD. The evidence brings me to conclude that the effect on innovative firm creation of a policy, that entails a public guarantee on bank debt, depend on the degree of banking com-

petition. Therefore, the empirical evidence supports an ex-ante mechanism of bank rent extraction.

5.1 Robustness

One of the requirements of SIA is that the firm must be incorporated as a limited liability company (LLC). I therefore use data about incorporation of unlimited liability partnerships (ULPs) from *Movimprese* to run a placebo test. Column 3 of Table 3 shows that the policy have no effect on incorporations of ULPs.

Similarly, I exploit incorporations of ULPs to run a placebo test for the DDD. I fail to find any effect on firm creation of ULPs in the DDD, as per columns 1-3 of Table A1 in Internet Appendix. Results are not significant either, when defining the dummy *Rent* using within-region medians, columns 4 and 5 of Table A1. Therefore it seems unlikely that my estimation of the effect of the policy could be biased by a contemporaneous trend in economic activity, differential across innovative and least innovative industries, as well as competitive and least competitive provinces.

Another concern of the analysis concerns the strong North-South divide that affects Italy, with the North being more developed and economically vibrant. In fact, when I sort provinces using the national median of the return distance, high market power provinces tend to be disproportionally located in the south of the country. To show that my result are not driven simply by high-market provinces being located in the South and therefore more economically weak, I construct a *South* dummy which equals one if the province is located in the south of Italy, and I substitute the treatment assignment *Rent* with *South* in constructing the DDD coefficient.[9] I also use this placebo triple interaction as a control in my main regression. Table A2 shows the estimation of this additional specification. The coefficient of the placebo interaction with *South*, if used as main regressor, is either negative but not significant or positive, suggesting that provinces in the South may have fared better under the policy. Similarly, when I add the placebo interaction to the main specification the coefficient on the true interaction becomes bigger, more significant and similar in magnitude to the one obtained defining *Rent* using regional medians. These results are insensitive to measuring incorporations in percentage of previously registered firms. This is evidence that if anything, SIA had a stronger effect in the South, compared to the North. Therefore, the differential effect of the policy in the two groups of provinces is not mechanically driven by the North-South

[9]South here is considered as the collection of the NUTS1 areas South and Isles.

divide which affects the Italian economy.

Next, I assess the robustness of the analysis to the measure of bank market power. I use two alternative measures of competition: bank conduct (λ), as estimated in Coccorese (2008), and HHI of bank branches, for consistency with the previous literature. I then re-estimate both the DDD models and the IV-approach. Tables ?? and ?? presents results of the DDD using both alternative measures to construct the triple interaction, and incorporations and vc deals as outcomes. Furthermore, the tables report estimates by ranking provinces using both national and regional medians, of both HHI and λ. Results are consistent in magnitude and significance to those of the main analysis, both for the number of new firms and the number of VC deals. Regarding the IV approach, in the interest of brevity I only present results using the number of saving bank branches per capita in 1936. Table A6 shows the second stages of the 2SLS estimation, using both bank conduct and HHI of bank branches, and for incorporations defined in both numbers and percentages. Independently of the measure used, results are comparable both qualitatively and quantitatively to those of the main analysis. The robustness checks confirm that the Return Distance, while being synthetic and parsimonious, is a good proxy for the level of competition and market power in local banking markets.

Lastly, I investigate the robustness of my analysis to the industry assignment. In the main analysis, I define an industry as R&D-oriented if it was over-represented, compared to the overall distribution in Italy, in the sample of firms that took up SIA but were incorporate before its passing. I define an alternative dummy, $Industry'$, which takes value of 1 if the 2-digits NACE code is identified by the OECD as either an high-technology manufacturing industry or a knowledge-intensive services industry. This classification is built by the OECD on the base of R&D expenditures and patenting activity for all member countries, and therefore it is exogenous to characteristics specific of Italian firms. Table A7 collects the estimated of the DDD model in which the triple interaction is constructed using the alternative $industry'$ dummy, and considering as outcomes the number of new limited liability companies incorporate and the number of VC deals. The coefficients are consistent, in magnitude, sign, and significance, with those of the main analysis, both by ranking provinces using national and regional medians of the return distance. Overall, this section shows that the results of the main analysis are robust to the choices made in the treatment assignment at both the industry and province level.

6 Conclusion

In this paper I shed light on how bank market power affects the success of a policy to stimulate innovative firms creation. Exploiting a policy intervention of the Italian Government in late 2012, I show that where banks have more market power the effect of the policy on innovative firm creation, defined as the number of firms incorporated in innovative industries, is weaker. Conversely, more competitive provinces respond better to the policy. The proposed channel is that banks are less likely to finance innovative and risky ventures, even when the policy entails a public guarantee on start-ups' bank debt. The empirical evidence is consistent with a theoretical framework in which banks extract rents ex-ante in the credit relationship. Moreover, the relative weaker effect of the policy on firm creation in provinces with higher bank market power also results in fewer and smaller venture capital activity.

I use two alternative identification strategies to causally estimate the effect of bank market power. Firstly, I use a difference-in-difference-in-differences framework, comparing firm creation in innovative and other industries, in provinces with higher and lower bank market power, before and after the policy intervention. To measure bank market power I develop a new parsimonious approach. My return distance measures the difference between the average rate of return of short-term loans and the fictional competitive rate, implied by the average probability of success of these loans. Secondly, I use an IV-approach, borrowing and improving an instrument for the the Italian banking sector originally developed by Guiso et al. (2004). The instrument uses the Fascist banking reform of 1936. Results from the DDD and the IV are similar and show that the policy is weaker where bank market power is higher.

Therefore, policy makers should take into account bank market power and banking competition in order to design effective policies to foster innovative firm creation. Looking at the bigger picture, the analysis suggests that lack of competition in local banking sectors may be a factor keeping certain regions at a standstill in the development of bursting start-ups' economies, though both directly depressing firm creation and indirectly hindering venture capital activity.

References

Albanese, Giuseppe et al. (2019). "Regional policies for Italian innovative start-ups". In: *Questioni di Economia e Finanza - Occasional Papers* 511.

Alessandrini, Pietro, Andrea F Presbitero, and Alberto Zazzaro (2009). "Banks, distances and firms' financing constraints". In: *Review of Finance* 13.2, pp. 261–307.

Amore, Mario Daniele, Cedric Schneider, and Alminas Žaldokas (2013). "Credit supply and corporate innovation". In: *Journal of Financial Economics* 109.3, pp. 835–855.

Axelson, Ulf and Milan Martinovic (2013). "European venture capital: myths and facts". In: *British Private Equity & Venture Capital Association*.

Benfratello, Luigi, Fabio Schiantarelli, and Alessandro Sembenelli (2008). "Banks and innovation: Microeconometric evidence on Italian firms". In: *Journal of Financial Economics* 90.2, pp. 197–217.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan (2004). "How much should we trust differences-in-differences estimates?" In: *The Quarterly journal of economics* 119.1, pp. 249–275.

Bonaccorsi di Patti, Emilia and Giovanni Dell'Ariccia (2004). "Bank Competition and Firm Creation". In: *Journal of Money, Credit, and Banking* 36.2, pp. 225–251.

Boone, Jan (2008). "A new way to measure competition". In: *The Economic Journal* 118.531, pp. 1245–1261.

Boot, Arnoud WA and Anjan V Thakor (2000). "Can relationship banking survive competition?" In: *The journal of Finance* 55.2, pp. 679–713.

Calenda, Carlo (2017). "Relazione annuale al Parlamento sullo stato di attuazione e sull'impatto della policy a sostegno delle startup e delle PMI innovative". In: *Ministero dello Sviluppo Economico*.

Cao, Qingqing et al. (2020). "Relationship Banking and Firm Entry Dynamics". In: *Unpublished working paper*.

Chava, Sudheer et al. (2013). "Banking deregulation and innovation". In: *Journal of Financial economics* 109.3, pp. 759–774.

Claessens, Stijn and Luc Laeven (2003). "What drives bank competition? Some international evidence". In.

Coccorese, Paolo (2008). "Bank competition and regional differences". In: *Economics Letters* 101.1, pp. 13–16.

Cornaggia, Jess et al. (2015). "Does banking competition affect innovation?" In: *Journal of financial economics* 115.1, pp. 189–209.

Cowling, Marc, Elisa Ughetto, and Neil Lee (2018). "The innovation debt penalty: Cost of debt, loan default, and the effects of a public loan guarantee on high-tech firms". In: *Technological Forecasting and Social Change* 127, pp. 166–176.

Dass, Nishant and Massimo Massa (2011). "The impact of a strong bank-firm relationship on the borrowing firm". In: *The Review of Financial Studies* 24.4, pp. 1204–1260.

Decker, Ryan et al. (Sept. 2014). "The Role of Entrepreneurship in US Job Creation and Economic Dynamism". In: *Journal of Economic Perspectives* 28.3, pp. 3–24.

Denes, Matthew et al. (2020). "Investor Tax Credits and Entrepreneurship: Evidence from US States". In: *Available at SSRN 3596342*.

DeYoung, Robert, Dennis Glennon, and Peter Nigro (2008). "Borrower–lender distance, credit scoring, and loan performance: Evidence from informational-opaque small business borrowers". In: *Journal of Financial Intermediation* 17.1, pp. 113–143.

Diamond, Douglas W (1991). "Monitoring and reputation: The choice between bank loans and directly placed debt". In: *Journal of political Economy* 99.4, pp. 689–721.

Dickson, VA (1979). "The Lerner index and measures of concentration". In: *Economics Letters* 3.3, pp. 275–279.

Feinberg, Robert M (1980). "The Lerner index, concentration, and the measurement of market power". In: *Southern Economic Journal*, pp. 1180–1186.

Felice, Emanuele (2019). "The roots of a dual equilibrium: GDP, productivity, and structural change in the Italian regions in the long run (1871–2011)". In: *European Review of Economic History* 23.4, pp. 499–528.

Fields, L Paige et al. (2006). "Do bank loan relationships still matter?" In: *Journal of Money, Credit and Banking*, pp. 1195–1209.

Finaldi Russo, Paolo, Silvia Magri, and Cristiana Rampazzi (2016). "Innovative Start-Ups in Italy: Their Special Features and the Effects of the 2102 Law". In: *Politica economica* 32.2, pp. 297–330.

Gompers, Paul and Josh Lerner (2001). "The venture capital revolution". In: *Journal of economic perspectives* 15.2, pp. 145–168.

Gonzalez-Uribe, Juanita and Su Wang (2020). "The Effects of Small-Firm Loan Guarantees in the UK: Insights for the COVID-19 Pandemic Crisis". In: *Available at SSRN 3382280*.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales (2004). "Does local financial development matter?" In: *The Quarterly Journal of Economics* 119.3, pp. 929–969.

Hannan, Timothy H (1997). "Market share inequality, the number of competitors, and the HHI: An examination of bank pricing". In: *Review of Industrial Organization* 12.1, pp. 23–35.

Henrekson, Magnus and Tino Sanandaji (2017). "Schumpeterian entrepreneurship in Europe compared to other industrialized regions". In.

Herrera, Ana Maria and Raoul Minetti (2007). "Informed finance and technological change: Evidence from credit relationships". In: *Journal of Financial Economics* 83.1, pp. 223–269.

Hombert, Johan and Adrien Matray (2017). "The real effects of lending relationships on innovative firms and inventor mobility". In: *The Review of Financial Studies* 30.7, pp. 2413–2445.

Kerr, William R and Ramana Nanda (2009). "Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship". In: *Journal of Financial Economics* 94.1, pp. 124–149.

Landier, Augustin (2003). "Start-up financing: From banks to venture capital". In: *Unpublished working paper, University of Chicago, Chicago, IL*.

Lerner, Josh (1998). "Angel financing and public policy: An overview". In: *Journal of Banking & Finance* 22.6-8, pp. 773–783.

Lerner, Josh et al. (2018). "The globalization of angel investments: Evidence across countries". In: *Journal of Financial Economics* 127.1, pp. 1–20.

Milhaupt, Curtis J (1996). "Market for Innovation in the United States and Japan: Venture Capital and the Comparative Corporate Governance Debate". In: *Nw. UL Rev.* 91, p. 865.

Mollica, Marcos and Luigi Zingales (2007). "The impact of venture capital on innovation and the creation of new businesses". In: *Unpublished working paper, University of Chicago*.

Mollick, Ethan (2014). "The dynamics of crowdfunding: An exploratory study". In: *Journal of business venturing* 29.1, pp. 1–16.

Nishiyama, Yasuo (2007). "Are banks risk-averse?" In: *Eastern Economic Journal* 33.4, pp. 471–490.

Panzar, John C and James N Rosse (1987). "Testing for monopoly equilibrium". In: *The journal of industrial economics*, pp. 443–456.

Petersen, Mitchell A and Raghuram G Rajan (1994). "The benefits of lending relationships: Evidence from small business data". In: *The journal of finance* 49.1, pp. 3–37.

— (1995). "The effect of credit market competition on lending relationships". In: *The Quarterly Journal of Economics* 110.2, pp. 407–443.

Presbitero, Andrea F and Alberto Zazzaro (2011). "Competition and relationship lending: Friends or foes?" In: *Journal of Financial Intermediation* 20.3, pp. 387–413.

Puri, Manju and Rebecca Zarutskie (2012). "On the life cycle dynamics of venture-capital-and non-venture-capital-financed firms". In: *The Journal of Finance* 67.6, pp. 2247–2293.

Rajan, Raghuram G (1992). "Insiders and outsiders: The choice between informed and arm's-length debt". In: *The Journal of finance* 47.4, pp. 1367–1400.

Rhoades, Stephen A (1995). "Market share inequality, the HHI, and other measures of the firm-composition of a market". In: *Review of industrial organization* 10.6, pp. 657–674.

Robb, Alicia M and David T Robinson (2014). "The capital structure decisions of new firms". In: *The Review of Financial Studies* 27.1, pp. 153–179.

Senor, Dan and Saul Singer (2011). *Start-up nation: The story of Israel's economic miracle*. Random House Digital, Inc.

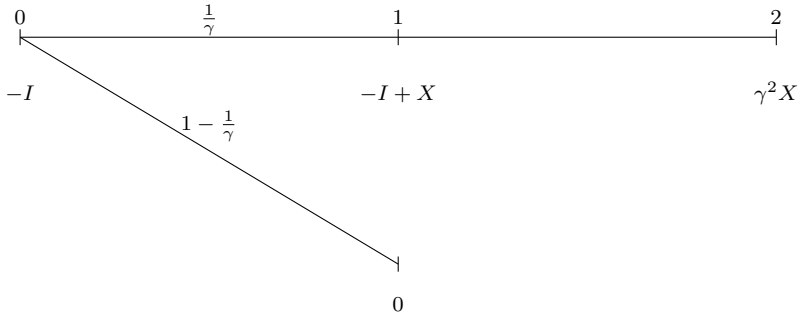
Sharpe, Steven A (1990). "Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships". In: *The journal of finance* 45.4, pp. 1069–1087.

Ueda, Masako (2004). "Banks versus venture capital: Project evaluation, screening, and expropriation". In: *The Journal of Finance* 59.2, pp. 601–621.

Ughetto, Elisa, Giuseppe Scellato, and Marc Cowling (2017). "Cost of capital and public loan guarantees to small firms". In: *Small Business Economics* 49.2, pp. 319–337.

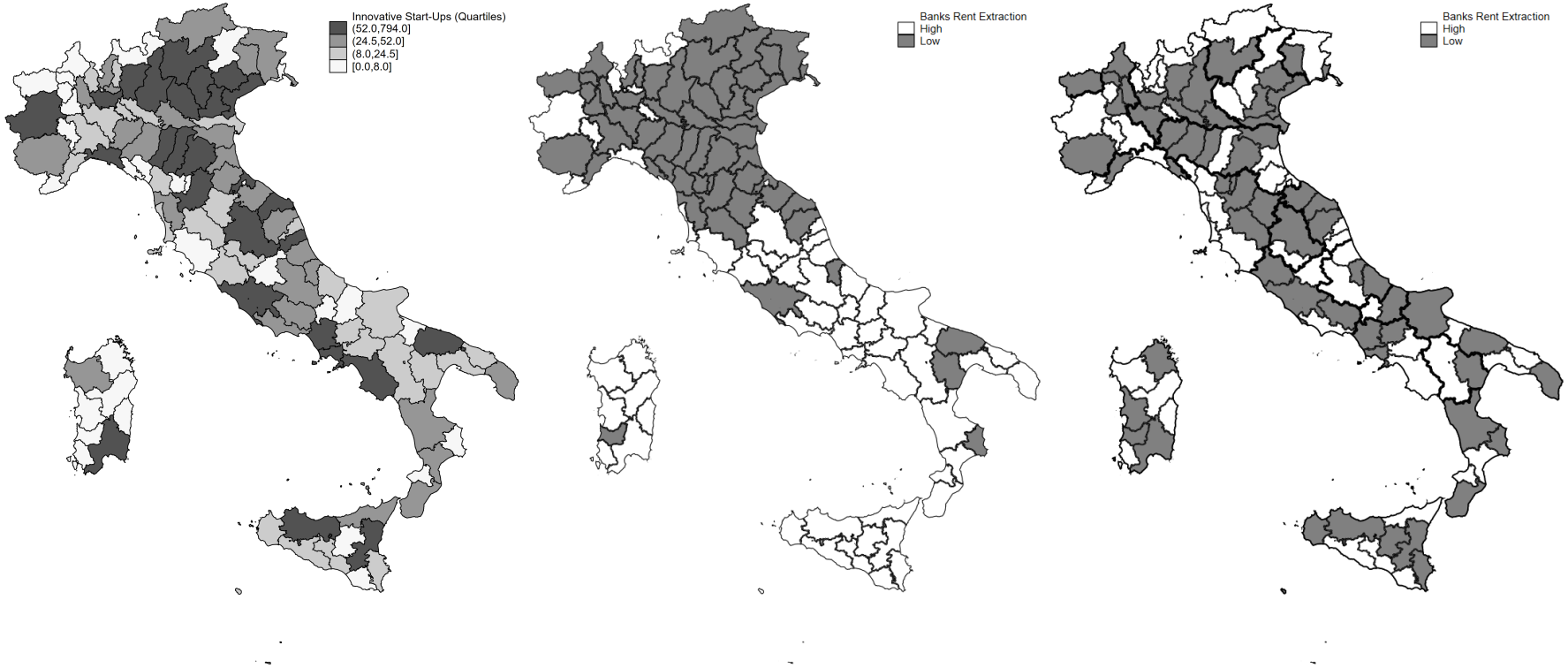
7 Figures

Figure 1: CASHFLOWS IN THE MODEL



Time-line of the cashflows of the entrepreneur's project. The project needs to be financed at time 0 and refinenced at time 1. It produces a risky cashflow at time 1 and a safe one at time 2. The parameter γ measures the level of innovativeness of the firm, making it more risky in the first period (i.e. the first cashflow is more risky) and more profitable in the second (i.e. the cashflow at time 2 is bigger).

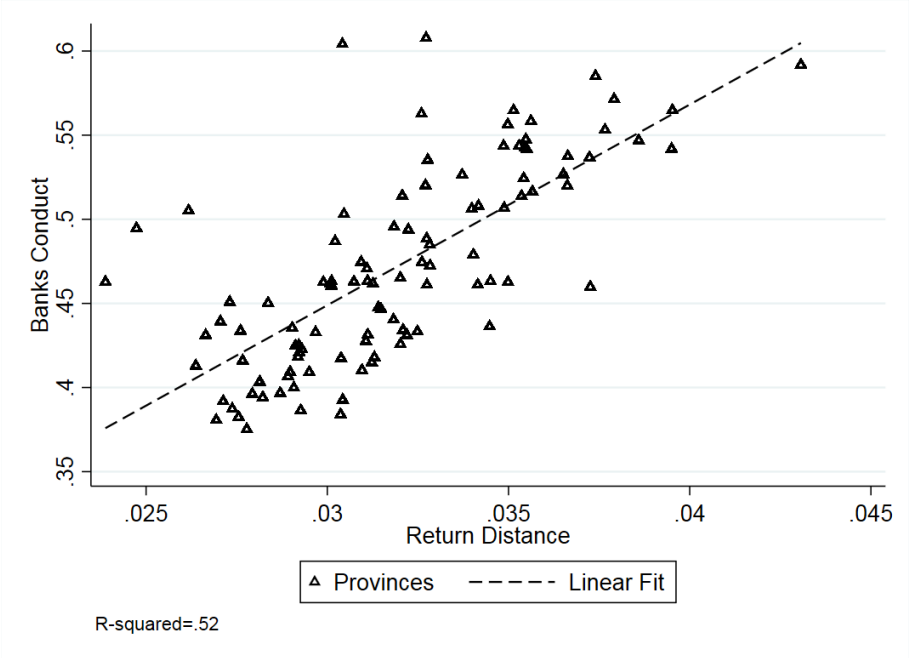
Figure 2: GEOGRAPHIC DISTRIBUTIONS OF START-UPS AND RENTS



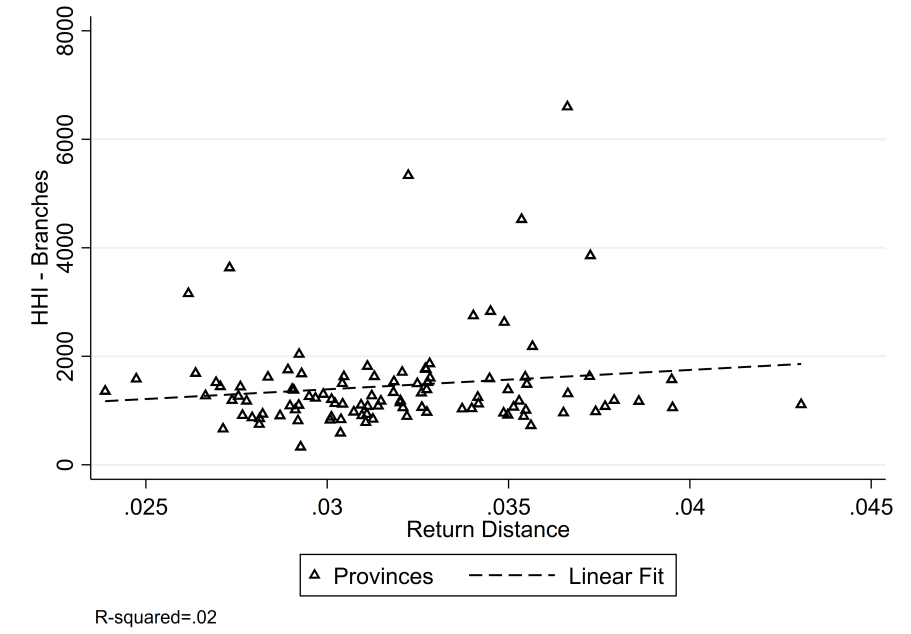
(a) (b) (c)

In map (a), provinces are ranked by the number of start-ups incorporated under the *Start-Up Italy* policy, as of end of 2016; In map (b), provinces are ranked by the average return distance between 2010 and 2012, where white provinces are scoring above the national median and are classified as "high bank market power" provinces; In map (c), provinces are again ranked by the average return distance between 2010 and 2012, but white provinces are scoring above the regional median and are classified as "high bank market power" provinces. Regional boundaries are outlined in black.

Figure 3: RETURN DISTANCE AND OTHER COMPETITION MEASURES



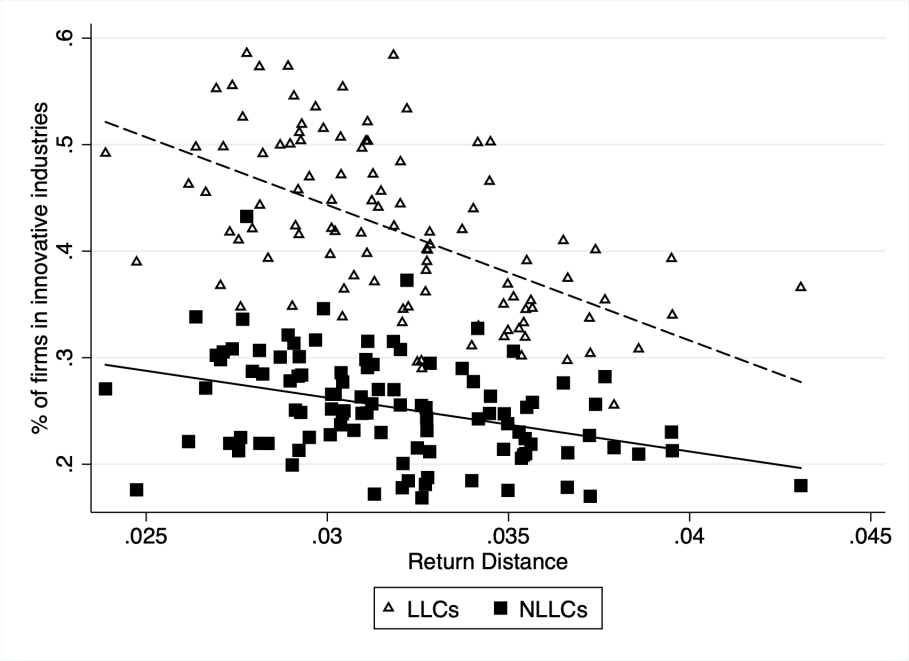
(a) Return Distance and bank conduct as estimated by Coccorese (2008)



(b) Return Distance and HHI of bank branches.

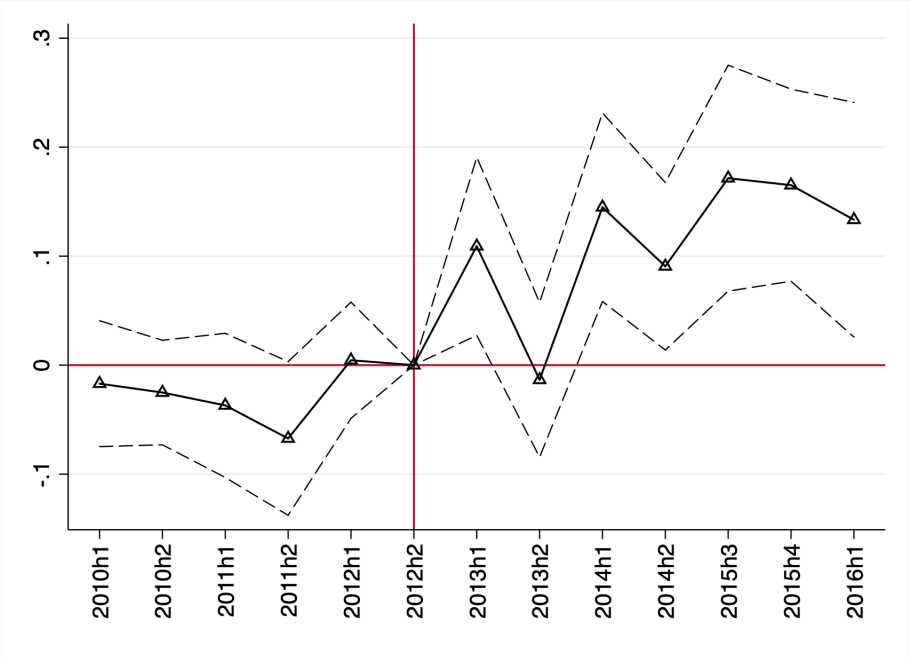
Scatter plot of the return distance against other banking competition measures: in (a), bank conduct in Italian provinces in the period 2010-2012, as estimated by Coccorese (2008), and in (b), HHI of bank branches estimated over the same time period.

Figure 4: RETURN DISTANCE AND INNOVATIVE FIRMS



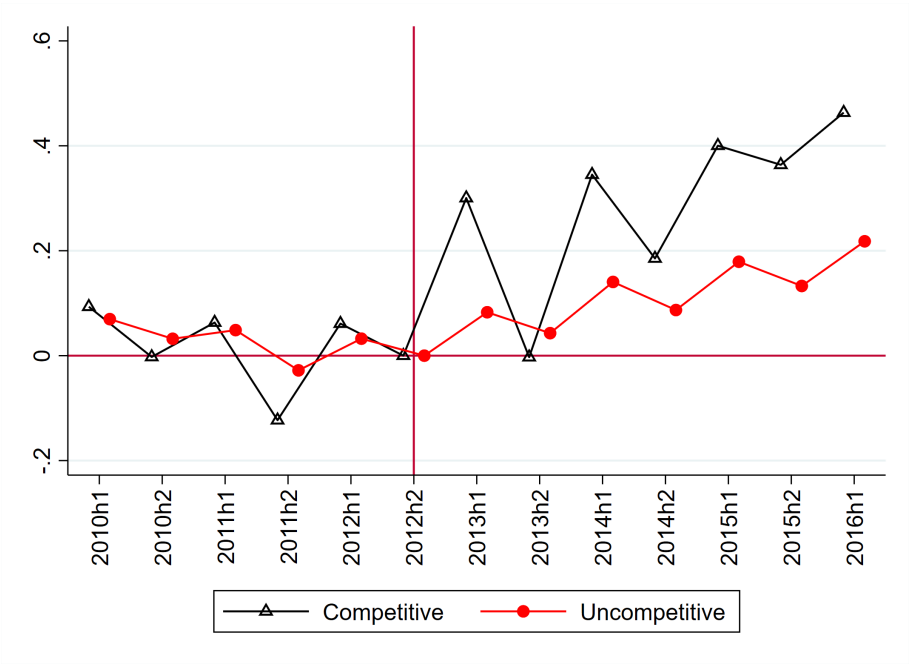
Correlation between return distance and percentage of total firms registered that operate in R&D-oriented industries, for limited liability companies (LLCs, triangles) and for unlimited liability partnerships (ULPs, squares).

Figure 5: PARALLEL TRENDS - POLICY

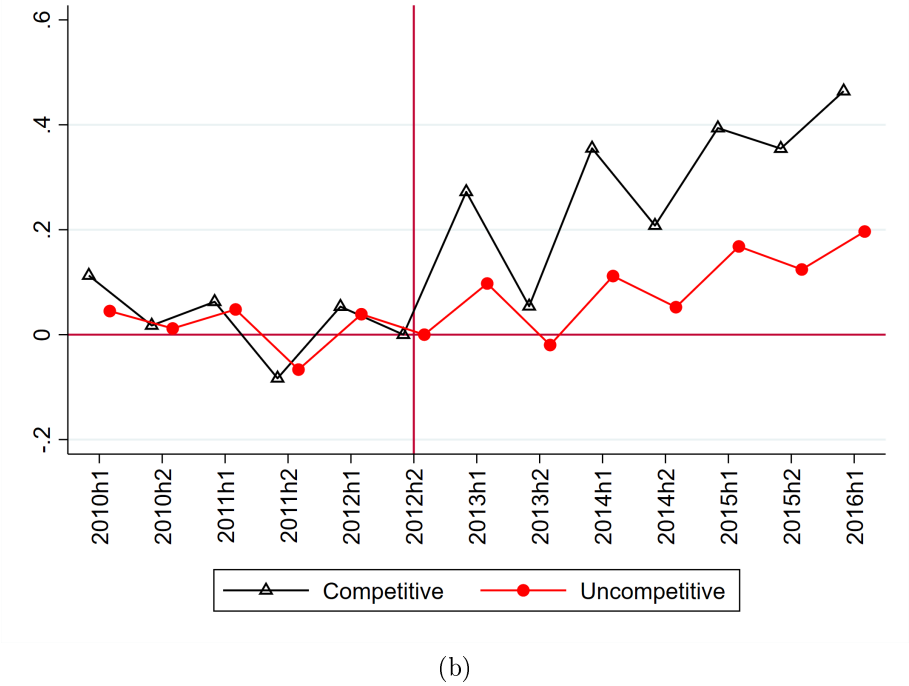


Evolution over time of the difference in incorporations between the two groups of industries (innovative minus non-innovative). The red vertical line signals the passing of the policy. To smooth seasonality estimates are reported at the six-months frequency.

Figure 6: PARALLEL TRENDS - DDD (FIRM CREATION)



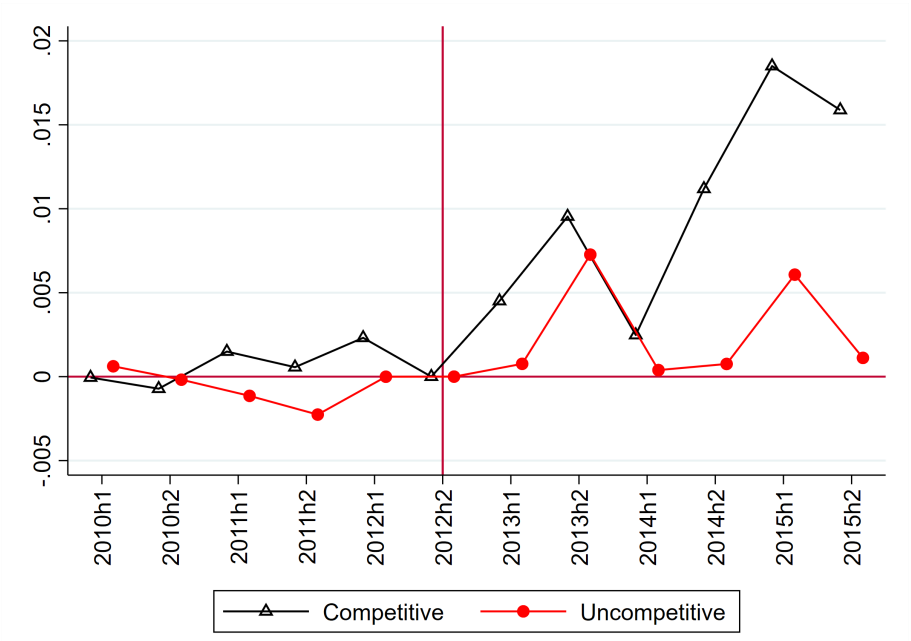
(a)



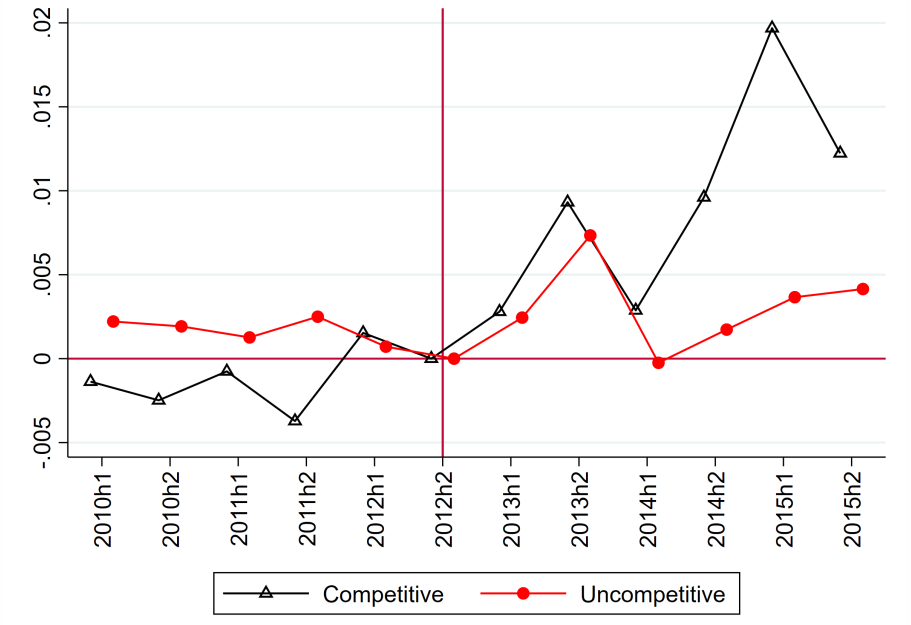
(b)

The graph shows the evolution over time of the difference in firm creation between the two groups of industries in competitive (black) and uncompetitive (red) provinces. In (a) provinces are sorted using the national median return distance, while in (b) provinces are sorted using the median return distance in the corresponding region. The red vertical line signals the passing of the policy. To smooth seasonality estimates are reported at the six-months frequency.

Figure 7: PARALLEL TRENDS - DDD (VC ACTIVITY)



(a)



(b)

The graph shows the evolution over time of the difference in VC activity between the two groups of industries in competitive (black) and uncompetitive (red) provinces. In (a) provinces are sorted using the national median return distance, while in (b) provinces are sorted using the median return distance in the corresponding region. The red vertical line signals the passing of the policy. To smooth seasonality estimates are reported at the six-months frequency.

8 Tables

Table 1: INNOVATIVE INDUSTRIES & SECTOR REPRESENTATION

PANEL A: Innovative industries

NACE 2-digits Industries	*NACE 2-digits Codes*
Manufacture of basic pharmaceutical products	21
Manufacture of computer, electronic, optical products	26
Manufacture of electrical equipment	27
Manufacture of machinery and equipment n.e.c.	28
Publishing activities (includes software publishing)	58
Computer programming, consultancy, related activities	62
Information service activities	63
Management consultancy activities	70
Scientific research and development	72

PANEL B: Distribution of sectors in the SIA start-up sample

NACE Sectors	*% of Startup Sample*	*Avg. % in Italy*
Agriculture	0.57%	**13.26%**
Arts & Sports	0.47%	1.12%
Construction	1.33%	**14.50%**
Education	0.78%	0.44%
Energy	1.98%	0.14%
Finance	0.15%	1.95%
Healthcare	0.75%	0.58%
Hospitality	0.57%	**6.64%**
ICT	**42.17%**	2.09%
Manufacturing	**17.63%**	9.94%
Mining	0.00%	0.08%
Other Services	0.44%	3.81%
Professional S. & R&D	**25.23%**	3.20%
Real Estate	0.06%	4.65%
Services & Consulting	3.30%	2.73%
Trade	4.22%	**25.50%**
Transport	0.35%	2.90%
House Services	0.00%	0.00%
International Org.	0.00%	0.00%
Public & Defense	0.00%	0.00%
Unclassified	0.00%	6.27%
Utilities	0.00%	0.18%

List of industries which are considered innovative in order to match those most represented in the sample of start-ups taking up the program.

Table 2: T-TESTS - HIGH AND LOW RENT PROVINCES

PANEL A ECONOMIC ACTIVITY	(1) L-H National	(2) North-South	(3) L-H Regional
Value Added (€ Mil.)	7,626.73**	7,263.92*	6,441.85*
Income per Capita (€)	4,343.50***	4,664.15***	197.87
Surface (km2)	-327.40	-342.62	451.06
Population (100k)	0.70	0.80	2.17*
Blackouts per User	-1.63***	-1.89***	0.24
% Export of Dynamic Sectors	-5.57	-0.59	0.22
Hospital Emigration Rate	-2.97***	-3.84***	0.94
Patents per Inabit. (Mil.)	64.15***	73.29***	11.88
Unemployment Rate - Youth	-10.18***	-13.61***	2.24
Unemployment Rate	-5.45***	-6.42***	0.73
PANEL B BANKING SECTOR	(1) L-H National	(2) North-South	(3) L-H Regional
Deposits per Branch (€ Th.)	3905.05**	4706.31**	1044.92
Loans per Branch (€ Th.)	9738.07***	4179.14	6666.44*
Growth Rate of Fin. Comp.	-0.01	0.14	-0.66*
Birth Rate of Fin. Comp.	-0.74***	-0.44*	0.10
Branches - Foreign %	0.28*	0.52***	0.07
Banks - Foreign %.	2.09	3.46**	-0.77
Banks - Relationship %	-11.99*	-16.84***	2.01
Branches - Relationship %	4.41*	9.42***	-1.67
HHI - Branches	-0.04***	-0.01	-0.02
Loan/Deposit Ratio	0.09	-0.12*	0.16**
Branches - per 100k Inhab.	25.74***	25.76***	1.16
Banks - per 100k Inhab.	0.74***	0.51*	-0.01
Employees	2346.63**	2148.13**	1479.37
Deposit Costs (€ Mil.)	0.06**	0.04	0.04
HR Costs (€ Mil.)	180.22**	164.98**	113.62
HR Costs per Branch (€ Mil.)	0.14***	0.06	0.06

T-tests for differences between low and high bank market power provinces in various indicators of economic activity and the banking sector, measured at the passing of the policy (end of 2012). T-tests are repeated for provinces located in North and in the South, as well as defining low and high bank market power categories using regional medians. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 3: DIFFERENCE-IN-DIFFERENCES

	Limited Liability Companies			Unlimited Liability Partnerships		
	(1)	(2)	(3)	(4)	(5)	(6)
Incorporations	New Firms	Log(1+New Firms)	New Firms (%)	New Firms	Log(1+New Firms)	New Firms (%)
Policy × *Industry*	0.108***	0.0346***	0.00140***	0.0470	-0.00772	0.00107
	(0.0295)	(0.00687)	(0.000463)	(0.112)	(0.00649)	(0.000692)
Observations	134,784	134,784	120,332	134,784	134,784	117,587
R-squared	0.322	0.516	0.020	0.394	0.801	0.058
Fixed Effects						
Quarter	YES	YES	YES	YES	YES	YES
Province	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES

Estimates of the effect of SIA on incorporations of firms in innovative industries, using a DID approach. Incorporations are expressed in numbers, natural logarithm of new firms and new firms as percentage of firms registered four quarters before. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 4: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES

Limited Liability Companies Incorporations	(1) New Firms	(2) Log(1+New Firms)	(3) New Firms (%)	(4) New Firms	(5) Log(1+New Firms)	(6) New Firms (%)
$Rent \times Policy \times Industry$	-0.262**	-0.0429***	-0.00286*			
	(0.118)	(0.0145)	(0.00149)			
$Rent_r \times Policy \times Industry$				-0.153***	-0.0319***	-0.00208**
				(0.0500)	(0.0115)	(0.000953)
Observations	129,792	129,792	112,839	129,792	129,792	112,839
R-squared	0.913	0.819	0.443	0.913	0.819	0.443
Fixed Effects						
$Quarter \times Province$	YES	YES	YES	YES	YES	YES
$Quarter \times Industry$	YES	YES	YES	YES	YES	YES
$Province \times Industry$	YES	YES	YES	YES	YES	YES
$Quarter \times Province \times Sector$	YES	YES	YES	YES	YES	YES
$Quarter \times Region \times Industry$	YES	YES	YES	YES	YES	YES

Main DDD regression to estimate the causal effect of bank market power on the effect of SIA, measured in terms of new incorporations in R&D-oriented sector. Incorporations are measured in numbers (columns 1 and 4), natural logarithm of 1 plus the number of new firms ($Ln(1 + NewFirms)$, columns 2 and 5) and new firms as percentage of registered firms four quarters before (columns 3 and 6). The dummy *Rent* is calculated using the median return distance at the national level in Columns 1-3, and at the regional level in Columns 4-6. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 5: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - VENTURE CAPITAL DEALS

	(1) VC Deals	(2) Log(1+Deals)	(3) Log(1+Funding)	(4) VC Deals	(5) Log(1+Deals)	(6) Log(1+Funding)
Rent × *Policy* × *Industry*	-0.0278	-0.0134	-0.00512			
	(0.0189)	(0.00919)	(0.00436)			
$Rent_r$ × *Policy* × *Industry*				-0.0143*	-0.00755**	-0.00161
				(0.00737)	(0.00350)	(0.00260)
Observations	194,688	194,688	194,688	194,688	194,688	194,688
R-squared	0.541	0.504	0.418	0.541	0.504	0.418
Fixed Effects						
Quarter × *Province*	YES	YES	YES	YES	YES	YES
Quarter × *Industry*	YES	YES	YES	YES	YES	YES
Province × *Industry*	YES	YES	YES	YES	YES	YES
Quarter × *Province* × *Sector*	YES	YES	YES	YES	YES	YES
Quarter × *Region* × *Industry*	YES	YES	YES	YES	YES	YES

DDD regression to estimate the causal effect of bank market power on the effect of SIA for venture capital activity. At the Province×Industry level, venture capital activity is measured as number of VC deals (columns 1 and 4), logarithm of 1 plus the number of deals (columns 2 and 5) and logarithm of 1 plus total VC funding in million Euro (columns 3 and 6), in each quarter. The dummy *Rent* is calculated using the median return distance at the national level in columns 1-3 and at the regional level in columns 4-6. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 6: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - BANK FUNDING

	(1) Loans	(2) Log(1+Loans)	(3) Log(1+Funding)	(4) Loans	(5) Log(1+Loans)	(6) Log(1+Funding)
Rent × *Policy* × *Industry*	-0.508**	-0.0754*	-0.670			
	(0.204)	(0.0403)	(0.427)			
$Rent_r$ × *Policy* × *Industry*				-0.212*	-0.0362	-0.160
				(0.117)	(0.0270)	(0.284)
Observations	113,568	113,568	113,568	113,568	113,568	113,568
R-squared	0.906	0.845	0.736	0.906	0.845	0.736
Fixed Effects						
Quarter × *Province*	YES	YES	YES	YES	YES	YES
Quarter × *Industry*	YES	YES	YES	YES	YES	YES
Province × *Industry*	YES	YES	YES	YES	YES	YES
Quarter × *Province* × *Sector*	YES	YES	YES	YES	YES	YES
Quarter × *Region* × *Industry*	YES	YES	YES	YES	YES	YES

DDD regression to estimate the causal effect of bank market power on the effect of SIA for bank funding backed by public guarantees. At the Province×Industry level, bank funding is measured as number of loans (columns 1 and 4), logarithm of 1 plus the number of loans (columns 2 and 5) and logarithm of 1 plus total value of loans in Euro (columns 3 and 6), in each quarter. The dummy *Rent* is calculated using the median return distance at the national level in columns 1-3 and at the regional level in columns 4-6. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 7: INSTRUMENTAL VARIABLES - EXCLUSION RESTRICTION

	(1) Branch per capita 1936	(2) Saving Branch per capita 1936
Cars per capita 1933-38	5.637	2.843
	(5.190)	(1.993)
Share Active Population	0.101	0.140
	(0.335)	(0.129)
Entr. share of workf. 1936	-0.167	0.033
	(0.467)	(0.179)
Agr. share of workf. 1936	0.113	0.073
	(0.182)	(0.069)
Factory share of workf. 1936	0.0771	0.074
	(0.221)	(0.085)
Region V.A. per capita 1938	0.000	0.000
	(0.001)	(0.001)
Region V.A. per worker 1938	-0.000	-0.000
	(0.001)	(0.001)
Constant	-0.032	-0.094
	(0.201)	(0.077)
Observations	104	104
R-squared	0.236	0.276

Regression of the banking structure of provinces in 1936 on several economic indicators measured in 1936. The two outcome variables are the instruments used in the IV analysis. Number of cars per capita, as proxy of income, is only available in 1933 and 1938 and the average of the two values is used. Value added is only available at the region level and measured in 1938. Data on active population and composition of the workforce has been obtained digitalizing the Census of 1936. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 8: INSTRUMENTAL VARIABLES - NUMBERS AND PERCENTAGES

PANEL A: INCORPORATIONS (NUMBERS)

	(1) First Stage	(2) IV	(3) First Stage	(4) IV	(5) First Stage	(6) IV	(7) OLS
Saving Branches (1936)	-4.104***				-2.789**		
	(1.150)				(1.345)		
Return Distance		-1.198***		-1.763***		-1.458***	-0.350***
		(0.461)		(0.591)		(0.452)	(0.131)
Bank Branches (1936)			-1.485***		-0.925*		
			(0.434)		(0.506)		
Constant	3.482***	3.820**	3.567***	5.704***	3.580***	4.685***	0.991**
	(0.0556)	(1.539)	(0.0777)	(1.971)	(0.0767)	(1.509)	(0.438)
Observations	104	104	104	104	104	104	104
R-squared							0.066
F Statistics	12.75		11.71		8.19		-

PANEL B: INCORPORATIONS (PERCENTAGES)

	(1) First Stage	(2) IV	(3) First Stage	(4) IV	(5) First Stage	(6) IV	(7) OLS
Saving Branches (1936)	-4.104***				-2.789**		
	(1.150)				(1.345)		
Return Distance		-0.00931**		-0.00771*		-0.00858**	-0.00211*
		(0.00431)		(0.00425)		(0.00375)	(0.00126)
Bank Branches (1936)			-1.485***		-0.925*		
			(0.434)		(0.506)		
Constant	3.482***	0.0317**	3.567***	0.0264*	3.580***	0.0293**	0.00774*
	(0.0556)	(0.0144)	(0.0777)	(0.0142)	(0.0767)	(0.0125)	(0.00424)
Observations	104	104	104	104	104	104	104
R-squared							0.027
F Statistics	12.75		11.71		8.19		-

Estimation of the effect of bank market power on the effect of the policy using the IV approach, via 2SLS. The first stage (columns 1, 3 and 5) uses the number of savings banks' branches and total banks' branches per capita in 1936 as instruments for the return distance at the province level. The outcome variable is the effect of SIA at the province level, estimated on new incorporations in innovative sectors expressed as numbers (Panel A) and percentages of firms registered four quarters before (Panel B). To estimate the effect of *SIA*, I use the difference-in-differences framework in Equation 26. For reference, column 7 collects estimate of the basic OLS regression of the policy's effects on the return distance. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Internet Appendix A - Supplementary Tables

Table A1: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - ULPs

Unlimited Liability Companies Incorporations	(1) New Firms	(2) Log(1+New Firms)	(3) New Firms (%)	(4) New Firms	(5) Log(1+New Firms)	(6) New Firms (%)
$Rent \times Policy \times Industry$	-0.0140	-0.0122	-0.000406			
	(0.162)	(0.0231)	(0.00196)			
$Rent_r \times Policy \times Industry$				-0.0413	-0.00736	-0.00134
				(0.0744)	(0.0138)	(0.00141)
Observations	129,792	129,792	110,012	129,792	129,792	110,012
R-squared	0.974	0.946	0.473	0.974	0.946	0.473
Fixed Effects						
$Quarter \times Province$	YES	YES	YES	YES	YES	YES
$Quarter \times Industry$	YES	YES	YES	YES	YES	YES
$Province \times Industry$	YES	YES	YES	YES	YES	YES
$Quarter \times Province \times Sector$	YES	YES	YES	YES	YES	YES
$Quarter \times Region \times Industry$	YES	YES	YES	YES	YES	YES

DDD regressions to estimate the causal effect of bank market power on the effect of SIA using incorporations of unlimited liability partnerships (ULPs) as dependent variable, excluded from participating in the SIA policy. Incorporations are measured in numbers (columns 1 and 4), natural logarithm of 1 plus the number of new firms ($Ln(1 + NewFirms)$, columns 2 and 5) and new firms as percentage of registered firms four quarters before (columns 3 and 6). The dummy *Rent* is calculated using the median return distance at the national level in Columns 1-3, and at the regional level in Columns 4-6. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A2: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - SOUTH

Limited Liability Companies Incorporations	(1) New Firms	(2) Log(1+New Firms)	(3) New Firms (%)	(4) New Firms	(5) Log(1+New Firms)	(6) New Firms (%)
South × *Policy* × *Industry*	-0.0291	0.00782	0.00224**	0.0504	0.0232*	0.00373**
	(0.0570)	(0.0142)	(0.00108)	(0.0755)	(0.0135)	(0.00147)
Rent × *Policy* × *Industry*				-0.157**	-0.0303**	-0.00296**
				(0.0748)	(0.0129)	(0.00144)
Observations	129,792	129,792	114,349	129,792	129,792	114,349
R-squared	0.897	0.783	0.296	0.897	0.783	0.297
Fixed Effects						
Quarter × *Province*	YES	YES	YES	YES	YES	YES
Quarter × *Industry*	YES	YES	YES	YES	YES	YES
Province × *Industry*	YES	YES	YES	YES	YES	YES
Quarter × *Province* × *Sector*	YES	YES	YES	YES	YES	YES
Quarter × *Region* × *Industry*	NO	NO	NO	NO	NO	NO

DDD regressions where the dummy *Rent*, defined using the median return distance at the national level, is substituted with a dummy *South*, equal one if the province is located in the South of Italy and 0 otherwise. The placebo triple interaction of *South* with *Industry* and *policy* is used both as main regressor (columns 1 to 3) and as a control (columns 4 to 6). Outcome variable is Incorporations of limited liability companies as measured in numbers (columns 1 and 4), natural logarithm of 1 plus the number of new firms ($Ln(1 + NewFirms)$, columns 2 and 5) and new firms as percentage of registered firms four quarters before (columns 3 and 6). The fixed effects for *Quarter* × *Region* × *Industry* are excluded to avoid collinearity with the dummy of interest *South* × *Policy* × *Industry*. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A3: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - ROBUSTNESS 1

Limited Liability Companies Incorporations	(1) New Firms	(2) New Firms	(3) New Firms	(4) New Firms
$Rent_{\lambda} \times Policy \times Industry$	-0.209			
	(0.142)			
$Rent_{HHI} \times Policy \times Industry$		-0.0967**		
		(0.0463)		
$Rent_{\lambda,\,r} \times Policy \times Industry$			-0.163***	
			(0.0579)	
$Rent_{HHI,\,r} \times Policy \times Industry$				-0.135***
				(0.0510)
Observations	129,792	129,792	129,792	129,792
R-squared	0.913	0.913	0.913	0.913
Fixed Effects				
$Quarter \times Province$	YES	YES	YES	YES
$Quarter \times Industry$	YES	YES	YES	YES
$Province \times Industry$	YES	YES	YES	YES
$Quarter \times Province \times Sector$	YES	YES	YES	YES
$Quarter \times Region \times Industry$	YES	YES	YES	YES

Robustness check of the DDD regression to estimate the causal effect of bank market power on the effect of the policy, measured in terms of new incorporations in R&D-oriented industries. Incorporations are measured in number of new firms. The dummy *Rent* is calculated using the median Bank Conduct (λ), estimated according to Coccorese (2008), and the median HHI of bank branches. Sorting of provinces is done both at the national and regional level. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A4: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - ROBUSTNESS 2

Limited Liability Companies VC Investment	(1) VC Deals	(2) VC Deals	(3) VC Deals	(4) VC Deals
$Rent_{\lambda} \times Policy \times Industry$	-0.0323			
	(0.0213)			
$Rent_{HHI} \times Policy \times Industry$		-0.0104*		
		(0.00561)		
$Rent_{\lambda,\,r} \times Policy \times Industry$			-0.0189**	
			(0.00848)	
$Rent_{HHI,\,r} \times Policy \times Industry$				-0.0138*
				(0.00738)
Observations	194,688	194,688	194,688	194,688
R-squared	0.541	0.541	0.541	0.541
Fixed Effects				
$Quarter \times Province$	YES	YES	YES	YES
$Quarter \times Industry$	YES	YES	YES	YES
$Province \times Industry$	YES	YES	YES	YES
$Quarter \times Province \times Sector$	YES	YES	YES	YES
$Quarter \times Region \times Industry$	YES	YES	YES	YES

Robustness check of the DDD regression to estimate the causal effect of bank market power on the effect of the policy, measured in terms of venture capital deals in R&D-oriented industries. The dummy *Rent* is calculated using the median Bank Conduct (λ), estimated according to Coccorese (2008), and the median HHI of bank branches. Sorting of provinces is done both at the national and regional level. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A5: DIFFERENCE-IN-DIFFERENCE-IN DIFFERENCES - WITHOUT FEs

	(1) New Firms	(2) VC Deals	(3) New Firms	(4) VC Deals
$Rent \times Policy \times Industry$	-0.125**	-0.0168*		
	(0.0576)	(0.0101)		
$Rent_r \times Policy \times Industry$			-0.126**	-0.0191**
			(0.0550)	(0.00948)
$Rent \times Policy$	-0.0492	-0.00131		
	(0.0486)	(0.000946)		
$Rent_r \times Policy$			-0.0932*	-0.00152*
			(0.0479)	(0.000879)
$Rent \times Industry$	-0.326**	-0.00483		
	(0.147)	(0.00696)		
$Rent_r \times Industry$			-0.155	-0.00918
			(0.141)	(0.00648)
$Industry \times Policy$	0.170***	0.0223**	0.166***	0.0227**
	(0.0516)	(0.00978)	(0.0492)	(0.00906)
$Industry$	0.279*	0.0115*	0.188	0.0133**
	(0.142)	(0.00661)	(0.134)	(0.00625)
$Policy$	0.144***	0.00171*	0.162***	0.00176**
	(0.0346)	(0.000928)	(0.0333)	(0.000867)
$Rent$	-0.299*	-0.000334		
	(0.151)	(0.000294)		
$Rent_r$			-0.169	-0.000269
			(0.146)	(0.000281)
Constant	0.674***	0.000601**	0.603***	0.000558**
	(0.138)	(0.000262)	(0.129)	(0.000249)
Observations	134,784	202,176	134,784	202,176
R-squared	0.007	0.009	0.004	0.010

DDD regressions estimated without the use of any fixed-effect, to asses the robustness of estimation to the fixed-effect structure considered. Incorporations are measured in number of new firms (columns 1 and 3) and VC investments as number of deals (columns 2 and 4). In columns 1 and 2, provinces are sorted at the national level, whereas in columns 3 and 4 provinces are sorted at the region-level. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A6: INSTRUMENTAL VARIABLES - ROBUSTNESS

Limited Liability Companies Incorporations	(1) LLC - New	(2) LLC - New	(3) LLC - Pct.	(4) LLC - Pct.
Bank Conduct (λ)	-6.198***		-0.0482**	
	(2.068)		(0.0213)	
HHI - Branches		-17.09		-0.133
		(15.71)		(0.124)
Constant	2.742***	2.020	0.0234**	0.0177
	(0.974)	(2.024)	(0.0100)	(0.0160)
Observations	104	104	104	104
F Statistics	23.83	1.35	23.83	1.35

Estimation of the effect of bank market power on the effect of SIA using the IV approach, via 2SLS. The first stage uses the number of savings banks' branches per capita in 1936 as instruments for Bank Conduct - λ (columns 1 and 3), estimated according to Coccorese (2008), and HHI of bank branches (columns 2 and 4) at the province level. The outcome variable is the effect of SIA at the province level, estimated on the number (columns 1 and 2) and percentages (columns 3 and 4) of new incorporations in innovative sectors using the difference-in-differences framework in Equation 26. The last row reports F statistics of the first stage. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A7: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - ROBUSTNESS 3

Limited Liability Companies	(1) New Firms	(2) VC Deals	(3) New Firms	(4) VC Deals
$Rent \times Policy \times Industry'$	-0.262**	-0.0278		
	(0.118)	(0.0189)		
$Rent_r \times Policy \times Industry'$			-0.0874***	-0.00650*
			(0.0330)	(0.00334)
Observations	129,792	194,688	129,792	194,688
R-squared	0.913	0.541	0.913	0.541
Fixed Effects				
$Quarter \times Province$	YES	YES	YES	YES
$Quarter \times Industry$	YES	YES	YES	YES
$Province \times Industry$	YES	YES	YES	YES
$Quarter \times Province \times Sector$	YES	YES	YES	YES
$Quarter \times Region \times Industry$	YES	YES	YES	YES

Robustness check of the DDD regression to estimate the causal effect of bank market power on the effect of the policy, measured in terms of new incorporations and venture capital deals in R&D-oriented industries. Incorporations are measured in number of new firms. The dummy $Industry'$ equals one if the 2-digits NACE code is considered as either a high-technology manufacturing or knowledge-intensive services industry, according to the OECD/Eurostat definition. Standard errors are clustered at the province-level (106 clusters). *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.