THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Essays on Entrepreneurship

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 28,422 words.

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Abstract

In the first chapter, I investigate how women's participation in entrepreneurship responds to a shock to maternity risk. Exploiting the liberalization of a contraceptive in Italy, I find that lower maternity risk leads to an increase in the number of young women who become entrepreneurs and in the equity stakes of new female entrepreneurs. The effects are larger for women joining innovative firms, who become more likely to be executives and the main owners of their firms. This suggests that easier management of maternity risk reduces the gender gap in entrepreneurship and that maternity risk is more important for women selecting in innovative entrepreneurship.

The aim of the second chapter is to assess whether and how banks' rent-extraction affects entrepreneurial innovation, defined as the birth of innovative firms. I show that the effect of banks' rent-extraction is theoretically ambiguous, and I show that a lower degree of banking competition leads to a weaker effect of the policy empirically, exploiting a policy intervention to foster entrepreneurial innovation. I propose a new way to measure banks' rents and I use a difference-in-difference-in-difference (DDD) design and Instrumental Variables approach for identification. Following the policy intervention, the birth rate of innovative firms is lower where banking competition is weaker.

In the third chapter, I study how the existence of benefits from relationship lending could be detrimental to the scope and success of Venture Capital. I construct a model in which entrepreneurial choices are tilted towards less innovative projects to reap the benefits of relationship banking. Relationship banking benefits cause the entrepreneur to opt for more traditional projects, forgoing more profitable innovative projects and VC financing. The mechanism is exacerbated by higher costs to obtain venture capital and lower VC expertise. The model shows how banks and venture capitalists are linked through entrepreneurial choices.

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1. Maternity Risk and the Gender Gap in Entrepreneurship

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In developed countries women's participation rates in entrepreneurship are 40 to 50% those of men (Halabisky (2018), Bosma and Kelley (2019)). This gender gap is particularly severe for entrepreneurial projects that are more capital intensive and innovative, with women accounting for less than 10% of the total of entrepreneurs (Coleman and A. Robb (2009), P. A. Gompers and Wang (2017b)). Despite the importance of innovative start-ups for job creation and economic growth (Decker et al. (2014), Puri and Zarutskie (2012)), little is known about the cause of the wide gender gap in innovative entrepreneurship and its implications for the efficient allocation of talent in this pre-eminent sector of the economy.

Entrepreneurship, in growth-oriented and innovative firms in particular, requires significant commitment of time and resources. Levine and Rubinstein (2017) find that incorporated entrepreneurs work 27% more hours and earn 41% more per hour than salaried employees. The literature in labor economics shows that women select out of high-powered jobs that penalize them more for career breaks and flexible hours, because of maternity risk and motherhood (Bertrand et al. (2010), Goldin (2014)). This suggests that maternity risk is likely to be an important factor in the decision of women to become entrepreneurs, a career with highly skewed payoffs and lack of protection for prospective mothers. Yet the link between maternity risk and female entrepreneurship remains understudied.

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In this paper, I study the response of female entrepreneurship to a shock to maternity risk, defined as the possibility of a woman having an unexpected pregnancy. I focus in particular on founders of innovative start-ups, defined as young businesses whose aim it is to bring innovative products and services to the market (Hellmann and Puri (2000)), for which the gender gap is wider (P. A. Gompers and Wang (2017b)). As the shock to maternity risk, I exploit the liberalization of an Emergency Contraceptive Pill (ECP) that took place in Italy in May 2015. The liberalization constitutes a positive exogenous shock to the ability of women to avoid unwanted pregnancies and manage their fertility choices. To measure entrepreneurship, I use administrative data to reconstruct the population of new incorporated and unincorporated business owners in Italy and their initial equity stakes.

To causally identify the effect of the shock, I exploit variation in women's prior access to abortion services, which depends on the municipality where they reside. I use a difference-in-differences design (DID henceforth), comparing entrepreneurial outcomes of women in municipalities that differ in the barriers women faced in accessing abortion services prior to the liberalization of ECPs. The idea is that the liberalization reduces maternity risk more for women who previously faced greater barriers to access abortion services.

I find a moderate effect on women's participation in regular entrepreneurship and a large effect on the selection of women into innovative entrepreneurship. For regular entrepreneurship, in municipalities where barriers to abortion are one standard deviation higher than the cross-sectional mean, the number of women aged 35 or younger who become entrepreneurs increases by 3% compared to pre-liberalization levels. As a result, the gender gap in participation rates closes by 6%. I also document a new dimension of the gender gap, pertaining to equity holdings. Controlling for age and firm characteristics, women founders hold on average between 0.4 and 2 percentage points less equity than men. Therefore, the gender gap in entrepreneurship also has an intensive margin: not only do fewer women join entrepreneurship, but those who join also own less of the firm. Following the liberalization, higher barriers to abortion are associated with an increase in equity holdings of women aged 35 or younger of 0.14%, closing 14% of the gender gap. When considering limited-liability companies only, the increase is 0.61%, or 16% of the gender gap. At the firm level, the average new limited-liability company has 1.19% more of its equity held by women and new companies are also more likely to be majority-owned

by one or more women. The proportion of women within similar founding teams grows by 1.03%.

All effects are larger when I focus on innovative start-ups. Once ECPs are more easily available, the number of women aged 35 or younger who start an innovative firm increases by 39.6% where barriers to abortion are one standard deviation higher than the cross-sectional mean, closing 27% of the gender gap. Also, higher barriers to abortion correspond to the average female founder of younger age holding 17.35% more equity in her innovative start-up, and being 16.46% and 43.42% more likely to be the main owner or an executive, respectively, where main owners hold the largest equity stake among founders. Consequently, the gender gap in equity holdings closes by 64%, while the gap in the probability of being an executive reduces by 23%.

Lastly, I use microdata from a survey of the labor force to investigate if the liberalization had an effect on women's the probability of being employed and on the number of hours worked. The liberalization had no significant effect on these variables, suggesting maternity risk is of greater importance for prospective entrepreneurs. I also use the survey to further investigate entrepreneurship. I find that, following the liberalization, women below 35 years of age in a stable relationship living in areas with higher barriers to abortion are 17.78% more likely to be entrepreneurs and, conditionally on being entrepreneurs, work 5.42% more hours. This is consistent with Bastianelli, Rosato, et al. (2016) and Loghi and Crialesi (2017), who show that emergency contraception and abortions are mostly required by women below age 35 who are in a stable relationship.

Italy represents an ideal setting to study the importance of maternity risk for entrepreneurial choices of women. In Italy women's access to abortions varies cross-sectionally due to the ability of gynecologists in public hospitals to refuse abortion services on the basis of their ethical and religious beliefs. To measure women's barriers to accessing abortion services at the municipality level, I use a novel dataset on the number of gynecologists who are conscientious objectors (COs) in each Italian public hospital, combined with travel times between each hospital and each municipality. I measure access to abortion in a given municipality as the weighted mean of the share of CO gynecologists in each public hospital, using travel times between that hospital and the municipality as weights.

The DID design combines differential prior access to abortion across mu-

nicipalities with the exogenous liberalization of ECPs. The European Commission imposed the liberalization of ECPs on all countries of the European Union following a complaint by an ECP manufacturer. The liberalization allowed women to buy ECPs in pharmacies without needing a prescription from a doctor, increasing women's access to the drug. I demonstrate the relevance of my measure of abortion access by showing its predictive ability for the effect of the ECP liberalization on fertility of women. A one standard deviation higher weighted mean share of CO gynecologists is associated with a 1% decrease in the number of births per fertile woman. This is evidence that the liberalization altered the fertility choices and outcomes of women.

Italy represents the ideal laboratory where to study the importance of maternity risk also because the usage of modern contraceptives is unusually low (e.g. 51.8% of women in a relationship use modern contraceptives, compared to 70% in the US), suggesting that women are more exposed to the risk of unwanted pregnancies and face higher social costs in avoiding them.[2] Also, prior to the liberalization obtaining emergency contraception in Italy was harder than in other developed countries, as Italy was the only country in the world that required women to take a pregnancy test in order to have ECPs prescribed by a physician, imposing an additional burden and social stigma on consumption of ECPs. Furthermore, Italy has the lowest proportion of women who own and manage a new business in the European Union (Halabisky (2018)).

The use of the DID allows me to control both for time-varying macroeconomic shocks and for time-invariant economic and cultural differences at the local level. One potential concern is that the participation of women in entrepreneurship may have been affected by local time-varying shocks, other than the liberalization. To investigate this concern, I restrict the sample to women who would not be (or less) affected by the liberalization but presumably still by other shocks. I fail to find an effect of the liberalization on women aged between 36 and 49 and women above 50 years of age, both in terms of participation and in equity holdings. Also, I fail to find an effect on men's participation in regular and innovative entrepreneurship, irrespectively of the age group considered. Finally, the liberalization had no effect on female founders of unlimited-liability partnerships and sole proprietorships. These results are consistent with maternity risk being more important for selection

[2]Modern contraceptives are defined as "a product or medical procedure that interferes with reproduction from acts of sexual intercourse" (Hubacher and Trussell (2015)).

into entrepreneurial projects that are more complex and growth-oriented. In fact, prior studies show that the choice of limited liability strongly predicts growth-orientation of the firm, while partnerships and proprietorships are legal forms suitable for entrepreneurial projects which are less time and capital intensive (Guzman and Stern (2016) and Levine and Rubinstein (2017)).

To rationalize my findings, I build on the model of Goldin (2014), who predicts that women select out of occupations that disproportionally reward time spent at work. I augment and reinterpret this model to include the choice between paid employment and entrepreneurial careers under maternity risk. In accordance with the empirical results, the model predicts that if maternity risk is sufficiently high, a woman would choose paid employment over entrepreneurship.

My results have important policy implications. Policymakers of both developed and developing countries have devoted attention and resources in designing interventions to foster female entrepreneurship (Halabisky (2018)). My findings suggest the importance of interventions to promote work-life balance of mothers and access to social protection by female entrepreneurs. While these are factors frequently considered in policies for female employees (Gatewood et al. (2014)), interventions towards female entrepreneurship often act through development of role models, mentoring activities and extended financial support. Therefore, efforts of policymakers may be ineffective without also tackling the importance of maternity risk for female entrepreneurs and, more importantly, for women's demand for entrepreneurship.

My paper contributes to the recent literature explaining the gender gap in entrepreneurship and why women start different entrepreneurial projects compared to men, as documented by Guzman and Kacperczyk (2019) and P. A. Gompers and Wang (2017b). The literature proposes two main explanations for the gender gap. On the one hand, female entrepreneurship could be discouraged by psychological factors, such as attitude towards risk and competition or self-perception of own abilities (Del Carpio and Guadalupe (2018), Jetter and Walker (2018), Guiso and Rustichini (2018)). On the other hand, it could also be hindered by external factors, mainly discrimination by capital providers. Assenova and Mollick (2018), Hebert (2018), P. A. Gompers and Wang (2017a), and Gornall and Strebulaev (2018) focus on venture capitalists, Ewens and Townsend (2018) on angel investors and Greenberg and Mollick (2015) on crowd-funding. I contribute to this literature by proposing

women's maternity risk as one driver of the gender gap.

Relatively few papers have addressed the relationship between motherhood and entrepreneurship. Gottlieb et al. (2016) show that women are more likely to become entrepreneurs during longer maternity leave that protect them against experimentation risk, but they do not directly examine the effect of maternity leave on entrepreneurs. My work most closely relates to the contemporaneous working paper of Bulka and Zandberg (2019), who assess the importance of access to abortion for women selecting into entrepreneurship in the US. Similarly to my results, they find that the number of female entrepreneurs increases when unwanted pregnancies are easier to avoid. Beyond their analysis, I also document a positive effect on equity holdings and on the probability of having executive roles, and I uncover the much greater importance of maternity risk for innovative entrepreneurship.

By studying the importance of maternity risk for the selection of women into entrepreneurship, I also contribute to the literature on what drives individuals to become entrepreneurs (Evans and Jovanovic (1989), Levine and Rubinstein (2017), and Levine and Rubinstein (2018)). In studying the effect of liberalizing contraception, I contribute to the literature on policy drivers of entrepreneurship (Mullainathan and Schnabl (2010), Bruhn (2011), and Branstetter et al. (2013)). Finally, I contribute to the economic literature that studies the effects of contraceptives on economic outcomes of women, starting from the seminal work of Goldin and Katz (2002) and Bailey (2006), and more recently Bailey, Hershbein, et al. (2012) and Bailey and Lindo (2017). I expand this literature documenting the importance of fertility control for entrepreneurship.

The rest of the paper proceeds as follows: Sections 1.1 and 1.2 outline the institutional background and describe the data. Section 1.3 states the identification and estimation strategy, while Section 1.4 provides summary statistics. Section 1.5 presents the main results of the paper and robustness checks, and Section 1.6 concludes.

1.1 Institutional Background

The liberalization of emergency contraception pills (ECPs), by making these drugs more easily available, reduces likelihood of women having unwanted pregnancies. It also reduces the cost of averting unwanted pregnancies by

giving women an alternative to abortion procedures, especially for those women who face a more difficult or more stigmatized access to abortion. To identify the effect of this shock, I exploit the exogeneity of the liberalization's timing, combined with the cross-sectional variation in access to abortion caused by gynecologists' conscientious objection.

Abortion has been legal in Italy since 1978, although there is still a lot of resistance from institutions and politics (e.g. the Catholic Church, which plays an important role in providing healthcare services in Italy, still deems abortion to be homicide). At the same time, Italy had a *Modern Contraceptive Prevalence Rate* (MCPR), which measures the fraction of women in a relationship that uses modern contraceptive methods, of 51.8% in 2013 (Loghi and Crialesi (2017)). This ranks below all European and most North African countries. As a reference, the US had a *MCPR* above 70% in 2013. This makes Italy a useful setting to study whether the risk of unwanted pregnancies shapes women's entrepreneurial choices.

Italy, like some other European countries, also has a data advantage over many other countries, such as the US: in Italy, all firms, public and private, are required to disclose yearly information about their ownership structure and financials. This allows me to study the intensive margin of selection into entrepreneurship by observing the roles of individual women inside firms, in terms of equity held and executive positions taken.

1.1.1 Emergency Contraception, Abortion and Conscientious Objection in Italy

There are two types of emergency contraception pills (ECPs) available for purchase in Italy (like in most other countries): the ulipristal acetate pill (UPA ECPs), also known as 5-days-after pill, and the levonorgestrel pill (LNG ECPs), the older and more famous morning-after pill. EllaOne (UPA) was approved for sale in November 2011, whereas Norlevo (LNG) arrived in Italy in 2000.[3]

The difference between the two ECPs is the active substances of the two drugs. They guarantee different periods of efficacy, up to 120 hours and up to 72 hours for UPA and LNG, respectively (Glasier et al. (2010)). In Italy both,

[3]In the US, the most famous levonorgestrel pill is *Plan B*, whereas EllaOne is sold under the name *Ella*.

drugs are sold in one-dose packs, at a price of € 26.90 for UPA ECPs and € 17.22 for LNG ECPs.[4] The change of the prescription regime did not alter the price or the doses sold per pack.

In Italy both drugs were available only with a prescription from a general practitioner (GP). Moreover, Italy imposed an additional burden on women. To purchase EllaOne, women had to also take a mandatory pregnancy test to demonstrate they were not already pregnant. The reason being that, given the drug's time-span of efficacy, the Italian Drugs Safety Agency (AIFA) expressed worries about it being potentially abortive.[5]

In November 2014, following a request by an UPA ECPs manufacturer, the European Medicine Agency (EMA) adopted a recommendation to abolish the prescription regime for UPA ECPs in all EU countries. In January 2015, the European Commission issued an implementing decision for all EU countries to switch to the non-prescription regime. Every country, except Hungary and Malta, complied with the decision in 2015, abolishing prescription requirements for both UPA and/or LNG ECPs. The Italian Drugs Safety Agency (AIFA) lifted the prescription and pregnancy test requirements for UPA ECPs on the 8th of May 2015 and for LNG ECPs on the 3rd of March 2016. The liberalization increased the chances of women being able to take the drug in time to be effective, since women no longer needed to obtain the prescription beforehand. Furthermore, removing the need to consult a General Practitioner, the liberalization also lowered the social cost and the likelihood of incurring in the social stigma associated with averting pregnancies.

The decision was not motivated by lobbying on behalf of women's rights associations, but rather imposed by the EMA, speaking in favor of randomness in timing and lack of anticipation of the event. If anything, domestic politics pushed in the opposite direction. Before the liberalization, a parliamentary question was raised in 2012 by 85 MPs to ban the sale of EllaOne. Also, the AIFA president at the time of the liberalization was appointed in 2009 by a conservative center-right government, traditionally pro-life rather than pro-choice. Therefore, without the EU Commission's decision, it would have been unlikely for AIFA to liberalize ECPs of its own initiative.

On the other hand, abortion in Italy was legalized by Law 194 in 1978 (194/78). It required abortions to be made available in public hospitals through-

[4]Source: Federfarma, Italian Federation of Pharmacies (https://www.federfarma.it).

[5]Levy et al. (2014) prove this conjecture to be scientifically wrong.

out the country. Along with the law on divorce of 1970, it constitutes one of the main achievements for women's rights in Italy. At the same time, the law also allows gynecologists and nurses working in public hospitals to opt-out of providing abortion services, to guarantee their constitutional rights to religious, moral and ethical freedom. In fact, many religions, like Catholicism and Islam, prohibit their followers from both obtaining and performing abortion. This *Conscientious Objection* (CO) is granted to every doctor who requires it, with the only exception that the doctor could be coerced in case of an immediate threat to a patient's life. Appendix A.3 provides a more comprehensive review of Law 194 and abortion procedures in Italy.

1.1.2 Start-Up Italy Act

One of the challenges when analyzing innovative entrepreneurship is defining which firms are truly innovative. To identify a sample of Italian innovative entrepreneurship, I exploit the *Start-Up Italy Act* (SIA henceforth), which passed in December 2012. It is aimed at fostering innovative entrepreneurship throughout Italy and was renewed in 2016. The act gives a series of benefits to recently incorporated firms qualifying as innovative.

To qualify, a firm needs to fulfill size, sector and age requirements and conditions on patenting and research and development expenses, while the founding team needs to meet education conditions. The benefits comprise easier access to bank credit, tax breaks for equity investors and several exemptions from bureaucratic duties and red tape. Table A22 in Appendix A.2.1 gives an overview of the requirements and incentives of SIA. By the end of 2017, 9,039 firms had taken up the program, with only 3.28% of them incorporated before the launch of the program in December 2012.

The firms participating in the program represent a sample of young and innovative Italian start-ups. According to De Angelis et al. (2017), start-ups incorporated under SIA account for 54% and 36% of the number and total value of VC deals involving Italian firms between 2012 and 2015, respectively. Also, according to Calenda (2017) SIA incorporated start-ups accounted for 26.2% of all Italian firms operating in scientific research and development (NACE code M-72) and for 8.6% of those operating in the production of software (NACE code J-62) in 2017. The sample of start-ups considered here represents a sizeable proportion of the population of young and innovative Italian firms.

1.2 Data

I collect data from a variety of sources: data on abortions and gynecologists comes from the Italian Ministry of Health. Data about start-ups comes from the Italian Ministry of Economic Development, while for entrepreneurs and firms I use the ORBIS database. Lastly, data about labor market outcomes are from ISTAT's *Quarterly Cross-sectional Labor Force Survey* (Original title: *Rilevazione sulle forze di lavoro*).

1.2.1 Abortion and Conscientious Objectors

From the Italian Ministry of Health, I obtain detailed data at the hospital level for the years 2014 and 2015. For each of the 440 Italian public hospitals with a gynecology residency, I have the total number of gynecologists, the number of COs and the total number of abortions performed in that hospital in each year. I calculate the percentage of conscientious objectors for each hospital in 2014 and 2015 and then average this percentages across time, to have a measure of conscientious objection around the liberalization of UPA ECPs in mid-2015.

I construct a measure of barriers to abortion at the municipality level, combining travel times to hospitals with the share of objectors in the hospitals. For each of the 8,092 Italian municipalities existing in January 2013, I approximate the travel time to every hospital in Italy using the travel time between the municipality and the hospital's municipality. While recent the literature in health economics has proposed an approach to measure access to abortion at the local level using travel times to abortion clinics (Fletcher and Venator (2019), Lindo et al. (2019), Myers et al. (2019)), I use the inverse travel times as a weight to calculate a weighted average of the percentage of gynecologists who are conscientious objectors in all hospitals of the country. In this way, I do not restrict the choice set of women to the closest hospital. For each municipality, I obtain a weighted share of COs that measures the access to abortion services for women residing in that municipality. Data about travel-times by car between municipalities comes from the Italian Statistical Institute (ISTAT). The distances are calculated using a proprietary map book at the end of 2013.

A woman living in a given municipality will face higher barriers to access-

ing abortions if that municipality is far from hospitals and if there are few non-CO gynecologists in the nearer hospitals. In this way, I account for the possibility that a woman can potentially travel to each Italian hospital, even if at a higher cost (as proxied by distance). Such cost is not only the actual cost of travelling and the opportunity cost of time, but also takes into consideration the social cost and stigma associated with more complicated abortion procedures. Having to travel long distances to get an abortion entails a higher social and psychological cost for the woman, also due to the fact that it will be harder for her to have the procedure discreetly.

Since there may be more than one hospital in a municipality, I aggregate the conscientious objector data at the municipality level. To do so, I calculate the average percentage of COs in the hospitals located within each municipality, weighted by the total number of gynecologists in each hospital. The abortion access index is calculated as follows:

$$W_m = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j \ , \quad w_{mj} = \frac{1}{t_{mj}} \tag{1.1}$$

Subscript m indexes the municipality of interest and j indexes all the municipalities with at least one hospital. CO_j is the share of CO gynecologists in the hospitals of municipality j. The weights, w_{mj}, are calculated as $\frac{1}{t_{mj}}$, where t_{mj} is the travel time by car between municipalities m and j. The functional form $\frac{1}{t_{mj}}$ takes into account that the disutility of travel is non-linear in travel time (Koppelman (1981)) and that the marginal disutility of travel decreases in travel time (Cranenburgh et al. (2014)). The higher the value of W_m, the higher the barriers to abortion services are in municipality m.

1.2.2 Regular and Innovative Entrepreneurship

I collect information on the universe of firms started in Italy between the beginning of 2013 and the end of 2017. I use data from the ORBIS database by Bureau Van Dijk, which collects all administrative information disclosed by firms (see Kalemli-Ozcan et al. (2015) for a complete description). I identify all newly founded firms between 2013 and 2017 in Italy and, for each firm, I collect the date of incorporation, the legal form, the NACE 4-digits industry code and a unique identifier. I censor the data collection from the fourth quarter of 2017, due to the incompleteness of more recent data in the ORBIS

database.

I obtain information about the owners and founders of the firms from the ORBIS historical offline database. This database contains all filings of Italian firms regarding owners of equity and the date of the filing. Using the unique firm identifier, I collect information on founding teams of limited liability companies, both private and public, partnerships (unlimited liability companies) and sole-proprietorships. Members of founding teams are identified as all equity owners listed on the first available filing, provided that the filing was recorded within 20 months from the date of incorporation. I choose the 20 months cut-off because, according to Italian business law, each firm is required to disclose information about its owners when presenting the first balance-sheet. The first balance-sheet can be filed within 20 months from the registration of the firm in the local business registry (i.e. the date of incorporation). ORBIS provides information about the place where each founder resides and their percentage of equity in the firm.

Founders are identified by a unique identifier, their Italian fiscal code. An Italian fiscal code is constructed using biographical information of the person of interest and by reverse-engineering the algorithm it is possible to recover information about the gender and place and date of birth of the invidividual (see Stazi et al. (2002) for a in-depth description of the algorithm). The fiscal code does not carry information on the marital status of the individual or whether she has children.

Lastly, from ORBIS I also obtain information about the first executives of the firms, namely those executives who are appointed within 20 months of incorporation. The two main roles for executive directors in Italy are Chief Executive Officer (Amministratore Delegato) for companies and General/Managing Partner (Socio Accomandatario) for partnerships.

To identify the start-ups incorporated under the SIA program, I obtain from the Italian Ministry of Economic Development (MISE) the list of firms that took up the program between January 2013 and December 2017. The list contains a unique firm identifier and information about the requirements of the program that each firm satisfied at the moment of take-up. Using the unique firm identifier, I extract information about the start-ups from the ORBIS online database and following the procedure previously outlined I reconstruct their founding teams and obtain information about the founders from the ORBIS ownership database.

1.2.3 Labor Market Outcomes

To measure the impact of access to emergency contraception on women's labor market outcomes, I use the *Quarterly Cross-sectional Labor Force Survey*, run by ISTAT. The survey is conducted on a rotating representative sample of individuals at the province-quarter level. ISTAT samples individuals from all municipalities above a certain population threshold in every wave of the survey, whereas individuals from smaller municipalities are surveyed only in some waves. According to ISTAT, the population threshold varies across provinces to ensure representativeness of the sample within each province. Since access to abortion is defined at the municipality level, I keep only individuals who reside in municipalities that are included in every wave of the survey.

I use data from the first quarter of 2013 to the fourth quarter of 2018, the most recent available data. The survey provides information at the individual level on gender, age, marital and family status, employment and number of hours worked. Combining information on individual's marital and family status, I can identify the sub-samples of women who are in a stable relationship and of women who are mother of one or more children, which I cannot do for the sample of founders due to data limitations. I then use this information in the analysis to explore differences in responses to the shock by women in different relationship statuses.

1.3 Identification and Estimation Strategy

To identify the causal effect of the decrease in maternity risk on entrepreneurship, I combine the exogenous liberalization of ECPs in Italy with cross-sectional differences in access to abortion services among Italian municipalities. I use a Difference-in-Differences (DID henceforth) approach to compare the evolution of women's participation in entrepreneurship and the labor market, around the liberalization of ECPs (May 2015) across municipalities with different access to abortion services, due to conscientious objector gynecologists in public hospitals.

The idea is that abortion and ECPs are (imperfect) substitutes. While taking an ECP may not be equivalent to having an abortion, when ECPs are easier to obtain, abortion services become less important for avoiding an unwanted pregnancy. This implies that easier access to ECPs will be more important for

women that face significant barriers to accessing abortion services. Therefore, the decrease in maternity risk, caused by ECP liberalization, will be greater for women who live where access to abortion is lower.

I run my analysis at two different levels of aggregation. The first one is at the municipality level and it studies the evolution of the number of women who select into regular and innovative entrepreneurship. The second one is at the individual level, and it investigates the outcomes of individual founders (e.g. percentage of equity owned or probability of having an executive role) and firms (e.g. total woman-held equity or probability of being woman-led).

For both analyses, I divide the population of women into three age groups: women aged between 18 and 35, women between 36 and 49, and women above age 50. The motivation behind these breakpoints is that women of age 35 or younger are those more exposed to maternity risk and more likely to take emergency contraception or to resort to abortion services, while 49 years of age is the standard cut-off used by WHO when estimating the fertile population. According to the medical literature (Bastianelli, Farris, et al. (2005), Bastianelli, Rosato, et al. (2016)) the average Italian woman requesting ECPs is 26 years of age, with fewer than 9% older than 30. Moreover, around 70% of women who get an abortion are below 35, with the highest abortion rates among women in between 25 and 29 years of age.[6] In terms of fertility choices, the average age of having a first child in Italy was 30.7 in 2014, the highest in the European Union, and the Italian National Healthcare System uses 35 as the threshold to define advanced maternal age. Lastly, the 35 years threshold also has a biological justification, as Scheffer et al. (1999) estimate that between 35 and 37, women experience a structural shift in the decline rate of antral follicles; low levels of antral follicles are strong predictors of infertility.

For municipality-level outcomes, I estimate the following regression equation:

$$y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \varepsilon_{mt} \tag{1.2}$$

The time dimension of the DID is a *POST* dummy, which is 1 starting from the second quarter of 2015 and 0 before, as the liberalization of UPA ECPs took place in May 2015. The cross-sectional variation, W_m, is a continuous variable that measures access to abortion services in every municipality and

[6] Abortions and abortion rates are measured in 2014 using ISTAT data.

varies between 0 and 1. As discussed in the previous section, the higher W_m, the harder it is to access abortion services in municipality m. The regression coefficient on the interaction between $POST$ and W_m is the effect of interest.

To mitigate potential omitted variable bias, I fully saturate the regression with municipality and quarter fixed effects (γ_m and τ_t). I also add region fixed effects (ρ_r) interacted with the $POST$ dummy to account for differential effects of the liberalization across different regions. The main outcome is the number of female entrepreneurs per 1,000 women living in the municipality, by age category. I distinguish between regular entrepreneur and founders of innovative start-ups.

Next, I study outcomes at the individual level to understand whether the characteristics of new entrepreneurs change after the liberalization. For each founder, I retrieve her initial equity stake and investigate whether female founders hold more equity after the liberalization. The regression I estimate is as follows:

$$y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt} \tag{1.3}$$

where i indexes the founder and j the firm, m the municipality where she resides and t the quarter of incorporation of the firm. The regression includes quarter and municipality fixed effects and interactions between the $POST$ dummy and fixed effects for the region of the founder's municipality. I also include industry fixed effects (σ_s, defined using the 4 digits NACE sector codes) and fixed effects for the number of founders and legal form of the firm (FEs_j).

I also modify the second specification to investigate outcomes at the firm level. Firm-level outcomes allow me to better understand overall changes in the equity held by founders. For example, the founder's average equity stake after the policy could go up both because women tend to start more projects alone (in which case they own 100%) or because women hold more equity within similar-sized founding teams. While this concern can be partially addressed by the inclusion of a fixed effect for the number of founders, firm-level outcomes also allow me to investigate possible changes within the founding teams. I run the following regression:

$$y_{jmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{jmt} \tag{1.4}$$

While I use the same fixed effects structure of Equation 1.3, m now indexes the municipality of firm j rather than of founder i in firm j. Notably, the two could be different. While this makes the estimation noisier, it allows me to assign W_m to the firm. An alternative method would be to take the average access to abortion across the founders' municipalities, but, since people in certain municipalities will be more likely to be entrepreneurs because of the policy, a firm's access to abortion might be endogenous to the outcome of interest, making inference invalid.

Finally, since the literature in labor economics has established the relevance of abortion and contraception for women's labor market outcomes (Goldin and Katz (2002), Bailey (2006), Myers (2017)), I investigate if the increase in emergency contraception's availability had a similar effect. Using the data from the *Quarterly Cross-sectional Labor Force Survey*, I run the following individual-level regression:

$$y_{imt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + POST_t \times FEs_i + \epsilon_{imt} \tag{1.5}$$

The fixed effects structure is the same as in Equation 1.3. The regression includes fixed effects for age classes (5yrs bins), education levels, marital and family statuses, citizenship, and whether an individual is foreign-born, all interacted with the $POST$ dummy. Table A23 in Appendix A.2.1 summarizes the values these variables can take. The dependent variable y_{imt} represents different labor market outcomes: probability of being employed, number of hours worked, probability of being an entrepreneur and number of hours worked by entrepreneurs. Following the previous analysis, I estimate Equation 1.5 on different sub-samples of women, defined by age (18-35, 36-49, 50+), and relationship status (in a stable relationship or not).

Standard errors in all regressions are clustered at the level of the municipality, as women living in the same municipality might share several common factors besides access to abortion. Also, clustering at the municipality level accounts for serial correlation in the policy variable and time-varying shocks. Lastly, the DID identifying assumption is that women's participation to entrepreneurship would have evolved according to parallel trends in municipalities with greater and smaller barriers to abortion services. While this assumption is not directly testable, in Section 1.5 I check that different municipalities were on parallel trends prior to the liberalization of ECPs.

1.4 Summary Statistics

1.4.1 Barriers to Abortion

Figure A1 shows that municipalities where accessing abortion services is more difficult (higher W_m) tend to be clustered in the south (above the 75th percentile) and in the north-east (above the median). In north-western and north-central regions (e.g. Piemonte, Toscana and Emilia-Romagna), municipalities exhibit easier access to abortions (lower W_m).

Since barriers to abortion are not randomly assigned to municipalities, I investigate how they correlate with other municipality characteristics. I collect various economic and social statistics at the municipality level in 2014, prior to liberalization in mid-2015. Statistics at the municipality-level are obtained from a variety of ISTAT databases. Table A1 collects the results from regressing W_m on several indicators of the local economy, entrepreneurial climate, fertility and women's inclusion. Since W_m has a strong North-South clustering, I also run the regression including region fixed effects.

Some municipality-level characteristics correlate with W_m. For example, once I include region fixed effects, W_m positively correlates with income per-capita but negatively with the employment rate and it correlates positively with the percentage of graduates but negatively with the percentage of high-school graduates. Furthermore, women's involvement and fertility outcomes all predictably co-move with W_m. Municipalities in which there are higher barriers to abortion are also those in which there are more births, resulting in a smaller share of childless couples. In terms of women's involvement in decision roles, where W_m is higher the share of women in town boards is lower. Consistent with conscientious objection stemming from religious and moral beliefs, a higher W_m also corresponds to a higher share of votes in favor of centre-right and far-right parties, traditionally pro-life and against abortions. Lastly, access to abortion does not significantly correlate with entrepreneurship, measured as the number of firms per 100 residents and the number of workers in high-tech professions per 100 workers. Furthermore, Wm does not correlate with the number of female entrepreneurs per 1000 women, neither for all women nor for women of younger age ($\leq$35 years old). Because of the significant differences between municipalities with high and low W_m, all subsequent analyses include municipality fixed effects to absorb time-invariant differences

between municipalities.

1.4.2 Regular and Innovative Entrepreneurship

The final population of new entrepreneurs consists of 2,131,220 founders in 1,531,660 new firms, founded between the first quarter of 2013 and the fourth quarter of 2017. I identify at least one executive at founding for 1,335,874 of the start ups (a coverage of 82.2%), for a total of 1,411,407 executives, 426,411 of them women.

I have a sample of 9,039 innovative start-ups, resulting from the list obtained from the Ministry of Economic Development. From the ORBIS database, I collect information for 28,294 founders of 8,837 start-ups (98% of the list). Out of 8,837 start-ups with a founding team, information on executives at founding is available for 5,273 start-ups (around 60%), for a total of 6,183 executives. Innovative entrepreneurial project accounts for 1.4% of new entrepreneurs, and 0.6% of new firms.

Table A2 presents summary statistics for the population of new founders and of new firms. The first row of Panel A of Table A2 shows evidence of the gender participation gap in entrepreneurship, as only 30% of all new founders are women. In accordance with the literature on the gender gap, the problem is more severe in innovative firms, where the share of women falls to 20%. Compared to regular entrepreneurship, founders of an innovative start-up are less likely to be foreign-born individuals, tend to be 1 year older on average and to hold smaller stakes of equity in their companies. The evidence on foreign-born individuals is consistent with P. A. Gompers and Wang (2017b), who document that the innovation sector also suffers from a diversity gap. Figure A2 shows the gender gap in entrepreneurial participation as a function of age of the founders. For unlimited liability partnerships, the share of women is constant throughout the age structure, at around 30%. On the other hand, for limited liability companies the gender gap widens throughout fertile age (especially up to 30 years of age), to then stabilize at around 28%. This suggests a relationship between the fertile age of women and the existence of the gender gap in entrepreneurship.

Comparing the average new firm with the average new innovative start-up (Table A2, Panel B), the former tends to have more women within the founding team, and the team is smaller and younger on average. Both the

average new firm and innovative start-up have one executive, who is more likely to be a woman in the average new firm. Regarding sector and geographical distribution, Table A3 collects the NACE sectors and macro-regions (NUTS1) of new firms and new innovative start-ups. The latter tend to be clustered in ICT and R&D sectors (NACE sectors J and M), which combined account for almost 70% of the total. The same sectors accounts for less than 10% of all new firms. The most represented sectors in the population of new firms are wholesale and retail and the accommodation and food industry.

Geographically, almost a third of the start-ups are located in the Northwest, with Milan being the main Italian innovation hub. Nonetheless, the rest of the sample is rather more equally distributed across north-eastern, central and southern (including isles) Italy. Comparing the geographical distribution of innovative start-ups and of all new firms, the former are more concentrated in the North, suggesting that the South is a harder environment for innovative entrepreneurship. On the other hand, the South accounts for a bigger share of the total of new firms. I address such geographical clustering including region fixed effects interacted with the POST dummy in my specifications, in this way I compare firms and founders within coherent economic environments. There are 20 regions in Italy, which are larger administrative divisions than municipalities but smaller than macro-regions.

1.4.3 Labor Market Survey

After applying the aforementioned filters to the *Quarterly Cross-sectional Labor Force Survey*, I have 3,042,088 individual observations in 900 municipalities over 24 quarters, 1,601,883 of which are women (53%). Table A24 collects summary statistics for the sample: 32.7% of individuals are parents of one or more children, while 49.4% are singles. Women tend to be slightly older than men on average (48 versus 45 years).

In this sample , 4.4% of individuals are entrepreneurs. Also, this sample shows the participation gap in entrepreneurship between men and women: only 3.4% of women are entrepreneurs compared to 5.5% of men, more than 25,000 fewer individuals. The overall employment rate is around 81% for men and almost 8 percentage points lower for women. In terms of the average monthly wage, women earn on average 300 Euros less then men, which accounts for almost a third of their pay. This evidence is consistent with the literature in

labor economics that document the wage and employment gap in the US (Blau and Kahn (2006), Blau and Kahn (2013)).

Since I am excluding all individuals living in municipalities that are not included in the survey in all quarters, I use individuals living in 900 municipalities, out of 8,092, in the analysis. The 900 municipalities are representative of access to abortion of all municipalities. While the average W_m in Italy is 69.9% with a standard deviation of 0.045, the municipalities considered have an average W_m of 70.9% with a standard deviation of 0.069.

1.5 Results

1.5.1 Contraception and Fertility

I first show that the abolition of the prescription regime had a large effect on the sales of EllaOne, the 5-days-after ECP available in Italy, in Figure A3. In the second quarter of 2015 sales grew by 341% compared to the previous quarter.[7] Part of the effect could be driven by substitution between types of ECPs, as between May 2015 and March 2016 it was easier to get EllaOne than Norlevo, which was only liberalized in March 2016. In fact, the market share of EllaOne went from 5.5% at the start of 2015 to 60% at the start of 2016, but the total market for emergency contraception grew by 24% over the same period.[8] Hence, the abolition of the prescription regime appears to have enlarged the market for emergency contraception.

In order for the liberalization of ECPs to constitute a reduction of maternity risk I need to rule out the possibility of women substituting regular contraception with ECPs, especially in areas where barriers to abortion were higher. Unfortunately, data on sales or consumption of regular contraceptive methods at the municipality level are not available. From the Italian Ministry of Health and the Italian Drug Safety Agency (AIFA), I obtain data on consumption (defined daily dose, DDD, per 1000 inhabitants) of regular oral contraceptives at the region level for 2014 to 2018. The main types of oral contraceptives sold are progestins and estro-progestins, most frequently referred to as "the Pill".

If women substituted regular contraception with emergency one in regions

[7]Source: AIFA and Italian Ministry of Health.
[8]Source: data about market shares and size comes from IQVIA.

where accessing abortion services was more difficult, I would expect consumption of regular contraception to fall more after the liberalization in these regions. To test this, I aggregate access to abortion at the region level (W_r), using as weight the share of women aged 18-49 living in each municipality of each region:

$$W_r = \frac{1}{FF_r} \sum_m FF_m W_m \,, \quad \forall m \in r \tag{1.6}$$

FF_r and FF_m are the number of women aged 18 to 49 living in the region and municipality in 2014, respectively. I estimate regressions relating consumption of regular contraception to access to abortion, an indicator for the post-liberalization period, and their interaction. Table A4 collects the estimates. The liberalization of ECPs did not have a significant effect on women's consumption of oral contraceptives, as the coefficient on the post-liberalization is negative but not significant, whereas access to abortion correlates negatively and significantly with the consumption of regular contraception. The interaction term is not significant and positive, suggestive of a lack of differential substitution between contraceptive methods in regions with different access to abortion. However the small number of observations and unavailability of data prior to 2014 warrant caution in interpreting this finding.

To further rule out the possibility of women substituting regular contraception with emergency one, I investigate if the liberalization of ECPs affected regular contraception's popularity in Google searches. Figure A4 plots Google interest for searches of the most popular contraceptive pills sold in Italy (Yaz, Yasminelle and Yasmin), as well as of the word "condom". The liberalizations did not meaningfully decrease the popularity of these search terms. Furthermore, even though medical literature deems EC drugs as safe (Trussell et al. (2014)), EllaOne's label recommends not taking more than one dose during the same menstrual cycle. Also, survey evidence shows that more than 50% of women think that ECPs are either *very dangerous* or *rather dangerous* SWG (2017), which speaks in favor of women using ECPs as a last resort rather than as regular contraception.

I also test if liberalizing ECPs affected fertility, since maternity risk is not directly observable. I examine the number of children born per 1000 women of fertile age (conventionally 49 years or younger). If ECPs are an efficient way to avert unwanted pregnancies, following their liberalization women's fertility should decrease. If unwanted pregnancies are more frequent where barriers to

abortion access are higher, fertility should decrease more in these municipalities. To test this, I use the number of births per 1000 women in fertile age at the municipality level as an outcome variable of the DID. Data on fertility at the municipality level comes from ISTAT and is available at a yearly frequency.

Results of the estimation for 2012 to 2017 are collected in Table A5, and illustrated in Figure A5, that also shows that fertility in different municipalities followed parallel trends before the liberalization. The coefficient of the interaction between W_m and $POST$ is negative and significant. Therefore, following the liberalization of ECPs, fertility declined more in municipalities where having an abortion was harder. I find that a standard deviation increase in barriers to abortion is associated with a decrease in fertility of almost 1% of the pre-liberalization average, from 2015 to 2017, equivalent to a decrese in fertility of 0.5% per year. The effect is bigger than what documented in the literature on the liberalization of ECPs in the US: Mulligan (2016) finds that it led to a decrease of around 0.2% per year in women's fertility, while Gross et al. (2014) and Durrance (2013) find no effect. The discrepancy of my results with the previous literature might be explained by differences in the institutional settings. As noted in the introduction, Italy has a lower modern contraceptive prevalence rate than the US, which makes women more likely to be exposed to maternity risk. This result constitutes the first attempt to estimate the effect of emergency contraception's availability on women's fertility rates in Italy.

1.5.2 The ECP Liberalization and Female Entrepreneurship

I document a new dimension of the gender gap in entrepreneurship: conditional on being entrepreneurs, women hold less equity. Table A6 shows the result from a regression of the share of equity of each founder on an indicator variable of her being a woman. I include a set of fixed effects for the number of founders, the quarter of incorporation, municipality, NACE code and legal form. I estimate the regressions using data only from the *pre* period (e.g. before the second quarter of 2015). I repeat the analysis for different legal forms of the firm and different age brackets of the founder. I find that this gender equity gap is bigger for limited liability companies than for unlimited liability partnerships, and it grows to more than 2% of equity in innovative start-ups. Women tend to matter less for more structured and innovative entrepreneurial projects, even

if conditional on being entrepreneurs the equity gap with men is less dramatic than in terms of participation.

Therefore, women experience a gender gap both in participation and in equity holdings. I define the participation gap as the extensive margin of the gender gap, whereas the equity holding gap constitutes the intensive margin.

I start by studying the effect of the ECP liberalization on the participation of women in regular entrepreneurship. To study the extensive margin, I calculate the number of women in each age group (18-35, 36-49, 50+) who become owners of newly founded firms in each municipality and quarter. I standardize the number of new female entrepreneurs by the number of women in the respective age group living in the municipality. I use this measure as the dependent variable in estimating Equation 1.2. I include municipality and quarter fixed effects and region fixed effects interacted with the *POST* dummy to control for nation-wide or region specific time-variant shocks and for time-invariant differences between municipalities.

Table A7 collects the estimates. The coefficient on the interaction between barriers to abortion and *POST* is positive and significant for female entrepreneurs below age 35, and insignificant for all other age groups. The number of female entrepreneurs aged 35 or younger, standardized by the corresponding number of women living in the municipality, increases by 3% for one standard deviation increase in W_m, compared to the pre-liberalization mean. These results are consistent with women below 35 being most affected by the liberalization, since this is the age group most at risk of taking ECPs, as mentioned in Section 1.3.

The evidence in Table A7 suggests that giving women ways to manage their fertility risk helps shrink the gender participation gap in entrepreneurship. This can happen through at least two different channels. On the one hand, women might be more prone to become entrepreneurs after ECPs are made more easily available because they are less exposed to the risk of unwanted pregnancies. A similar channel has been documented by Bandiera et al. (2017), who show that awareness of contraceptives increases women's empowerment, improving their economic and entrepreneurial prospects. On the other hand, the number of female entrepreneurs could increase because fewer women experience unwanted pregnancies that cause them to forgo their entrepreneurial projects. This channel is in line with the labour economics literature on contraception, which shows that once contraceptive methods are

available fewer women forgo employment due to pregnancies (Goldin and Katz (2002), Bailey (2006)).

In column 5 of Table A7, I use a different definition of who is an entrepreneur. Following Gartner and Shane (1995), I consider as entrepreneurs only those individuals who have executive roles, rather than those who are equity holders. Using this alternative measure of entrepreneurship, the results do not change. The share of women younger than 35 who are entrepreneurs increases following the liberalization of ECPs, with a magnitude of 4%, comparable to the previous result.

To investigate how the intensive margin of the gender gap responds to the liberalization of ECPs, I study it's effect on the share of equity held by women in new firms founded around the event. Table A8 shows that for women 35 or younger the shock had a positive and significant effect on their share of equity. Their equity holding increases by 0.14%, with respect to pre-liberalization mean, for one standard deviation higher W_m. While the economics magnitude of the effect is small, it accounts for 14% of the gender gap in equity holdings. Women above 36 years are not significantly affected, consistently with maternity risk being more relevant for younger women.

According to Guzman and Stern (2016), business registration and limited liability are strong predictors of a firm's growth-orientation. These firms require bigger investments of time and resources from founders. Therefore, I expect maternity risk to be more relevant for women who start limited liability companies. To investigate this hypothesis, I run the analysis separately for founders of limited liability companies and unlimited liability partnerships and proprietorships. Columns 5 and 6 of Table A8 show that women who found a limited liability company are the only affected group. A one standard deviation higher W_m is associated with an increase by 0.6% of the equity holdings of women 35 or younger, which accounts for more than 17% of the gap in equity holdings with men. Young founders of partnerships and proprietorships are not significantly affected by the shock to maternity risk. As it was the case for the participation gap, giving young women ways to effectively deal with maternity risk allows a more equitable participation of both genders in entrepreneurship.

To assess the robustness of the result on equity holdings, I use a difference-in-difference-in-differences analysis (DDD), that adds interactions with a *female dummy* (F) to the previous specification and uses the population of male

founders as control group. The results are shown in Table A9 and confirm the robustness of the main analysis. When considering newly incorporated limited liability companies, the liberalization increases equity holding of young women (35 years or less) relative to young men and also makes them more likely to be main owners, defined as those founders who hold the largest equity stake in the firm. On the other hand, there is no differential change between male and female founders when considering founders between 36 and 49 years of age or founders of unlimited liability partnerships or proprietorships.

1.5.3 Firm-Level Evidence

Lastly, I investigate the effect of the liberalization on women's involvement at the firm level. For each firm, I calculate the amount of equity owned by women, whether control, defined as an equity stake of 50% or more, is assigned to one or more women, the maximum share of equity held by a woman, and the percentage of women in the founding team. As discussed in Section 1.3, I assign to each firm the access to abortion of the municipality where it is located, which may not be the same where the founders live.

Table A10 presents the estimates of Equation 1.4. I restrict the analysis to limited-liability companies. I find a positive and significant effect on the total amount of equity held by women, the likelihood of one or more women being in control of the firm and on the percentage of women in the founding team. This evidence is consistent with the results at the founder level. Since the coefficient on the maximum share of equity is not significant, there is no evidence that following the liberalization women are more likely to start firms on their own. This suggests that after the liberalization women are more likely to be part of bigger founding teams, within which they matter more.

1.5.4 The ECP Liberalization and Female Innovative Entrepreneurship

Using the sample of innovative start-ups incorporated under the *Start-up Italy Act*, I next study the effect of the ECP liberalization on the gender gap in innovative entrepreneurship, both in the extensive and intensive margin. As it is the case for limited liability companies, innovative entrepreneurial projects require significant investments in time and resources, especially in their early

stages. Moreover, innovative entrepreneurial ideas depreciate faster than non-innovative ones, making the ability to start the project at the right time particularly important. For these reasons, maternity risk might be an important factor for women selecting in innovative entrepreneurship.

Column 1 of Table A11 shows that the shock to maternity risk had a positive and significant effect on the number of women who join innovative entrepreneurship. For one standard deviation higher W_m, the number of women who join innovative entrepreneurship increases by 32%. When dividing women by age (18-35, 36-49, 50+), the only significantly affected group is that of younger women, as shown in column 3 of Table A11.

The effect of the liberalization is more than ten times larger for innovative entrepreneurship than for regular entrepreneurship. While one standard deviation higher W_m corresponds to a 3% increase in the number of young female entrepreneurs, it corresponds to an almost 40% increase in the number of female entrepreneurs in innovative firms. This suggests that the risk of unwanted pregnancies and inefficient planning of motherhood matter more for selection into innovative entrepreneurship than for selection into regular entrepreneurship.

I next study whether the liberalization causes women who found an innovative start-up after the liberalization to hold more equity with respect to those who founded it before when facing higher barriers to abortion. Table A12 shows that the average equity stake of female founders living in areas with worse access to abortion goes up more after the liberalization of ECPs, as the coefficient on the interaction of $POST$ and W_m is positive and significant. It corresponds to an increase in younger women's average equity stake of almost 18% for one standard deviation higher W_m. Similarly to what I see in the extensive margin, the intensive margin effect is larger in terms of economic magnitude for innovative entrepreneurs than for the whole population of founders. The coefficient is significant for all women, but when considering different age brackets only women younger than 35 are significantly affected. Again, the results are consistent with young women being most affected.

A possible consequence of women holding more equity is that they could also take on more important roles. To test whether this is the case, I study the probability of a woman having two main roles, one is being the main owner and the other being an executive. Executives are defined as those managers who have executive powers (e.g. a CEO is an executive, but a board member is

not). Table A13 collects estimates of the effect on the probability of the average woman founder being the main owner. When considering all women the effect is positive but not significant, but when restricting the sample to women aged 35 or younger, women who found their start-up after the liberalization of ECPs are almost 17% more likely to be main owners, for one standard deviation increase in W_m. Young female founders in areas with worse access to abortion also become more likely to be executives at founding, which is not the case for female founders in other age categories (Table A14).

Another consequence of holding more equity is that women would make bigger investments in their start-ups. To study if this is the case, I estimate the Euro-value of each founder's equity stake. To do so, I multiply the percentage of equity owned by each founder by the capital stock resulting form the first balance sheet filed by the company. Importantly, this measure is only a proxy of the value of the investment made by the founder, unless all equity contributions have been made in cash. I find that female founders aged 35 or younger invest around 24% more in their start-ups, for one standard deviation higher W_m, compared to the pre-policy mean (Table A15). This corresponds to investments bigger by almost 1000 Euros, excluding start-ups with only one founder.

I then study whether women who join innovative entrepreneurship following the liberalization of ECPs are different, compared to those who join prior to it. Since the data are from administrative sources, I have limited information about the founders. I investigate the average age, within each of the age brackets I considered in previous analysis. If the liberalization of ECPs allowed the selection into entrepreneurship of women in maternal age, I expect to find an increase in the average woman founder below 35, as maternal age in Italy tends to corresponds with the 30s. Table A16 shows that this is indeed the case, while women in other age brackets do not seem to be of different age around the policy.

Lastly, I investigate women's participation in innovative entrepreneurship at the start-up level. I study the amount of equity held by women, whether control is assigned to one or more women, the maximum share of equity in the hands of a single woman, and the percentage of women in the founding team. Following the same analysis of regular entrepreneurship, I define access to abortion using the municipality of incorporation of the start-up. The evidence is mostly consistent with the previous founding. From Table A17, the

percentage of women in the founding team increases, while other coefficients are insignificant. The coefficient on the total equity held by women is positive and close to being significant. In interpreting these results, it is important to take into account the noise introduced in the estimation and the limited size of the sample, compared to the one of all firms, which makes the estimates imprecise. Conversely, the coefficients on the maximum share held by a single woman and the likelihood of a single woman holding more than 50% are both negative and insignificant. The conclusion I draw from these results is that women do not necessarily start projects on their own but rather join bigger founding teams.

1.5.5 The *Quarterly Cross-sectional Labor Force Survey*

I use the *Quarterly Cross-sectional Labor Force Survey* to assess the robustness of the results on female entrepreneurship, and since the impact of emergency contraception on women's labor market outcomes has not been studied, I also study the impact of ECP liberalization in Italy on women's probability of employment and hours worked.

Firstly, I document the gender gap for different economic outcomes (Table A19). I use all individuals in the survey to regress different labor market outcomes on a dummy equal to one if the individual is a woman, and I include fixed effects for age, education, relationship status, citizenship and profession to match women to similar men. Being a woman below 35 years entails a 17.6% lower probability of being employed and a 26.5% lower probability of being an entrepreneur with respect to men in the same age group. Furthermore, women tend to work 16.8% fewer hours than men, for a 3% lower hourly wage. The gap is wider when considering only individuals who are in a stable relationship. Considering only individuals in a relationship, being a woman entails a 40% lower chance to either work or to be an entrepreneur, and female entrepreneurs work on average 27% fewer hours than men.

To focus on entrepreneurship, I identify the entrepreneurs in the survey and investigate how the probability of being an entrepreneur, conditionally on being able and willing to work, changes for women. In this dataset, entrepreneurs are defined differently from the self-employed. Self-employed are workers who provide a service or a good using mainly their own labor (e.g. doctors and lawyers), while entrepreneurs use both their own labor and capital. I focus

on entrepreneurs rather than self-employed to be consistent with the previous analysis. Also, in Italy self-employed are entitled to paid maternity leave depending on their profession, whilst entrepreneurs do not have any maternity benefit and therefore experience a higher cost associated with motherhood. I leverage the richness of the dataset to analyze the effect on women in different relationship statuses.

Firstly, I find that the effect of ECP liberalization on the probability of being an entrepreneur is stronger for women aged 35 or younger in a stable relationship (Table A20, columns (1) to (3)). In this group, the probability of being an entrepreneur increases by 16%, for one standard deviation higher W_m. The evidence is consistent with Bastianelli, Rosato, et al. (2016) who find that women in a relationship are more likely to require emergency contraception. Interestingly, the probability of being self-employed, for women in the same age category and in a stable relationship, is not affected. This result is consistent with entrepreneurship being a more demanding career, compared to self-employment, and therefore more incompatible with higher maternity risk.

To study the intensive margin of entrepreneurial participation, I use the number of weekly hours worked by women who are entrepreneurs. As for the probability of being an entrepreneur, the only significantly affected group are women aged 35 or less in a stable relationship (Table A20, columns (4) to (6)). These women increase their hours worked by 5% with respect to the pre-liberalization mean for one standard deviation higher W_m. Notably, the increase is not significant for women in self-employment, suggesting that entrepreneurs are more affected by the liberalization than the self-employed. The results in this section provide evidence of entrepreneurship being an harder career than paid and self-employment to undertake when maternity risk is higher.

Lastly, I study how labor market outcomes of younger women responded to the liberalization. The literature in labor economics has reached the conclusion that regular contraceptives and access to abortions have been important drivers of women selecting into employment during the 20^{th} century. The seminal works of Goldin and Katz (2002) and Bailey (2006) demonstrated the importance of the Pill for women's labor market outcomes, and Myers (2017) shows the positive impact of abortion legalization. The setting I study differs from the aforementioned literature in labor economics. First, I investigate the impact of emergency contraception among women to whom regular contracep-

tion is easily available. Second, I study Italy in the 21^{st} century, where women in paid employment are entitled to paid maternity leave of 5 months at 80% of their pre-maternity paycheck. The effect of contraception has mostly been studied in 20^{th} century US, where women did not have such benefits (according to Bartel et al. (2018) only 14% of workers had access to paid maternity leave by 2016 in the US).

I start by studying the probability of being employed, conditional on being able and willing to work. Table A21, columns (1) and (2), reports the estimates of Equation 1.5. The effect of the liberalization of ECPs is insignificant. Furthermore, I study women's labor supply conditional on working, measured as the number of contractual working hours per week. As for the employment probability, Table A21 (columns (3) and (4)) does not show any significant effect of the shock to maternity risk. Results are consistent with maternity risk being more salient for women who want to select into entrepreneurship, compared to women who select into general employment.

1.5.6 Discussion and Robustness

I use a difference-in-differences framework with multiple periods (i.e. quarters), therefore the identifying assumption is parallel trends in the outcomes of interest, namely that female entrepreneurship in municipalities with different levels of access to abortions would have behaved similarly without the liberalization. Since the cross-sectional variation in access to abortion is measured by a continuous variable, I cannot divide the observations into treated and control groups and plot the dependent variables of the two groups over time. To circumvent this problem, I estimate the following regression equation:

$$y_{ijmt} = \alpha + \sum_{k=2013h1}^{2017h2} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + FEs_{jt} + \epsilon_{ijmt} \tag{1.7}$$

For ease of visualization and to decrease the noise and seasonality of the estimates, I estimate this regression at the six-months frequency. Therefore, τ_t is a full set of half-yearly dummies interacted with W_m. Given the presence of fixed effects, I have to drop one interaction. Following the literature, I drop the first semester of 2015, which is the last non-treated period. If the parallel trends assumption is likely to be satisfied, all the β_{mt} coefficients should be insignificant before the first semester of 2015 (the liberalization took place in

May 2015) and significant thereafter, showing no evidence of pre-trends in the outcomes between municipalities with different barriers to abortion. I plot the β_{mt} coefficients, with 90% confidence bounds. Figures A5 to A9 plot the estimates of β_{mt} for most results in Section 1.5. In general, there are no significant effects of the treatment before the liberalization of ECPs.

I also use the sample of men, especially those of younger age, to run a placebo test of my identification strategy. I re-estimate the main analysis on the population of male founders only, both for regular entrepreneurship and innovative one only. Appendix A.2.1 collects the tables of the estimation. I fail to find a significant effect on men's participation in entrepreneurship in all estimations. The effects are generally positive but much smaller than those I find for the population of women. The placebo test also allowss me to conclude that a reduction maternity risk, by increasing women's involvement but not men's one, helps closing the gender gap, both in participation and equity holdings.

When studying innovative entrepreneurship in Section 1.5.4, I do not include a set of fixed effects for the number of founders. Since the sample of innovative founders is smaller this is to avoid to identify the coefficients of interest on a narrow set of observations. Consequently, the results for women's participation in innovative entrepreneurship (Tables A12 and A13) could be driven by women starting more one-founder firms following the the liberalization. As a result, the average percentage of equity would go up mechanically as women would always have 100% of the equity of a one-founder firm. Investigating such dynamics helps understanding how maternity risk affects women's participation. In Column 5 of Tables A12 and A13, I re-estimate Equation 1.3 excluding one-founder start-ups. The coefficients are similar, implying that the effect on both variables is not driven by an increase in the number of one-founder start-ups.

I furthermore assess the robustness of the main results to the threshold of 35 years of age. Figure A10 collects estimates, for various outcomes, of separate regressions where the threshold is moved, from including only women aged 28 or younger, up to ones aged 42 or lower. As the threshold is lowered, estimates become generally bigger in magnitudes but more noisy, since the number of observations is reduced. When moving the threshold to the left, regression coefficients become smaller in magnitude. This is consistent with women being mostly affected by ECPs' liberalization when they are younger

than 35, whereas as the sample considered is enlarged, the coefficients wane as non-treated women are added.

Lastly, I check whether results are robust to specifying access to abortion in alternative ways. In constructing W_m in the main analysis, I use travel times and non-linear weighting to allow women to travel to every hospital. As a robustness check, I use linear weighting to measure access to abortion as W_L:

$$W_L = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j \ , \quad w_{mj} = \frac{t_{max} - t_{mj}}{t_{max}} \tag{1.8}$$

Where t_{max} is the maximum travel time between municipality m and any hospital j. Furthermore, I measure access to abortion as W_m and W_L, but excluding any hospital located farther than 4 hours from municipality m. Lastly, I measure access to abortion as the share of CO gynecologists in the closest hospital to a woman's municipality. This last approach is consistent with the literature in health economics. Tables A25 to A28 in Appendix A.2.1 collect the estimates of the main regressions for women in innovative entrepreneurship, repeated with different measures of access to abortion. The results are comparable, both qualitatively and quantitatively, to the one of the main analysis, that are therefore robust to measuring access to abortion in alternative ways.

1.6 Conclusions

In this paper, I study the effect of a decline in maternity risk on women's participation in entrepreneurship, with a particular focus on innovative entrepreneurship.

I find that, in response to the reduction in cost and likelihood to avoid unwanted or unplanned pregnancies, women tend to participate more in entrepreneurial projects, and the effect is stronger for women participating in more innovative firms. I use the abolition of the prescription requirement for one type of ECP in Italy in 2015 as a reduction to maternity risk. To identify the effect, I exploit the differential access to abortion services in different municipalities caused by the decision of gynecologists in public hospital to conscientiously object to performing abortion services. The higher the barriers to accessing abortion services the larger the decline in maternity risk.

I study women's participation in entrepreneurship both in the extensive and in the intensive margin. The extensive margin of women's participation is given by the number of women who select into entrepreneurship and the intensive margin is how much a woman matters within the firm, conditional on joining entrepreneurship. In the extensive margin, the number of women aged 35 or younger who join entrepreneurship goes up, more so for those who join more innovative firms. For the intensive margin, I study the amount of equity held by female founders, their probability of being main owners or executives, and whether firms tend to be more likely to be controlled by women. I find that younger women facing higher barriers to accessing abortion hold significantly more equity in limited liability companies and innovative start-ups, following the liberalization. Furthermore, female founders of innovative start-ups aged 35 or younger who face lower access to abortion are also more likely to be the main owners and the executives. On the other hand, I fail to find an effect for women participating in unlimited liability partnerships and sole-proprietorships, entrepreneurial projects which are less oriented to growth and risk.

When analyzing entrepreneurship using the *Quarterly Cross-sectional Labor Force Survey*, I find that younger women, living in areas where access to abortion is impaired, are more likely to be entrepreneurs, but only if they are in a stable relationship. The evidence is consistent with the group of younger women in a relationship being the most exposed to maternity risk. These same women also tend to work more hours as entrepreneurs after the liberalization. Regarding labor market outcomes, women do not seem to be more likely to be employed or to consistently work more intensively. This constitutes the first attempt at estimating the effect of emergency contraception's availability on women's labor market outcomes.

The paper concludes that maternity risk helps explaining the participation gap in entrepreneurship. I also establish that maternity risk is more important for women who want to join more innovative entrepreneurial projects. Therefore, giving to women cheaper and easier ways to manage maternity risk significantly improves their participation in entrepreneurship, innovative one in particular, both in terms of the number of women and their involvement within the firm.

2. Lend Me a Hand - Banks Rent Extraction and Policies for Start-Ups

FABRIZIO CORE[1]

In developed countries, innovative start-ups and high growth firms account for about 50% of firm-level gross job creation and contribute significantly to economic growth (Decker et al. (2014), Mollica and Zingales (2007) and Puri and Zarutskie (2012)). However, there are significant differences between countries in the contribution and importance of high-growth innovative young firms. Countries like Israel have a bursting innovative start-up economy (Senor and Singer (2011)). In Europe, while others countries Italy or Spain are lagging behind, some others, like the UK or Germany, achieved good results (Henrekson and Sanandaji (2017)).

There is no conclusive evidence on why this is the case, in particular Axelson and Martinovic (2013) show that Europe does not seem to suffer from a particularly strong stigma of failure, a factor often used to explain the lower level of innovation in Europe. European governments spend a significant amount of effort and resources to design and promote policies aimed at helping start-ups gettin founded from VCs (P. Gompers and Lerner (2001)), angels (Lerner (1998)) and crowdfunding (Mollick (2014)). Lerner et al. (2018) comment on the fact that these policies represent fertile future research avenues and it is of paramount importance to asses what factors contribute to the success or failure of such policies, both in terms of policy design and economic environment.

Most policies are aimed at helping firms in R&D and patenting activities on one hand, and easing financing conditions for equity providers on the other. Another common 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 for the success of private firms, like Petersen and Rajan (1994), and in particular for innovative firms, see A. M. Robb and Robinson (2014).

[1]I thank Ulf Axelson, Daniel Paravisini, Denis Gromb, Vicente Cuñat and Dirk Jenter for their very helpful comments. I also benefited from the comments of participants in the PhD Seminar at the LSE and the HEC PhD Conference.

In this paper, I study the salience of banking competition for transmission of incentives to entrepreneurial innovation. 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 banking competition and cost of debt, I find that in provinces in which credit is more expensive the effect of the policy in fostering the birth of firms in innovative industries is weaker. On average, the policy intervention increased the number of innovative firms by 25%, while in provinces with lower competition of the banking sector the increase has been of only 10%. Therefore the policy is less than half effective where banking competition is lower.

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 on the success of a similar policy is theoretically ambiguous. I develop a simplified theoretical framework in which banks extract rents and 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 the debt can push bank toward financing more or less innovative firms, depending on the model considered. This theoretically ambiguity requires the question to be investigated empirically.

In order to identify the effect of banks' rent extraction on the effect of the policy, I use a triple difference design, in which I compare birth rate of firms in innovative and non-innovative industries industries between low and high-competition provinces. The use of a DDD framework allows me to use fixed-effects in the estimation, to address the concern of confounders related to the business cycle and province and sector specific factors. The idea behind this approach is that the policy affects certain industries, where innovative start-ups are concentrated, more than others. 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 banking competition on the effect of the policy.

Since the degree of competition of the local banking market is not ran-

domly assigned and provinces with different degrees of banking competition tend to be different, I also use an instrumental variable approach. I implement and improve the instrument developed by Guiso, Sapienza, et al. (2004) for the Italian banking market. This instrument uses the structure of the banking sector build by the Fascist regime in 1936, following a banking reform. Results of the IV and DDD estimations are consistent, and 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. In light of my results, rent extraction and competition in the banking sector is one of the factors explaining the lag of certain European countries in developing bursting start-up sectors, which are fundamental to support and foster growth and employment.

My paper contributes to the literature about banks' 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), Dass and Massa (2011), A. M. Robb and Robinson (2014) and Kerr and Nanda (2009)). 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 rent extraction and its link to innovative firms my work contributes the literature of banking competition and innovation, like Chava et al. (2013) and Cornaggia et al. (2015), who link competitive banks behaviour to more innovation. Furthermore, it builds on the literature estimating banking sector parameters using Italian data, similarly to Guiso, Sapienza, 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 focus on banks' rents and competition, like Coccorese (2008) and Presbitero and Zazzaro (2011).

In developing a new measure to estimate banks rent-extraction 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). My paper also contributed to the literature about the im-

portance of public guarantees on debt for SMEs, see Ughetto et al. (2017) and Cowling et al. (2018).

The remainder of the paper proceeds as follows: Section 2.1 outlines the theoretical ambiguity in a simple framework of banks' rent-extraction. Sections 2.2 and 2.3 give an overview of the policy stimulus (SIA) and explain how I construct my new measure of banking competition and rents. Section 2.4 illustrates my estimation and identification strategies, while Section 2.5 review the data sources and offers summary statistics. Lastly, Section 2.6 explains and discusses the main results of the paper and their robustness, while Section 2.7 concludes.

2.1 Theoretical Framework

I develop a simple theoretical framework to show how higher rent extraction can cause banks to finance more innovative ventures as well as fewer. Furthermore, a policy that gives public guarantees on firms' debt can result in banks financing more innovative firms when rents are higher, but the result can be the opposite depending 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 the design of the rent extraction process, the prediction for the finance of innovation 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 chasflows; 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.

2.1.1 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 a final safe cashflow at *time 2* ($\gamma^2 X$), that

again depends on her type.

There is a continuum of entrepreneurs, each with an own type γ that determines how innovative is her project and it is perfectly observable. They are uniformly distributed across types γ on the interval $[1;\ \gamma_{max}]$. Innovation (i.e. higher γ) makes the the first cashflow of the project riskier and the second cashflow bigger. The funding required, both at *time 0* and *1*, does not depend on γ. Figure B1 pictures 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 refinances 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 one.*

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 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:

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

Taking derivative of the expression above and using Assumption 1, it is easy to show that $NPV(\gamma)$ 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 different ways.

2.1.2 Ex Post Rent Extraction

The first rent-extraction mechanism I study follows Rajan (1992), where banks can extract an ex-post rent by holding up the entrepreneur they previously financed. 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:

$$R_2 = I + \Delta \tag{2.1}$$

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

$$\frac{1}{\gamma}(R_1 + R_2) = I + \frac{1}{\gamma} I \tag{2.2}$$

By substituting 2.1 into 2.2, I obtain the first repayment banks requires from an entrepreneur:

$$R_1 = \gamma I - \Delta \tag{2.3}$$

Comparing 2.3 and 2.1 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:

$$R_1 = \gamma I - \Delta < X \;\Rightarrow\; \gamma < \frac{X + \Delta}{I} \tag{2.4}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I + \Delta}{X}} \tag{2.5}$$

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 results 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 2.4 is less binding. On the other hand, the inequality in 2.5 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).

2.1.3 Ex-Ante Rent Extraction

The second rent-extraction mechanism I study is the opposite of Section 2.1.2. Here banks are exogenously non-competitive and that 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 two now potentially different entrepreneurs in the first and second rounds are:

$$R_1 = \gamma(I + \Delta) \tag{2.6}$$

$$R_2 = I + \Delta \tag{2.7}$$

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

profit condition analogous to Equation 2.2. Feasibility now requires:

$$R_1 = \gamma(I + \Delta) < X \Rightarrow \gamma < \frac{X}{I + \Delta} \tag{2.8}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I + \Delta}{X}} \tag{2.9}$$

An higher Δ is now associated with more high-type entrepreneurs (i.e. more innovative ones) excluded from funding. As in the previous case, 2.9 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 to compensate the bank for their riskiness and also pay the additional rent, $\gamma\Delta$.

2.1.4 Guarantees' Effect

After establishing the theoretical ambiguity between rent extraction 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.

Guarantees' Effect - Ex-Post Rent Extraction

Implementing the policy in the ex-post rent-extraction mechanism yields the analogous of equations 2.1 and 2.2:

$$R_2 = I + \Delta \tag{2.10}$$

$$\frac{1}{\gamma}(R_1 + R_2) + (1 - \frac{1}{\gamma})kI = I + \frac{1}{\gamma}I \tag{2.11}$$

By substituting 2.10 into 2.11, I obtain the first repayment banks ask to a generic entrepreneur:

$$R_1 = \gamma(1 - k)I + kI - \Delta \tag{2.12}$$

Feasibility of the repayment schedule requires:

$$R_1 = \gamma(1-k)I + kI - \Delta < X \;\Rightarrow\; \gamma < \frac{X + \Delta - kI}{I - kI} = \bar{\gamma} \tag{2.13}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I+\Delta}{X}} \tag{2.14}$$

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:

$$\frac{\partial \bar{\gamma}}{\partial k} = \frac{X + \Delta - I}{(1-k)^2 I} > 0 \tag{2.15}$$

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 2.15 with respect to Δ:

$$\frac{\partial^2 \bar{\gamma}}{\partial k \partial \Delta} = \frac{1}{(1-k)^2 I} > 0 \tag{2.16}$$

Equation 2.16 shows that the effect of the policy should be greater when rent extraction by banks is higher and terms of credit more expensive.

Guarantees' Effect - Ex-Ante Rent Extraction

To obtain the effect of the policy under an ex-ante mechanism of rent-extraction, I rewrite Equations 2.6 and 2.7 introducing the guarantee:

$$R_1 = \gamma(I + \Delta) - k(\gamma - 1)I \tag{2.17}$$

$$R_2 = I + \Delta \tag{2.18}$$

Following the previous steps feasibility requires:

$$R_1 = \gamma(I + \Delta) - k(\gamma - 1)I < X \Rightarrow \gamma < \frac{X - kI}{I + \Delta - kI} = \hat{\gamma} \tag{2.19}$$

$$R_2 = I + \Delta < \gamma^2 X \;\Rightarrow\; \gamma > \sqrt{\frac{I+\Delta}{X}} \tag{2.20}$$

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:

$$\frac{\partial \hat{\gamma}}{\partial k} = \frac{I(X - \Delta - I)}{(I + \Delta - kI)^2} > 0 \tag{2.21}$$

The last inequality in 2.21 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 rent extraction impacts on this beneficial effect. Further differentiating 2.21 by Δ yields:

$$\frac{\partial^2 \hat{\gamma}}{\partial k \partial \Delta} = -\frac{I(X - \Delta - I + X - kI)}{(I + \Delta - kI)^3} < 0 \tag{2.22}$$

Where Assumption 3 again implies the last inequality. 2.22 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 banks' rent-extraction (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 rent extraction. The following empirical investigation serves the purpose of solving such theoretical ambiguity.

Stemming from this brief analysis, it is important to understand what effect banks' rents have on the financing of innovation. It is potentially an important driver for the success of policies like the one considered in this paper. To offer ground to my investigation, in the next session I study how incorporations in innovative sectors, following the introduction of a policy in the last quarter of 2012, vary in local economies with different degrees of banks' rent extraction.

2.2 The Policy Intervention

To foster the birth of innovative ventures in Italy, the government launched in December 2012 a series of incentives for newborn and young firms which qualify as innovative, according to a set of criteria, the so called *Start-Up Italy* act (SIA).

To take-up the policy 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 technological innovation as main business objective;
3. Having value of production smaller than 5 million Euros as per the last available balance sheet;
4. Not having distributed any dividend in the past;
5. Being a private independent company, not a university/corporate spillover.

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

1. R&D expenses accounting for at least 15% of the biggest between value and cost of production;
2. A patent granted or a registered trademark for a piece of software;
3. Having at least one third of all employees and collaborators holding a PhD or having been researchers in accredited institutions, or at least two thirds of them holding a master degree.

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

- Access to government's guarantees on 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 failing and filing for bankruptcy;
- Exemption to several bureaucratic duties and red tape (e.g. subscribing to the registry is usually expensive but it is free for a start-up taking up the program).

In particular the access to the public guarantee, which to start-ups under the program is given preferentially and always for 80% of bank debt, is the policy intervention I exploit in my analysis.

The public guarantee must be obtained at the moment in which the bank gives 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.

2.3 Measuring Banks Rent Extraction

I develop a new measure of bank's rent extraction, which I call Return Distance (RD). Banks extract rents when terms of credit are too expensive, that mean that rate at which a loan is given does not reflect the probability of the entrepreneur repaying it. On the other hand, a risk-neutral competitive bank should price loans to make zero profits in equilibrium:

$$\sum_i [p_i(1+r) - 1] = 0 \quad \Rightarrow \quad r^\star = \frac{1-\bar{p}}{\bar{p}} \tag{2.23}$$

Where $\bar{p}$ is the true probability of success and $r^\star$ is the average (net) rate of return that a competitive lender sets to lend one unit of funds for one period of time. If the observed average rate of return on loans ($\bar{r}$) is bigger than $r^\star$ banks are extracting in equilibrium and making a profit. The bigger the difference between the observed and the competitive average rate, the higher the rent. 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 collateralized and given by risk-neutral intermediaries. In fact, according to Nishiyama (2007) finds that banks appear to be close to risk neutrality. Furthermore, my synthetic measure does not take into account the existence of

banks' 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 relevant geographical market for banks' loans, where banks should on average make zero profits. I, therefore, choose the province as a unit of observation over the region as there is a vast literature which indicates that in Italy the province is the appropriate size of local banking market (see Herrera and Minetti (2007), Alessandrini et al. (2009), and Presbitero and Zazzaro (2011))[2].

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

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 non-limited liability companies (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:

$$\bar{d} = \frac{d_{pf} L_{pf} + d_{nfc} L_{nfc}}{L_{pf} + L_{nfc}} \tag{2.24}$$

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 (2.23).

To calculate 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

[2]Italy, in 2016, was divided in 20 regions and 104 provinces

parties before maturity (e.g. unsecured leasing);

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 given, 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):

$$\bar{r} = \frac{r_R L_R + r_F L_F + r_S L_S}{L_R + L_F + L_S} \tag{2.25}$$

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

I measure 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 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 rent extraction is higher, and provinces below median are those in which it is lower. The resulting dummy variable *Rent* constitutes one of the treatment assignments of the empirical analysis.

2.4 Estimation and Identification

The goal of this empirical exercise is to estimate the causal effect of banks' rent-extraction on the effectiveness of the policy stimulus. To study the effectiveness of the policy, I study the evolution of incorporations in industries which are over represented among start-ups that took up the program around the passing the policy, in provinces with higher and lower banking competition. I do not use directly the number of incorporations under the program because taking up the program is an endogenous decision of the firm.

Firstly, I use a difference-in-differences (DID) design to causally estimate the effect of the policy. I compare the difference in incorporations before and after the policy between R&D oriented industries and non-R&D oriented ones.

Industries are defined as two-digits NACE codes and R&D oriented industries are those that are over-represented among firms that took up the program between its launch and the end of 2016. The list of R&D oriented industries can be found in Table B1. I estimate the following equation:

$$y_{piq} = \alpha + \gamma Industry_i * Policy_q + Q_q + I_i + P_p + \epsilon_{piq} \tag{2.26}$$

Where $Industry_i$ is a dummy equal to 1 for R&D oriented industries 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. Figure B7 gives evidence of the identifying assumption of parallel trends for the DID.

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

To causally identify the effect of banks' rent-extraction on the effect of the policy stimulus, I add a further difference to my previous specification, resulting in the following regression equation:

$$\begin{aligned} y_{prisq} = \alpha + \beta Industry_i * Policy_q * Rent_p + \\ + PQ_{pq} + IQ_{iq} + PI_{pi} + PQS_{pqs}(+RIQ_{riq}) + \epsilon_{piqs} \end{aligned} \tag{2.27}$$

Where $Industry_i$ and $Policy_q$ are the dummies previously defined. $Rent_p$ equals one if the province has a pre-policy rent-extraction above the national median and zero otherwise. I fully saturate the regression using Province-Quarter, Industry-Quarter and Province-Industry fixed effects. Also, 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 some specifications, I add a Region-Industry-Quarter fixed effect to account for additional policies launched at the regional level to foster the Start-Up Italy Act (RIQ_{riq}) and that could result in differential industry-specific trends across regions. y_{prisq} is the dependent variable of interest, corresponding to the number of newly incorporated firms and the percentage of incorporations to the total of firms

registered 4 quarters before in that industry in each province. The coefficient β is the DDD estimator, where the three layers of differences are pre and post policy, innovative and non-innovative industries and high-rent and low-rent provinces. The coefficient β captures the causal impact of banks' rents 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 rent-extraction in that province 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. In addition, only regions are allowed to pass individual policies.

The identifying assumption of the DDD requires parallel trends in the differences in incorporations between high-rent and low-rent provinces for innovative and non-innovative industries, absent the policy. Figure B3 shows absence of pre-trend in the differences between the two groups of provinces. Figure B4 shows the trends using the dummy *Rent* defined at the regional level.

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 2.27 accounts for all those factors that additively interact with the endogenous variable. To take into account potential correlations between my observations, all standard errors are clustered at the province level, when using the national sorting, and at the region-sector level when sorting at the regional level.

2.4.1 Instrumental Variable Approach

Alternatively, to estimate the salience of banks' rent extraction on the effect of the policy is to estimate the policy's effect in every province and then regress these effects on the provinces' rent extraction. I can estimate the effect of the policy at the province-level by estimating β from Equation 2.26 for every province, and then regress the βs on the return distance in the cross-section of provinces. The second regression would suffer from endogeneity of banks' rent extraction. To circumvent the problem I can instrument bank rent extraction.

To do that, I rely on the instrument developed by Guiso, Sapienza, et al. (2004), who exploit the Italian reform of the banking sector in 1936, carried out by the Fascist regime. 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 an instrument for local 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, 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, Sapienza, et al. (2004), the Fascist regime favoured savings banks because most of these banks directors were donors of the Fascist Party.

While Guiso, Sapienza, et al. (2004) use the instrument at the region-level, my analysis is conducted at the level of the province. Therfore, I refine the instruments (i.e. number of banks branches and of savings bank branches per capita) by calculating 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, digitalizing the 1936 Italian Census.

2.5 Data

To conduct the empirical investigation I obtain data from a variety of sources. I collect data on quantities needed to estimate the return distance 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 the delinquency rates of short-term loans that banks give to firms 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. From the same database, I obtain data on average rate of returns of short-term loans at the province-quarter frequency.

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 business

registry (*InfoCamere*), which collects and aggregates data from the registries all over Italy. The analysis runs from 1995 to 2017 and comprises data at quarterly frequency about the total number of firms in the registry, the number of firms which are active and the number of new firms incorporated and dissolved in that quarter, both for limited-liability companies (LLCs) and non-limited-liability companies (NLLCs).[3] 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 industries of them (e.g. *manufacturing of chemical products* or *catering and food services*). In the main analysis, I use data from eight quarters before (2010Q4) the passing of the policy (2012Q4) to eight quarters after (2015Q1).

Data for the construction of the 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, which I transposed from digitalized PDF into usable data.

2.5.1 Summary Statistics

Table B1 lists the industries that are over-represented among firms that took up the Start-Ip Italy (SIA) program. Since the passing of SIA (fourth quarter of 2012) 6850 start ups took up the program, by the end of 2016. Table B2 compares the distribution of the start-up sample and Italian firms from *Movimprese* across sectors.[4] 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.

Start-ups incorporated under the SIA tend to have a strong preference for bank financing, as shown in Table B3. In fact, the total Euro-value of the public guarantee used under the program is more than 10 times the value of

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

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

the outside equity raised in the sample. Furthermore, according to Calenda (2017), the public guarantee on debt has been voted the most useful tool of the program by the entrepreneurs who took it up. Therefore the Italian setting is ideal to study the importance of banks' rent-extraction for the financing of innovation.

In terms of geographical dispersion, Figure B5 shows that the policy has stimulated firms creation throughout the country, with a slight prevalence of North-Eastern provinces. On average, provinces in which there are bigger cities (e.g. Rome, Milan and Naples) tend to have generated a higher number of start-ups. In particular, the province of Milan is a clear outlier, having generated 794 start-ups alone (more than 10% of the total).

Figure B6 plots the treatment assignment of provinces. High-rent provinces tend to be clustered in the South, whereas low-rent 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.[5] Figure B7 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 rent-extraction. All indicators are measured at the end of 2012, when the policy is passed. When sorting using the national median, column 1 of Table B4, the two groups of provinces (low-rent minus high-rent) are different. High-rent 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 Table B5 shows that the two groups also differ in the structure of their banking sectors. In least competitive provinces the banking sector is smaller, both in terms of loans and deposits, with fewer foreign players and branches per capita.

Column 2 of Tables B4 and B5, shows that almost all of these differences can be explained by the low-rent provinces being mostly located in the south of the country, which suggests such differences are not driven by rent extraction but by the North-South divide. On the other hand, sorting provinces using

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

regional medians results in groups that are more homogeneous, as shown by column 3 of Tables B4 and B5. The differences between the groups for most of the indicators become insignificant. Regarding the banking sector, high-rent provinces have slightly less loans per branch, consistent with an higher price for such loans, 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, evidence of a less efficient intermediation sector.

To give evidence that the return distance can be used as a measure of banks' rent-straction and competition, I estimate banks' conduct in every province between 2010 and 2012. To do so I replicate the procedure outlined by Coccorese (2008). Banks' conduct measures the distance between marginal costs and revenues of loans in each geographic market and it is estimated structurally nonlinear simultaneous equations. To estimate conduct I collect supplementary data on GDP and wages in the banking sector at the province-level, as well as data on government bonds yields. Figure B8 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. Therefore, the return distance offers a synthetic and parsimonious way to measure competition in local banking sectors, without the need of structural methods.

Lastly, I show that the instrumental variables used in the IV identification strategy did not meaningfully correlate with economic development in 1936. Table B6 collects the result of a regression of number of banks' branches per capita and number of savings banks' branches per capita on number of cars per capita (proxy for GDP), share of active population (proxy for employment) and shares of various sectors of the total workforce (entrepreneurs, agriculture and manufacturing). Provinces in 1936 which different in the number of branches of savings banks per capita in 1936 were not different in terms of local economies, which substantiate the claim that the banking reform was not driven by provinces' financial needs.

2.6 Results

I start by documenting a correlation between R&D orientation of local economies and banking competition. Following the theoretical framework, if banks extract rents ex-post an higher degree of rent-extraction 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 financed.

Figure B9 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 B1 at quarterly frequency, average 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 and non-limited liability ones. Notably, the slope is steeper for LLCs, consistent with these firms being riskier. Overall, a lower degree of banking competition (i.e. higher rents) is associated with economic environments less oriented towards R&D and innovative. 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 overall effect of the SIA policy stimulus using a difference-in-differences (DID) framework. Table B7 collects the estimates of the DID. The DID estimates the effect of SIA both on the number of new incorporations of innovative LLCs and on the percentage of such 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. 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 dependant variable. SIA has therefore been a successful policy stimulus for enhancing R&D-oreiented industries.

The third leg of the analysis estimates the causal impact of banks' rent-extraction on the effect of the SIA policy. 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 B8 reports coefficients of the interaction term in Equation 2.27 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 rent-extraction. A comparable result holds for incorporations expressed in percentage terms (column 5). The effect of lower banking competition gets bigger in magnitude when the region-industry-quarter fixed-effect is included, which accounts for the passing of additional policies at the regional level (column 3).

To address concerns about the North-South divide, I estimate Equation 2.27 specifying the *Rent* dummy using regional medians, rather than the national one. Results are reported in Table B9 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, bigger in magnitude than in the previous specification, and it remains negative and significant when incorporations are expressed as percentage of registered firms four quarters before.

I also study the effect of banks' market power on the success of the policy stimulus trough an instrumental variable approach (IV). The need of an IV stems from the non-random assignment of banks' market power to different provinces, which prevents me from simply regressing the effect of the policy on the Return Distance. As previously mentioned, I firstly estimate the effect of SIA in the cross-section by estimating Equation 2.26 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 banks' branches and savings banks' branches per capita, following Guiso, Sapienza, et al. (2004).

Results of the IV estimation are collected in Table B10 and B11. In Table B10 the effect of the policy is estimated on the number of incorporations, while in Table B11 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 stages 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 pass-trough of a policy stimulus, which entails a public guarantee on bank debt, crucially requires a good degree of banking competition, even for those sectors which are supposed to rely less on bank credit. Therefore, empirical evidence supports an ex-ante mechanism of banks' rent extraction.

2.6.1 Robustness

One of the requirements of the SIA policy stimulus is that the firm must be incorporated as a limited liability company (LLC). I therefore use data about incorporation of non-limited liability companies (NLLCs) from *Movimprese* to run a placebo test. Column 3 of Table B7 shows that the policy have no effect on incorporations of NLLCs.

Similarly, I fail to find any effect on firm creation of NLLCs in the DDD, as per columns 2 and 4 of Table B8. Results are not significant even defining the dummy *Rent* using within-region medians (see columns 2 and 4 of Table B9).

To explicitly address the concern on the North-South divide, I construct a *South* dummy which equals one if the province is located in the South of Italy.[6] I then substitute the treatment assignment *Rent* with *South* in constructing the DDD coefficient. I also use this placebo triple interaction as a control in my main regression. Table B12 shows the estimation of this additional specification. The coefficient of the placebo interaction with *South* is never significant if used as main regressor. On the other hand, 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 unchanged if incorporations are expressed in percentage terms. Lastly, the coefficient on the placebo interaction, both if used as a control or main regressor, is always positive.

This is evidence that if anything, the SIA had a stronger effect in the South,

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

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 divide which affects the Italian economy.

2.7 Conclusions

In this paper I shed light on how banks rent-extraction affects the transmission of policy stimulus for innovative firms creation. Exploiting a policy intervention of the Italian Government in late 2012, I show that where banks extract higher rents the effect of the policy on the intensity of innovative entrepreneurship, defined as the number of new innovative ventures, is weaker. Therefore, more competitive provinces respond better to the policy, which 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.

To causally estimate the effect of banks' rent-extraction I use two alternative identification strategies. Firstly, I use a difference-in-difference-in-differences framework, comparing firm creation in R&D-oriented and other industries, in provinces with higher and lower rent-extraction, before and after the policy intervention. To measure banks' rent-extraction I develop a new parsimonious measure, the return distance. The 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 development of the Italian banking sector originally developed by Guiso, Sapienza, 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 rents are higher.

Therefore, policy makers should take into account and tackle the issue of banks rent extraction and banking competition, in order to design effective policies to spur entrepreneurial innovation. Looking at the bigger picture, I suggest that this feature of local banking sectors may be one of the factors that keeps some European regions at a standstill in the development of bursting start-ups' economies.

3. Liaisons Dangereuses - Relationship Banking and Venture Capital

FABRIZIO CORE[1]

Why has Venture Capital disproportionately grown in particular geographical regions, like Silicon Valley, and not in others? P. Gompers and Lerner (2001) identify this as one of the open questions in venture capital research. Since then, a literature has flourished in trying to establish what caused certain regions and countries to have a comparative advantage in venture capital activity, but with mixed success.

Venture capital activity varies significantly across countries and across time. In 2007, the United States accounted for 78% of all the value of VC deals around the world and 46% of all VC funds active in the world.[2] In 2016, while the share of American VCs rose to 59% of the total, the share of US-based deals on the total of VC deals around the world fell to 48%. Jeng and Wells (2000) find that GDP levels do not explain the cross-sectional difference in the dimension of the venture capital industry. Figure C1 plots VC investments as % of GDP in OECD countries against logarithm of GDP in 2016, showing that no clear association between GDP and size of VC activity has emerged since then. For example, Italy's VC industry accounted for 0.5% of the country's GDP, compared to almost 10% in Ireland or 15% in Canada, which both had lower levels of GDP.

The question on what drives differences in venture capital activity and success remains an open one. In this paper I propose relationship banking as one of the factors that impair the success of the venture capital industry. Empirically, Figure C2 shows that countries in which the relevance of relationship lender is higher, exhibit lower levels of VC activity.[3]

[1]I thank Ulf Axelson for his guidance. I also thank Hongda Zhong, Mike Burkart and Martin Oehmke for their very helpful comments.

[2]Source: Author computation on OECD Data.

[3]Relevance of relationship lenders is calculated is proxied by the ratio of loans deposit made by relationship lenders to the value of loans and deposits made by non-relationship lenders. Data about lending comes from the IMF *Financial Access Survey*, whereas data about VC activity is from the OECD databank.

Given the high degree of endogeneity of the structure of the banking sector, I build a model to explain the link between relationship lenders and VCs. Relationship banking, defined as the ability of banks to refinance the same firms overtime, adding value to these firms, interact with venture capitalist by altering entrepreneurs' choice about what type of projects to start.

In the model, an entrepreneur has two choose between two projects: one innovative, that is more profitable, and one traditional. Furthermore, the entrepreneur has to choose who to approach for obtaining funding. The two alternative sources of funding in the model are banks, who use debt and can build relationship refinancing the entrepreneur, and venture capital, that is costly to obtain for the entrepreneur but it is able to add value to more innovative projects. When refinancing the same entrepreneur over time, a bank can improve the profitability of a traditional project, similarly to what the VC can do in the innovative one. The existence of such relationship benefits can tilt the entrepreneur's choice towards less innovative project. Furthermore, banks use debt contracts, which do not allow them to be locked inside the firm. On the other hand, VCs use equity, and equity has the desirable property to lock the VC inside the firm, which in case of success allows the venture capitalists to share the gains with the entrepreneur.

The use of a theoretical model, allows me to undercover the indirect link between banks and VC. In particular, Da Rin et al. (2013) claim that there is a substantial scarcity of theoretical models in the finance literature that could help explaining the choice of different forms of financing by small firms (debt, angel and venture capital), and how this choice in turn affect the financiers. Linking venture capital and bank financing is the main contribution of my paper.

In the literature, few papers try to explain what drives differences across counntry in venture capital's success.Jeng and Wells (2000) find that the importance of initial public offerings is a main driver of later-stage VC activity, but it has little relevance for early-stage one. They claim this helps explaining why Europe has in general lower levels of venture capital activity compared to the US, a fact also documented by Bottazzi and Da Rin (2002). Other factors identified in the literature include the stigma of failure (Landier (2006)) and lower levels of expertise and ability of European venture capitalists (Hege et al. (2009) and Kaplan et al. (2007)). But more recently, Axelson and Martinovic (2013) show that European VC do not suffer from an higher stigma of failure

nor from lower expertise when comprehensively compared with their American counterparts.

My work contributes to the literature about relationship lending, started form the seminal papers of Rajan (1992) and Sharpe (1990), by showing that one of the hidden costs of this phenomenon is to crowd out investment opportunities for non-bank intermediaries. Importantly, as relationship lending has been associated with lack of competitiveness in the banking sector (Boot and Thakor (2000) and Petersen and Rajan (1995)) my model can also interpreted in light of a link between competition in the banking sector and venture capital activity.

My paper closely relates to Landier (2003), Ueda (2004) and Winton and Yerramilli (2008) in analyzing the choice of the entrepreneur between bank founding and venture capital. This strand of literature mainly focuses on endogenizing the choice of founding, conditional on the project chosen by the entrepreneur, and it rationalize the stylized fact that riskier ventures tend to attract venture capital, whereas safer and less profitable firms raise bank debt (P. Gompers (1995)). My contribution is showing that the choice of the financier and the choice of the type of venture by the entrepreneur is a joint problem, and depending on the characteristics of the financiers the entrepreneur's choice can change.

My paper also contributes to the literature studying the difference between the use of equity and debt for the financing of innovative firms (Casamatta (2003) and Trester (1998)). I contribute to the literature by studying the competition between banks and venture capitalists under different contracts design, rather than the contract design itself for a given type of financier.

The rest of the paper proceeds as follows: Section 3.1 states the assumption of the model, finds the best responses of financiers and of the entrepreneur, and solves the model in equilibrium; Section 3.2 extends the model by allowing the entrepreneur to choose among a continuum of projects, that differ for an innovation parameter γ; lastly, Section 3.3 concludes.

3.1 Main Model

The economy consists of three periods, from time 0 to time 2. An entrepreneur can start a project at time 0 and refinance it at time 1, conditionally on being successful. Every period, a project succeeds with probability θ, and

with probability $1-\theta$ it yields nothing and the entrepreneur is liquidated. A generic project requires funding F at time 0 and yields X with probability θ at time 1. At time 1, if the project is successful, the entrepreneur can invest an additional F and get X with probability θ at time 2. There is no discounting and all agents are assumed to be risk neutral.

The entrepreneur can choose between two projects: one innovative, that is more profitable, and one traditional. the entrepreneur has to choose whether to enter transformational or subsistance entrepreneurship (Schoar (2010)). She can only start one project and she cannot switch projects at time 1. Total proceedings from the project are:

$$\Pi_j = -F_j + \theta_j X_j + \theta_j(\theta_j X_j - F_j) = (1+\theta_j)(\theta_j X_j - F_j) \;\; j = (T,\, I)$$

The two projects differ for profitability, NPVs and funds required. Regarding the characteristics of the two projects, I make the following assumption:

- *Assumption 1*: $0 < \theta X_T - F_T < \theta X_I - F_I$

Both projects have the same probability of success ($\theta_T = \theta_I = \theta$) and both projects have positive NPVs. *Assumption 1* implies that the innovative project has a NPV higher than the traditional one, and therefore an entrepreneur investing her own funds would always choose an innovative project over a traditional one, as $\Pi_T = (1+\theta)(\theta X_T - F_T) < (1+\theta)(\theta X_I - F_I) = \Pi_I$. To more closely resemble innovation's pay-off one could assume $\theta_T > \theta_I$, which combined with the assumption $\theta X_T - F_T < \theta X_I - F_I$ implies that the innovative project has an higher variance of pay-offs. Since in my model all agents are risk neutral, assuming different probabilities of success for the two projects does not change any of the results.

3.1.1 Financing of the Entrepreneur

The entrepreneur is penniless and needs to seek funding by a financier at time 0 to start a project. At time 0, the financier can pay a monitoring cost, m, to make the cashflow at time 1 verifiable. This is consistent with a large part of the literature in banking (De la Fuente and Marin (1996) and Carletti et al. (2007), among others). If the entrepreneur is not monitored at time 0, she never goes trough with her project and she extract a non-monetary private

benefit that dominates the continuation value of the project. Unless m is paid at time 0, the financier cannot size anything from the entrepreneur.

At time 2, the cashflow is always verifiable. Regarding monitoring cost, I make the following assumption:

- *Assumption 2*: $(1+\theta)(\theta X_T - F_T) > m > \theta X_I - F_I$

Assumption 2 implies that a financier cannot break-even when financing the entrepreneur unless some other incentive is provided. No monitoring cost has to be paid at time 1 if the entrepreneur is successful, namely the second project's cashflow is always verifiable. On the other hand, *Assumption 2* implies that if the first cashflow is verifiable, then the entrepreneur always has an incentive to default strategically and pocket the first cashflow in full.

There are two types of agents that can finance the entrepreneur, banks and venture capitalist. The difference between the two agents is the contract used: banks can finance the entrepreneur using one-period debt claims, while venture capitalists use equity claims, buying a portion α of the cashflows generated by the project in exchange for all the funds needed by the entrepreneur. The difference in contracts entails that while an entrepreneur can seek re-financing from another bank at time 1, she is locked with the same VC in the second period. Long-term debt, equivalent to a multi-period debt claim, is ruled out by assumption. This si consistent with the empirical evidence showing that small firms in their early stages rarely has access to long-term bank financing (Whited (1992)).

Both types of financier has to pay the monitoring cost to make the first cashflow verifiable. Venture capitalists and banks compete with each other and finance the entrepreneur competitively, setting their overall profits to zero.

Relationship Banking and Venture Capital

When a bank finances an entrepreneur for the second time the second cashflow of the project is increased by an amount B. This relationship benefit reflects the fact that banks can add value when establishing long-term relationship with their clients, as empirically documented by DeYoung et al. (2008) and Dass and Massa (2011). Furthermore, B can only be earned if the project financed is of traditional type, and no benefit can be earned if the entrepreneur switches financier at time 1. I assume that when indifferent between switching or not, the entrepreneur sticks with the same bank.

On the other hand, venture capitalists can add value to the entrepreneur's project, but only if it is of innovative type. The value added by a VC is denoted by V and it is earned as an additional cashflow at time 2. The recent work of Bernstein et al. (2016) and Colombo et al. (2017) shows empirically that VCs add value to the firm they finance.

An additional difference between bank-finance and venture capital, is that the entrepreneur has to look for VC. This translates into having to pay a search cost K at time 0. Importantly, this cost is non-monetary and non-contractable, namely it is not taken into account by the VC when setting the portion α of the firm that she requires in order to finance the entrepreneur. Figure C3 shows the cashflows associated with financing a project with bank funding, whereas Figure C4 shows the cashflows under VC funding.

3.1.2 Financiers' Strategies

Bank - Traditional Project

Assume that the entrepreneur proposes a traditional project to a bank, which can establish lasting relations with her. To find the equilibrium repayments that the bank offers to the entrepreneur, I work by backward induction, finding the time 2 repayment R'_T and the first period one, R_T.

Competitor banks, outsiders from now on, can try to get the entrepreneur from the original bank, the incumbent. Because of competition outsiders can offer to the entrepreneur a repayment $R''_T = \frac{F_T}{\theta}$. At time 1, an outsider does not have to pay the monitoring cost and can free ride on the monitoring that the incumbent did at time 0. The incumbent has the advantage of being able to generate an extra benefit B at time 2, conditionally on the entrepreneur succeeding with probability θ. This benefit is assumed to be cash, verifiable and perfectly shareable between the entrepreneur and the bank.

In order to convince the entrepreneur to stick with her, the incumbent must offer a repayment that satisfies:

$$X_T - R'_T + B \geq X_T - \frac{F_T}{\theta} \;\Rightarrow\; R'_T \leq \frac{F_T}{\theta} + B$$

The incumbent bank therefore rationally set:

$$R'_T = \frac{F_T}{\theta} + B \tag{3.1}$$

Even if the banking sector is competitive, the incumbent is able to generate a monopolistic rent on the second financing relationship due to the additional value it is able to generate for the entrepreneurial project, similarly ot Rajan (1992).

After solving the second period, I can solve the first period's problem of the bank by finding R_T. At time 0 there is perfect competition among financiers and the expected profit for the bank must be equal to zero:

$$\theta R_T - m - F_T + \theta^2 R'_T - \theta F_T = 0$$

Plugging 3.1 in the expression above and rearranging yields:

$$R_T = \frac{m + F_T}{\theta} - \theta B \tag{3.2}$$

The bank, by establishing relationships that allow it to extract a monopolistic surplus, is able to transfer income across periods. This allows the bank to bear the cost of monitoring at time 0, generating a loss at time 1, but breaking even thanks to a profit at time 2. If there were no relationship benefits ($B = 0$), a bank would never finance a traditional project at time 0.

Bank - Innovative Project

If the entrepreneur proposes an innovative project to a bank, there is no relationship benefit that can be generated by the incumbent at time 2. Like before, at time 1 outsiders compete with the incumbent bank, offering a repayment $R''_I = \frac{F_I}{\theta}$. But now the entrepreneur is indifferent between switching and staying, since the incumbent can only offer the same repayment as outsiders and $R'_I = R''_I = \frac{F_I}{\theta}$. As per the previous section, I assume that the entrepreneur does not switch when indifferent.

Since at time 0 there is perfect competition among financiers, expected profit for the bank must be equal to zero:

$$\theta R_I - m - F_I + \theta^2 R'_I - \theta F_I = 0$$

Plugging R'_I in the expression above and rearranging yields:

$$R_T = \frac{m + F_I}{\theta} > X_I \tag{3.3}$$

Now the bank is no longer able to subsidize losses in the first credit relationship with rents in the second. Therefore, the repayment that it has to ask to the entrepreneur is too high, following form *Assumption 2*. In my model, the entrepreneur cannot start an innovative project with bank funding.

Venture Capital - Traditional Project

Another possibility for the entrepreneur is to look for venture capital, proposing a traditional project. When the entrepreneur decides to look for VC financing, she has to pay the search cost K. Importantly this cost is not internalized by the venture capitalist. The VC still has to pay the monitoring cost m, and since the project is of traditional type there is no value added V in the last period.

At time 0, VC makes the entrepreneur an offer to buy a certain percentage α_T of her firm. In exchange of α_T, VC provides the entrepreneur with F_T at time 0 and, conditionally on her surviving, F_T again at time 1. VC's break even condition is as follows:

$$\theta\alpha_T X_T - F_T - m + \theta^2\alpha_T X_T - \theta F_T = 0 \;\Rightarrow\; \alpha_T^* = \frac{(1+\theta)F_T + m}{\theta(1+\theta)X_T} \tag{3.4}$$

For VC financing to be feasible α_T^* must be smaller then 1. Rearranging and expressing everything in terms of project's NPV this condition becomes:

$$(1+\theta)(\theta X_T - F_T) > m$$

This condition is always satisfied under *Assumption 2*. Even without generating any additional benefit, the VC is able to finance a traditional project, something a bank would not do if it were not able to generate B. This framework outlines as equity allows the financing of firms in the presence of monitoring costs. In the absence of long-term term, short-term bank financing could be used only if banks can generate relationship surpluses.

Venture Capital - Innovative Project

Lastly, an entrepreneur could look for a VC to propose an innovative project. As in the previous case, the entrepreneur has to invest a search cost K, that is not considered by the VC in the terms of financing. Differently from before,

now the VC can add value to the project at time 2, increasing the last cashflow by V.

Denote α_I the fraction of the firm that the VC buys from the entrepreneur in exchange of the stream of investments F_I. The VC sets α_I as to break-even in expectation:

$$\theta\alpha_I X_I - F_I - m + \theta^2\alpha_I(X_I + V) - \theta F_T = 0 \Rightarrow \alpha_I^* = \frac{(1+\theta)F_I + m}{\theta(1+\theta)X_I + \theta^2 V} \quad (3.5)$$

Feasibility of VC financing, requires α_I^* to be smaller than one. This condition can be re-arranged as:

$$(1+\theta)(\theta X_I - F_I) + \theta^2 V > m$$

The inequality is always satisfied under *Assumption 2*. Venture capital financing is always available to the entrepreneur who wants to pursue an innovative project.

3.1.3 The Entrepreneur's Choice

The entrepreneur at time 0 must choose which project to pursue and which financier to approach. Therefore the strategy of the entrepreneur can be expressed as a menu of actions $(Project; Financier)$, where $Project$ is either $Traditional$ or $Innovative$ and $Financier$ is $Bank$ or VC.

Whenever the entrepreneur proposes to a financier a project she is not willing to fund, the entrepreneur gets a pay-off of 0. Furthermore, if the entrepreneur chose $Bank$ at time 0 and she is successful at time 1, she has to decide whether to switch bank or not. Importantly, the financier, both bank and VC, always pay the monitoring cost, m, at time 0 otherwise the entrepreneur never pays them back. Figure C5 describes the tree of the game.

The game is solved for sub-game perfect equilibria, using backward induction. I solve separately the two sub-games obtained from the first choice of the entrepreneur, whether look for VC funding or resolve to a bank. I start by analysing the decision of the entrepreneur whether to switch bank at time 1, conditionally on her having being successful.

Firstly, I Assume that the entrepreneur chooses $(Traditional; Bank)$. Conditionally on being successful at time 1, the entrepreneur has to decide whether to switch bank or not. Since the entrepreneur started a traditional project,

keeping the same bank generate an extra benefit B and entails a repayment $R'_T = \frac{F_T}{\theta} + B$. The pay-off of the successful entrepreneur at time 2 is:

$$\Pi_T^{NS} = X_T + B - \frac{F_T}{\theta} - B$$

If the entrepreneur switches, she loses the benefit B and pays $R''_T = \frac{F_T}{\theta}$:

$$\Pi_T^{S} = X_T - \frac{F_T}{\theta} = \Pi_T^{NS}$$

Since the entrepreneur is indifferent between switching or not, I assume she does not switch. This can be easily rationalized if the incumbent bank were to share a small part δ of B with the entrepreneur. Not to over-complicate the model, I simply assume that when indifferent the entrepreneur does not switch.

The second case is the one where the entrepreneur chooses an innovative project. As per the previous section, a bank would never finance an entrepreneur with an innovative project at time 0, since she would have to repay more than what she generates at time 1. Therefore there is no possibility for the entrepreneur to switch bank at time 1, as she is never founded.

As a result, conditionally on choosing bank founding, the entrepreneur never switches. Importantly, this result does not depend on the bank paying the monitoring cost, as the pay-off of the entrepreneur at time 2 does not depend on m.

Bank Funding - Project Choice

Conditionally on deciding to approach a bank for funding, the choice of the entrepreneur regarding which project to start is trivial. In fact, a bank would never agree to finance an innovative project, therefore the only project available to the entrepreneur under bank financing is the traditional one.

When the entrepreneur proposes a traditional project to the bank, the bank offers a menu of repayments that must be incentive compatible to avoid switching at time 1, and that takes into account the fact that the bank has to pay m upfront. The menu of repayments is as follow:

$$\begin{cases} R_T = \frac{m+F_T}{\theta} - \theta B \\ R'_T = \frac{F_T}{\theta} + B \end{cases} \tag{3.6}$$

Under this repayment menu, the total pay-off of the entrepreneur at time 0 becomes:

$$\begin{aligned}\Pi_T^B &= \theta(X_T - R_T) + \theta^2(X_T + B - R'_T) = \\ &= \theta X_T - m - F_T - \theta^2 B + \theta^2(X_T + B) - \theta F_T + \theta^2 B = \\ &= (1+\theta)(\theta X_T - F_T) + \theta^2 B - m \quad (3.7)\end{aligned}$$

Since banks compete to finance the entrepreneur at time 0 and they make zero profits in expectation, the entrepreneur pay-off equals the NPV of the project plus the relationship benefit, net of the monitoring cost. From *Assumption 1*, the expression in 3.7 is always greater than zero, that is the pay-off the entrepreneur would get proposing an innovative project to a bank. This means that if only bank finance were available, then the entrepreneur would always pursue a traditional project, because an innovative project cannot be funded in equilibrium with bank funding.

Venture Capital Funding - Project Choice

When the entrepreneur approaches a VC for funds, the VC proposes the entrepreneur to buy a fraction α of the firm, depending on the type of the project propose. The entrepreneur could get financed by a VC both for the traditional and the innovative project, since under *Assumption 3* both α_T^* and α_I^* are smaller than 1 and therefore feasible. Nevertheless, when deciding to approach a VC the entrepreneur has to pay the search cost K.

If the entrepreneur proposes a traditional project to the VC, she sells a fraction $\alpha_T^* = \frac{(1+\theta)F_T + m}{\theta(1+\theta)X_T}$ of the firm, getting a pay-off equal to:

$$\begin{aligned}\Pi_T^{VC} &= (1 - \alpha_T^*)(\theta X_T + \theta^2 X_T) - K = \\ &= \frac{\theta(1+\theta)X_T - (1+\theta)F_T - m}{\theta(1+\theta)X_T}\theta(1+\theta)X_T - K = \\ &= (1+\theta)(\theta X_T - F_T) - m - K \quad (3.8)\end{aligned}$$

From *Assumption 3*, the term in 3.8 is positive and equals the NPV of the traditional project, net of the monitoring cost m and the search cost K, which is born by the entrepreneur. This is because venture capitalists compete at time 0 and make zero profit in expectation, without considering the search

cost paid by the entrepreneur.

Alternatively, the entrepreneur could propose to the VC an innovative project. If the entrepreneurs is successful, the VC can add value in the last period and increase the cashflow by V. In exchange for funding, the VC buys a portion of the firm equal to $\alpha_I^* = \frac{(1+\theta)F_I+m}{\theta(1+\theta)X_I+\theta^2V}$. The resulting pay-off for the entrepreneur is asa follows:

$$\begin{aligned}\Pi_I^{VC} &= (1-\alpha_I^*)(\theta X_I + \theta^2(X_I+V)) - K = \\ &= \frac{\theta(1+\theta)X_I + \theta^2 V - (1+\theta)F_I - m}{\theta(1+\theta)X_I + \theta^2 V}(\theta(1+\theta)X_I + \theta^2 V) - K = \\ &\qquad (1+\theta)(\theta X_I - F_I) + \theta^2 V - m - K \quad (3.9)\end{aligned}$$

Now the profit of the entrepreneur equals the NPV of the innovative project plus the VC value-added V, net of monitoring and search costs. Again, this is the case because of competition of financiers at time 0.

3.1.4 Equilibrium

To solve the model, I need to find the menu of actions $(Project; Financier)$ chosen by the entrepreneur. From the previous sections there are three menus of actions feasible for the entrepreneur at time 0:

1. $(Traditional; Bank)$, which yields a pay-off Π_T^B;
2. $(Traditional; VC)$, which yields a pay-off Π_T^{VC};
3. $(Innovative; VC)$, which yields a pay-off Π_I^{VC}.

Comparing the first two cases is easy. In fact:

$$\begin{aligned}\Pi_T^B - \Pi_T^{VC} &= \\ &= (1+\theta)(\theta X_T - F_T) + \theta^2 B - m - [(1+\theta)(\theta X_T - F_T) - m - K] = \\ &\qquad = \theta^2 B + K > 0 \;\Rightarrow\; \Pi_T^B > \Pi_T^{VC}\end{aligned}$$

The entrepreneur always prefer bank financing to venture capital when choosing a traditional project. The result follows from the fact that banks can build relationship with the entrepreneur and add value, by offering her incentive compatible repayment to keep her around. On the other hand, finding venture

capital is costly for the entrepreneur, and she does not benefit from any value added in this case. Therefore the model shows that an entrepreneur who want to pursue subsistence entrepreneurship (Schoar (2010)), relationship lending is best form of financing.

It is also easy to show that conditionally on looking for venture capital, the entrepreneur prefers the innovative project to the traditional one. In fact:

$$\begin{aligned}
&\Pi_I^{VC} - \Pi_T^{VC} = \\
&= (1+\theta)(\theta X_I - F_I) + \theta^2 V - m - K - [(1+\theta)(\theta X_T - F_T) - m - K] = \\
&= (1+\theta)(\theta X_I - F_I - [\theta X_T - F_T) + \theta^2 V > 0 \;\Rightarrow\; \Pi_I^{VC} > \Pi_T^{VC}
\end{aligned}$$

The result follows from *Assumption 1.* Pursuing the innovative project under venture capital funding yields to the entrepreneur both an higher NPV of the project but also the value-added by the venture capital.

Therefore the choice of the entrepreneur restricts to choosing bank founding and start the traditional project or looking for venture capital proposing an innovative project. The entrepreneur is willing to look for venture capital if and only if:

$$\begin{aligned}
\Pi_I^{VC} &> \Pi_T^{B} \\
(1+\theta)(\theta X_I - F_I) + \theta^2 V - m - K &> (1+\theta)(\theta X_T - F_T) + \theta^2 B - m \\
\underbrace{\Delta NPV + \theta^2 V}_{Benefit\ of\ Innovation} &> \underbrace{\theta^2 B + K}_{Cost\ of\ Innovation}
\end{aligned} \tag{3.10}$$

In equilibrium the entrepreneur will only pursue an innovative project with a venture capitalist if the *Benefit of Innovation* is bigger than the *Cost of Innnovation.* The former is made by the extra-NPV that the innovative project delivers and the value added that the VC can generate. The latter comprises the search cost of getting venture capital, as the innovative project cannot be financed by a bank, and the opportunity cost of forgoing building relationship with a bank, earned when carrying out the traditional project. Importantly, if the entrepreneur could finance the project with own funds, she would always choose the innovative project, as it has an higher NPV.

Equation 3.10 constitutes the main result of the model. In fact, it shows that under certain values of the parameter the model predicts that relationship lending impair the ability of the venture capitalists to finance innovative

projects. Importantly, the result does not come from the fact the VC and banks compete directly. Venture capitalists and banks are linked to each other through the choices of the entrepreneur.

The inequality in 3.10 holds for higher values of V, lower values of K and B and for bigger differences in the NPV of the two projects. On the other hand, it means that when venture capital is scarce (higher K) and venture capitalists more inexperienced (lower V), an higher degree of relationship lending (higher B) requires a bigger wedge in projects NPVs to push the entrepreneur to choose the innovative projects.

Therefore, in economies in which the venture capital industries its in early stages, a significant degree of relationship lending could result in more entrepreneurs choosing not to innovate. In turn, this prevent new venture capitalists from entering the market, in a self-sustaining equilibrium in which few innovators get funded. As a result, relationship banking could be an important factor in preventing the development of the venture capital industry . This does not happen through a direct link between banks and venture capitalists, but rather though a feedback effect in entrepreneurial choices: relationship banking alters the type of projects that entrepreneurs are willing to start, this crowds out VCs' investment opportunities keeping new entrants out of the market; the scarcity and inexperience of venture capitalists then tilts even more entrepreneurial choices to favor non-innovative projects.

3.2 Extension - Continuum of Entrepreneurial Project

In this section I generalize the previous model, allowing the entrepreneur to choose among a continuum of projects, rather than a binary set. Every project differs for a parameter γ, which commands the evolution of cashflows, funds, monitoring cost and relationship banking benefit. The parameter γ can take any value in the interval $[0;\ \gamma_{Max}]$.

The structure of the project is the same as before: three periods with the possibility for the entrepreneur to rollover the project at the intermediate stage. The entrepreneur needs to obtain $F(\gamma)$ at time 0 and 1, and gets $X(\gamma)$ at time 1 and 2, always with probability θ. The financier financing the entrepreneur at time 0 has to bear a monitoring cost $m(\gamma)$. Relationship banking, defined as

the entrepreneur sticking with the same bank for two period, yields a benefit $B(\gamma)$ at time 2. I define $NPV(\gamma)$ as the NPV of the one-period project (i.e. $NPV(\gamma) = \theta X(\gamma) - F(\gamma)$). I make the following assumptions regarding the elements of the model:

1. $\frac{\partial X(\gamma)}{\partial \gamma} > 0 \; \forall \; \gamma$
2. $\frac{\partial F(\gamma)}{\partial \gamma} > 0 \; \forall \; \gamma$.
3. $\frac{\partial NPV(\gamma)}{\partial \gamma} > 0 \; \forall \; \gamma$.
4. $\frac{\partial m(\gamma)}{\partial \gamma} > 0 \; \forall \; \gamma$.
5. $\frac{\partial B(\gamma)}{\partial \gamma} < 0 \; \forall \; \gamma$ and $B(\gamma) > 0 \; for \; \gamma < \bar{\gamma} \; \wedge \; B(\gamma) < 0 \; for \; \gamma > \bar{\gamma}$.
6. $\frac{\partial [(1+\theta)NPV(\gamma) - m(\gamma)]}{\partial \gamma} > 0 \; \forall \; \gamma$.
7. $\theta X(\gamma_{Max}) - F(\gamma_{Max}) - m(\gamma_{Max}) < 0 < (1+\theta)X(0) - F(0) - m(0)$.
8. $\frac{\partial V(\gamma)}{\partial \gamma} > 0 \; \forall \; \gamma$

Under the first assumption, the cashflow of the project is increasing in the degree of innovation. The second assumption states that the funding needed by the entrepreneur grows with the degree of innovation chosen, but, as for the third assumption, the one-period NPV of the project is monotonically increasing in γ. Also, the monitoring cost is increasing in innovation, by the fourth assumption. Moreover, the fifth assumption gives the evolution of the relationship lending benefit as function of innovation: the more innovative the project the smaller the benefit from relationship banking. If the innovativeness of the project is greater then the threshold $\bar{\gamma}$, this benefit becomes a cost. Notably, this is not necessary for the main result of the model. If $B(\gamma)$ were 0, rather than negative, for $\gamma \geq \bar{\gamma}$, the model would yield the same result. This assumption makes the function $B(\gamma)$ differentiable.

Assumption 6 states that a project grows more profitable the higher the degree of innovation, even if that entails paying higher monitoring costs. Lastly, assumption 7 yields that the one-period project is not profitable enough to cover the monitoring cost no matter the degree of innovation chosen. This assumption makes it impossible for a financier to break-even without being able to finance the entrepreneur for more than one period.

3.2.1 Bank Finance

Now the entrepreneur has to choose a level of innovation γ so to maximize her pay-off. I start by solving the entrepreneur's problem conditionally on looking for bank finance. The repayments offered by banks will be functions of the degree of innovation. At time 1, the incumbent bank can offer a repayment that makes the entrepreneur indifferent between switching bank and keeping the same one. Calling $R'(\gamma)$ and $R''(\gamma)$ the repayments offered at time 1 by, respectively, the incumbent and an outsider:

$$R''(\gamma) = \frac{F(\gamma)}{\theta} \;\; and \;\; R'(\gamma) = \frac{F(\gamma)}{\theta} + B(\gamma) = R''(\gamma) + B(\gamma) \tag{3.11}$$

The entrepreneur would refinance the project with the incumbent only if $R'(\gamma) < R''(\gamma)$. This is true only if $\gamma < \bar{\gamma}$. An entrepreneur has no incentive to stick with an incumbent that shrinks her cashflow, and she will always switch if she has chosen a level of innovation to higher than $\bar{\gamma}$. Given that entrepreneur always switches, there is no bank willing to finance a project with a level of innovation $\gamma > \bar{\gamma}$.

On the other hand, if the entrepreneur has chosen a level of innovation smaller than $\bar{\gamma}$ at time 0, the incumbent bank would set a repayment so as to make the entrepreneur indifferent between sticking and switching: $R'(\gamma) = \frac{F(\gamma)}{\theta} + B(\gamma)$. At time 0, a bank would set a time 1 repayment $R(\gamma)$ so as to break-even in expectation:

$$\begin{aligned} -F(\gamma) - m(\gamma) + \theta(R(\gamma) - F(\gamma) + \theta R'(\gamma)) = 0 \\ R(\gamma) = \frac{F(\gamma) + m(\gamma)}{\theta} - \theta B(\gamma) \;\; | \, \gamma < \bar{\gamma} \end{aligned} \tag{3.12}$$

The last step is to find the optimal choice of the entrepreneur in terms of level of innovation γ, given the best response of banks and conditionally on looking for bank funding. An entrepreneur maximizes her total pay-off:

$$\begin{aligned} &\underset{\gamma}{Max}\, \Pi(\gamma) \\ &\begin{cases} \Pi(\gamma) = (1+\theta)(\theta X(\gamma) - F(\gamma)) - m(\gamma) + \theta B(\gamma), \;\; for \; \gamma < \bar{\gamma} \\ \Pi(\gamma) = 0, \;\; for \; \gamma \geq \bar{\gamma} \end{cases} \end{aligned} \tag{3.13}$$

Given assumptions 5 and 6, the entrepreneur will always choose a level $\gamma^* < \bar{\gamma}$, as her pay-off would be strictly positive. If she chooses a $\gamma \geq \bar{\gamma}$, no bank would finance her and she would get a pay-off of 0. Conditionally on choosing $\gamma < \bar{\gamma}$, the level of innovation chosen, γ_B^* satisfies:

$$\exists\, \gamma_B^* < \bar{\gamma} \;\; s.t. \;\; (1+\theta)(\theta X'(\gamma_B^*) - F'(\gamma_B^*)) - m'(\gamma_B^*) + \theta B'(\gamma_B^*) = 0 \quad (3.14)$$

I am agnostic about the solution γ_B^*. Depending on the shape of the functions, γ_B^* could be inside the interval $(0;\, \bar{\gamma})$ or a corner solution, either 0 or $\bar{\gamma}$:

- *If* $\frac{\partial[(1+\theta)NPV(\gamma)-m(\gamma)]}{\partial\gamma} > -\theta B'(\gamma)\ \forall\ \gamma \;\Rightarrow\; \gamma_B^* = \bar{\gamma}$
- *If* $\frac{\partial[(1+\theta)NPV(\gamma)-m(\gamma)]}{\partial\gamma} < -\theta B'(\gamma)\ \forall\ \gamma \;\Rightarrow\; \gamma_B^* = 0$
- *If* $\frac{\partial[(1+\theta)NPV(\gamma)-m(\gamma)]}{\partial\gamma} = -\theta B'(\gamma)$ *for some* $\hat{\gamma} \in (0;\, \bar{\gamma}) \;\Rightarrow\; \gamma_B^* = \hat{\gamma}$

Therefore, conditionally on getting bank financing, relationship banking imposes an upper limit to the optimal level of innovation that an entrepreneur is willing to choose.

3.2.2 VC Finance

Alternatively, an entrepreneur an invest the search cost K and look for VC funding. As in the main model, VC offer equity-based financing by buying a break-even portion of cashflow-rights α, which now will be a function of the degree of innovation of the project (i.e. $\alpha(\gamma)$). The search cost for the entrepreneur to find a VC, is fixed and does not depend the level of innovation chosen by the entrepreneur. A VC asks the entrepreneur a fraction of equity $\alpha(\gamma)$ such that:

$$-m(\gamma) - F(\gamma) + \alpha\theta X(\gamma) + \alpha\theta^2(X(\gamma) + V(\gamma)) - \theta F(\gamma) = 0 \;\Rightarrow$$
$$\alpha^*(\gamma) = \frac{(1+\theta)F(\gamma) + m(\gamma)}{\theta(1+\theta)X(\gamma) + \theta^2 V(\gamma)} \quad (3.15)$$

The condition for VC financing to be feasible is $\alpha^*(\gamma) < 1$, as the VC cannot buy more than 100% of the firm. Re-arranging and combining with assumption 6 yields:

$$(1+\theta)NPV(\gamma) - m(\gamma) + \theta^2 V(\gamma) > 0 \quad (3.16)$$

Interpretation of 3.16 is the same as in the basic model: the project must be sufficiently profitable and VC value added must be sufficiently relevant, to offset the monitoring cost. Notably, the inequality in 3.16 is always satisfied under assumption 7. The total pay-off of the entrepreneur under VC financing is:

$$\Pi = (1+\theta)(\theta X(\gamma) - F(\gamma)) - m(\gamma) - K + \theta^2 V(\gamma) \tag{3.17}$$

As it is the case in the baseline model, the pay-off of the entrepreneur equals the sum of the two periods NPVs net of monitoring and search costs. As in the previous subsection, I can find the optimal level of innovation the entrepreneur is willing to choose under VC financing. The entrepreneur chooses γ to maximize her expected pay-off:

$$\begin{aligned} \underset{\gamma}{Max}\, \Pi = (1+\theta)(\theta X(\gamma) - F(\gamma)) - m(\gamma) - K + \theta^2 V(\gamma) \\ (1+\theta)(\theta X'(\gamma) - F'(\gamma)) - m'(\gamma) + \theta^2 V'(\gamma) > 0 \; \forall \gamma \;\Rightarrow \\ \gamma^*_{VC} = \gamma_{Max} \end{aligned} \tag{3.18}$$

Where the inequality comes directly from assumptions 6 and 8. Therefore, it must be that $\gamma^*_{VC} > \gamma^*_B$, namely the optimal level of innovation is higher under VC financing than under bank finance with relationship lending. Notably, without any relationship benefit, under bank financing the entrepreneur would not be able to get funded, no matter the project chosen.

3.2.3 The Entrepreneur's Choice

At time 0, the entrepreneur has to choose whether to look for a VC or get bank funding. Given financiers best responses, the entrepreneur would choose a level of innovation γ^*_{VC} when obtaining venture capital and γ^*_B when securing funding from a bank.

The entrepreneur chooses the strategy that yields the highest expected pay-off. The condition under which she decides to obtain bank financing is as follows:

$$\begin{aligned} (1+\theta)(\theta X(\gamma^*_B) - F(\gamma^*_B)) - m(\gamma^*_B) + \theta^2 B(\gamma^*_B) > \\ > (1+\theta)(\theta X(\gamma^*_{VC}) - F(\gamma^*_{VC})) - m(\gamma^*_{VC}) - K + \theta^2 V(\gamma^*_{VC}) \end{aligned} \tag{3.19}$$

3.19 can be rearranged as:

$$\underbrace{K + \theta^2[B(\gamma_B^*] - V(\gamma_{VC}^*)) + [m(\gamma_{VC}^*) - m(\gamma_B^*)]}_{Cost\ of\ Innovation} > \\ > \underbrace{(1+\theta)[NPV(\gamma_{VC}^*) - NPV(\gamma_B^*)]}_{Benefit\ of\ Innovation} \quad (3.20)$$

The condition in 3.20 mirrors the one in 3.10 for the baseline model. If the cost of innovation, defined as the sum of the cost of looking for VC financing, the opportunity cost of forgoing relationship banking benefit and the spread in monitoring cost due to starting a more innovative project, outweighs the benefit of innovation, which is the spread in NPV due to starting a more innovative project, the entrepreneur would resolve to less innovative projects and will not use VC financing.

Importantly, the cost of innovation is increasing in monitoring costs and relationship lending benefit. Furthermore, from assumption 4 and 5 the functions $m(\gamma)$ and $B(\gamma)$ are, respectively, increasing and decreasing in γ. Therefore, the bigger the distance between γ_B^* and γ_{VC}^* the higher the cost of innovation. The difference between the two levels of innovation crucially depends on the condition in 3.14: when the function $B(\gamma)$ is very steep (i.e. its first derivative very negative), $\gamma_B^* = 0$ and the distance with γ_{VC}^* is maximized. Choosing VC funding and therefore a more innovative project, is particularly costly in this situation, in which the relationship benefit is very high for very non-innovative projects.

On the other hand, as in the baseline model, when VCs significantly increase the profitability of the project they finance (i.e. high and steep $V(\gamma)$) and when the search cost to obtain venture capital is low, the cost of innovation is lower. Notably, the benefit of innovation does only depend on the entrepreneur, in the sense it depends only on how profitable the more innovative projects is, compared to less innovative ones. At the same time, the cost of innovation does not depend on the entrepreneur, but rather on the efficiency and structure of the financing conditions. This is one of the main contributions of this paper, to show that decision to innovate or not crucially depends on the financing conditions faced by entrepreneurs. Depending on these conditions, entrepreneurs may avoid innovating and using venture capital, in favor of less innovative project pursued under bank financing.

3.3 Conclusions

The main contribution of this paper is to study the link between the banking sector and the scope and success of venture capital. In particular, my model shows that relationship lending can compete with VC and crowd out its investment opportunities. Importantly, banks and VCs are not directly linked, but they are intertwined through the choices of entrepreneurs who look for financing.

On the one hand, relationship banking eases credit constraints for the entrepreneurs, in the presence of monitoring costs. On the other hand, due to the limit in scope and expertise of banking intermediaries, this restricts entrepreneurs' investment opportunity set to more traditional projects. When benefits from relationship lending are sufficiently high, entrepreneurs who would be better off carrying out innovative projects switches to more traditional and less profitable ventures.

If the entrepreneur changes the type of project she carries out, this in turn affects venture capitalists, whose investment opportunities are now crowded out. In particular, when venture capitalists are more inexperienced and harder to obtain (i.e. entrepreneurs have to bear higher search costs to obtain venture capital), the effects of crowding out by relationship lenders are stronger, even if VC can still add significant value to an innovative project. Notably in my model, if entrepreneurs where to finance themselves with own funds, they would always choose a more innovative and profitable project.

Therefore, relationship lending is a factor that helps explaining why certain countries, or areas within countries, are struggling to develop a successful venture capital industry. Even if VCs and banks appeal to both very different investors and firms, entrepreneurial choices link them. As a result, policies aimed at fostering venture capital should take into consideration the structure of the banking sector.

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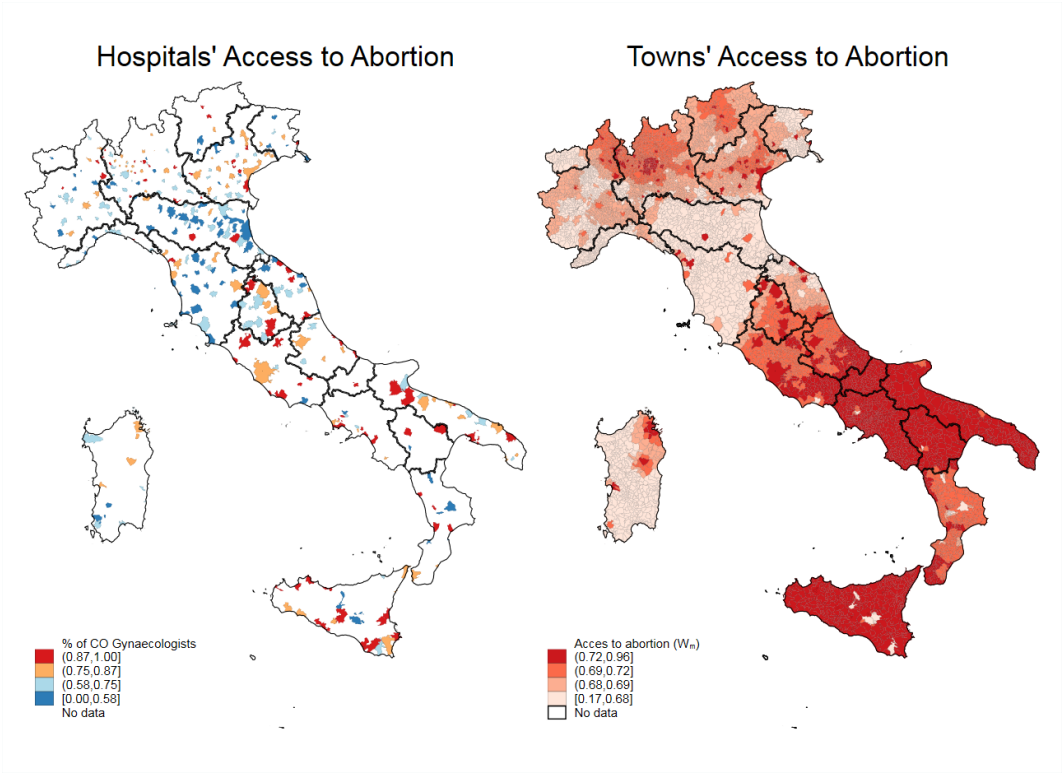
A. Appendix to Maternity Risk and the Gender Gap in Entrepreneurship

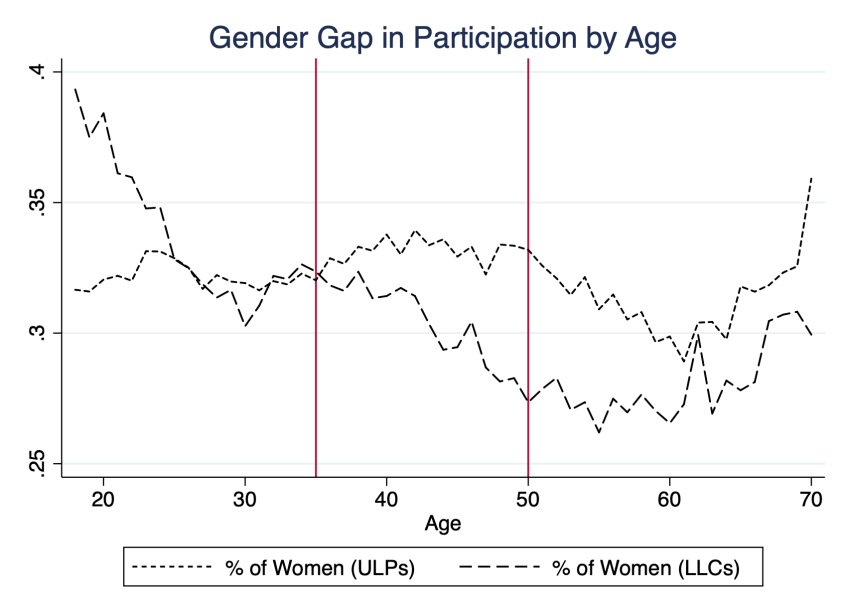
A.1 Figures

Figure A1: GEOGRAPHIC DISTRIBUTION OF ABORTION



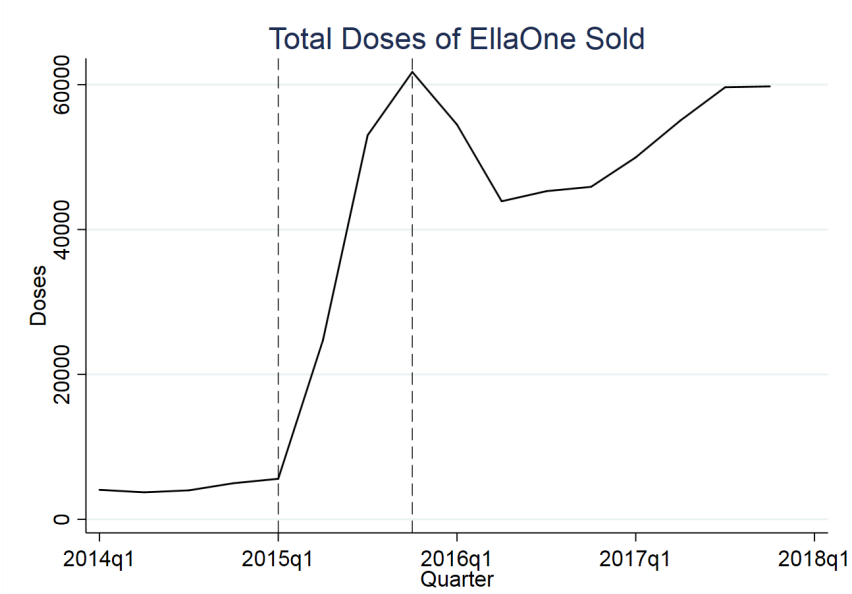
The map on the left shows the average percentage of CO gynecologists in towns where hospitals with gynecology residencies are located. The average (CO_j) is weighted by the number of gynecologists in each hospital of the municipality. The map on the right shows the geographical distribution of access to abortion (W_m) in every Italian municipality, after taking into account travel times to municipalities that have one or more hospitals ($W_m = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j$, $w_{mj} = \frac{1}{t_{mj}}$).

Figure A2: GENDER GAP BY AGE AND TYPE OF FIRM



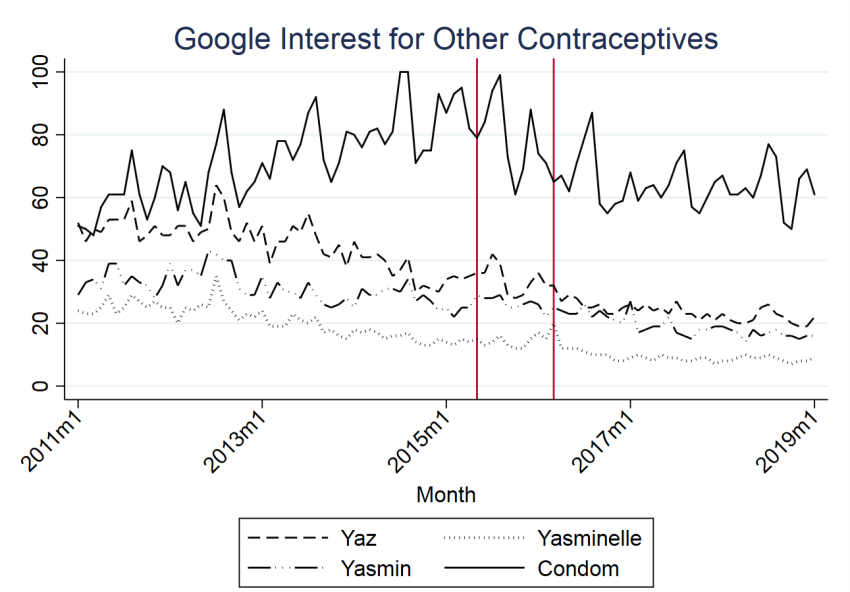
Percentage of founders of new limited liability companies (dashed line) and unlimited liability partnerships (dotted line) in the pre-liberalization period (2013 - first half of 2015) who are women by years of age at founding. The first vertical line is at age 35 and the second at age 50.

Figure A3: SALES OF ELLAONE



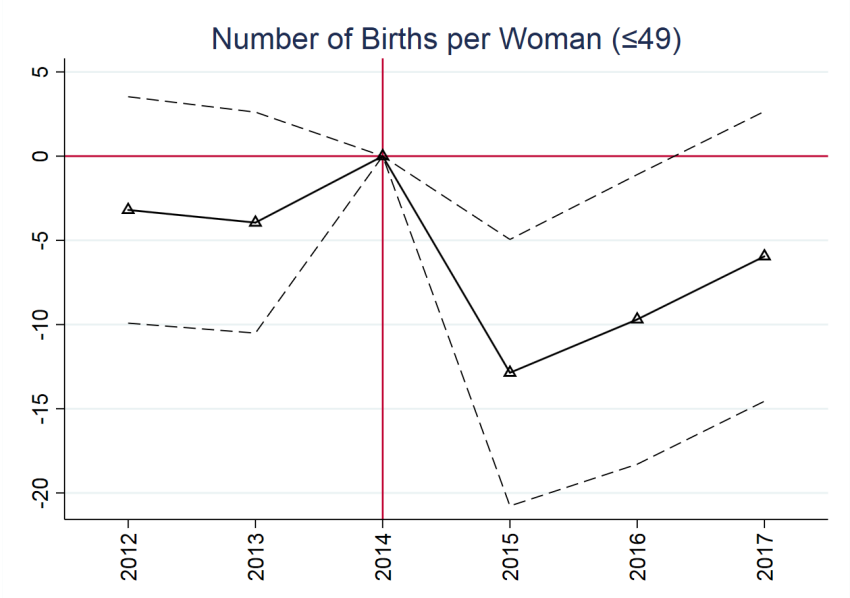
Evolution of quarterly sales of EllaOne in Italy between the first quarter of 2014 and the first quarter of 2018. The first vertical dashed line represents the quarter prior to the liberalization of EllaOne, while the second vertical dashed line represents the quarter prior to the liberalization of Norlevo. *Source*: AIFA and Italian Ministry of Health.

Figure A4: POPULARITY OF REGULAR CONTRACEPTIVES



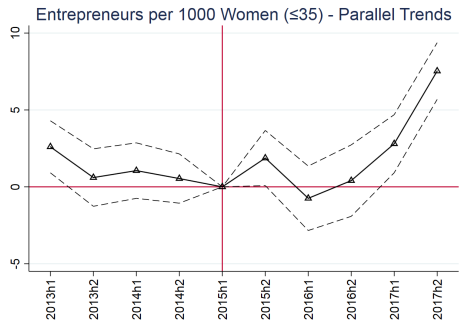
Evolution of monthly Google interest for the names of the most popular contraceptive pills in Italy (Yaz, Yasminelle and Yasmin) and the word "condom" . The first and second vertical lines indicate the liberalization of EllaOne and Norlevo respectively. *Source*: Google Trends.

Figure A5: PARALLEL TRENDS - BIRTHS

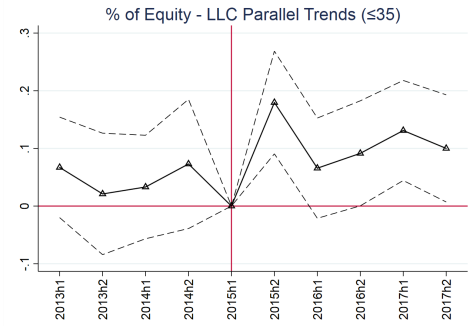


Visual representation of the parallel trends assumption of the difference-in-differences framework for the number of births per 1000 women in fertile age. Each triangle represents the coefficient (β_{mt}), plotted with 90% confidence intervals, of the interaction between a yearly dummy and access to abortion W_m from estimation of equation $y_{mt} = \alpha + \sum_{k=2012}^{2017} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$. I drop the last pre-liberalization interaction (2014).

Figure A6: PARALLEL TRENDS - REGULAR ENTREPRENEURSHIP (1)



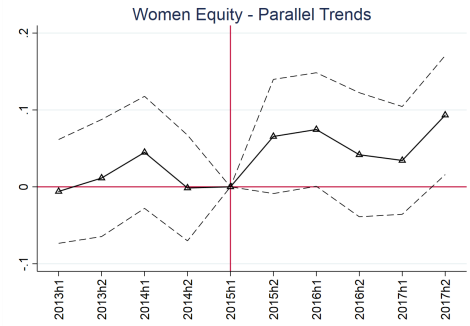
(a) Half-yearly effect on the number of entrepreneurs per 1000 women aged 35 or younger.



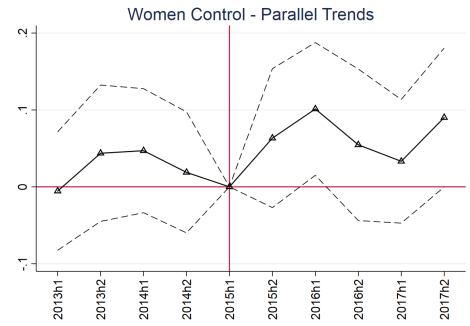
(b) Half-yearly effect on the percentage of equity held a limited liability company by the average woman founder aged 35 or younger.

Visual representation of parallel trends of the difference-in-differences framework for regular entrepreneurship outcomes. In the parallel trends graphs, interactions (β_{mt}) of half-yearly dummies and access to abortion W_m are plotted with 90% confidence intervals, according to estimation of equation $y_{ijmt} = \alpha + \sum_{k=2013h1}^{2017h2} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt}$.

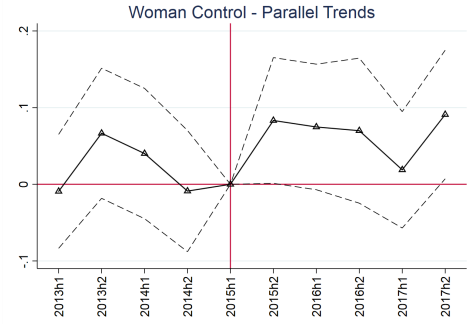
Figure A7: PARALLEL TRENDS - REGULAR ENTREPRENEURSHIP (2)



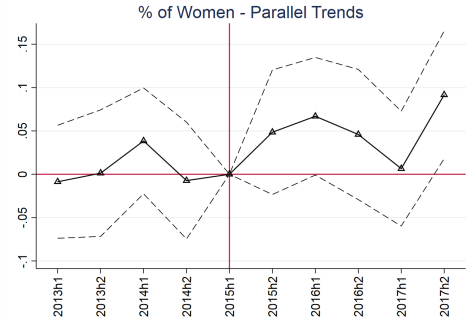
(a) Half-yearly effect on the total amount of equity in the hands of women.



(b) Half-yearly effect on the probability of a firm having more than 50% of equity in the hands of women.



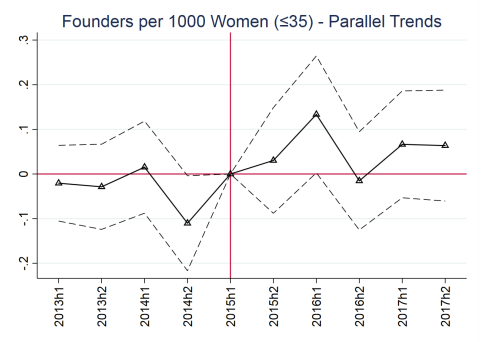
(c) Half-yearly effect on the probability of a firm having more than 50% of equity held by a woman.



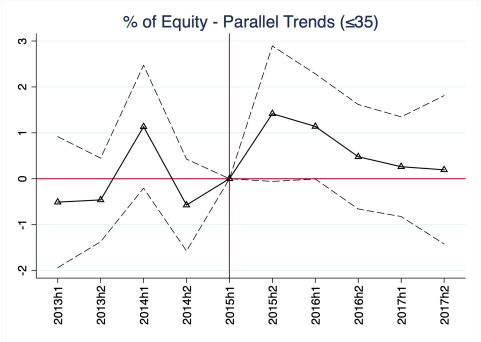
(d) Half-yearly effect on the percentage of founders who are women.

Visual representation of parallel trends of the difference-in-differences framework for regular entrepreneurship outcomes at the firm level. In the parallel trends graphs, interactions (β_{mt}) of half-yearly dummies and access to abortion W_m are plotted with 90% confidence intervals, according to estimation of equation $y_{jmt} = \alpha + \sum_{k=2013h1}^{2017h2} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{jmt}$.

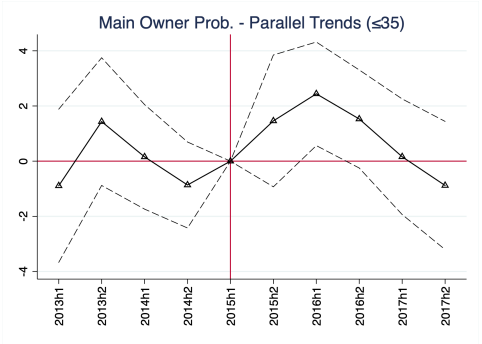
Figure A8: PARALLEL TRENDS - INNOVATIVE ENTREPRENEURSHIP



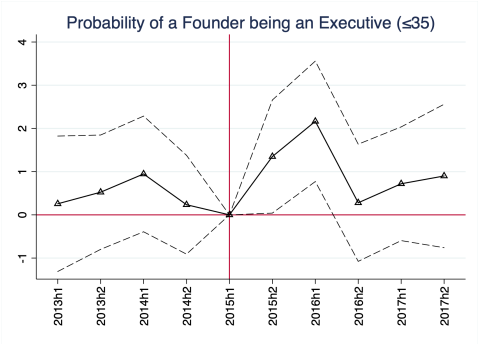
(a) Half-yearly effect on the number of young innovators per 1000 young women.



(b) Half-yearly effect on percentage of equity held by the average woman founder aged 35 or younger.



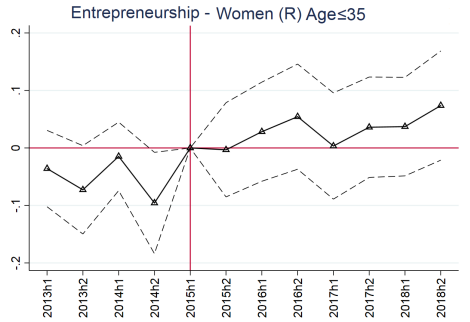
(c) Half-yearly effect on the probability of being the main owner for the average woman founder, aged 35 or younger.



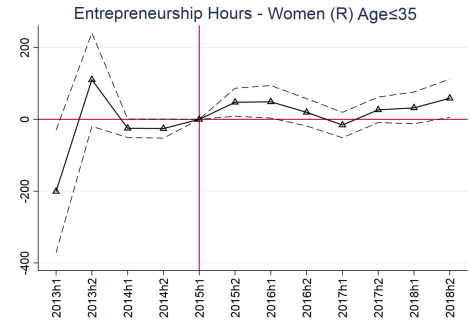
(d) Parallel trend visualization for the probability of a woman founder aged 35 or younger being also the executive of the start-up.

Visual representation of the parallel trends of the difference-in-differences framework for innovative entrepreneurship outcomes. In the parallel trends graphs, interactions (β_{mt}) of half-yearly dummies and access to abortion W_m are plotted with 90% confidence intervals, according to estimation of equation $y_{ijmt} = \alpha + \sum_{k=2013h1}^{2017h2} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt}$.

Figure A9: PARALLEL TRENDS - LABOR MARKET



(a) Half-yearly effect on the probability of being an entrepreneur for women aged 35 or younger.

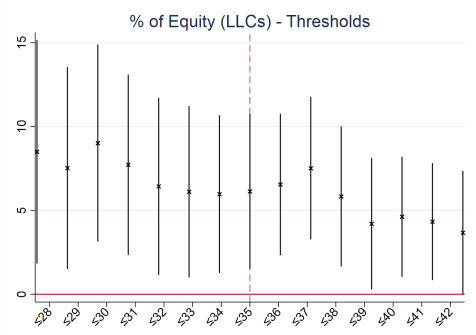


(b) Half-yearly effect on the number of hours worked by women entrepreneurs aged 35 or younger.

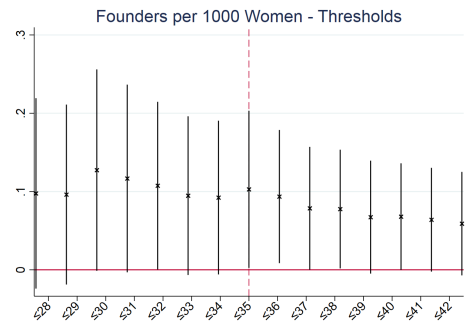
Visual representation of parallel trends of the difference-in-differences framework for entrepreneurial outcomes using the *Quarterly Cross-sectional Labor Force Survey*. In the parallel trends graphs, interactions (β_{mt}) of half-yearly dummies and access to abortion W_m are plotted with 90% confidence intervals, according to estimation of equation $y_{imt} = \alpha + \sum_{k=2013h1}^{2018h2} \beta_{mk}(\tau_k \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + POST_t \times FEs_i + \epsilon_{imt}$.

Figure A10: ROBUSTNESS - AGE THRESHOLD

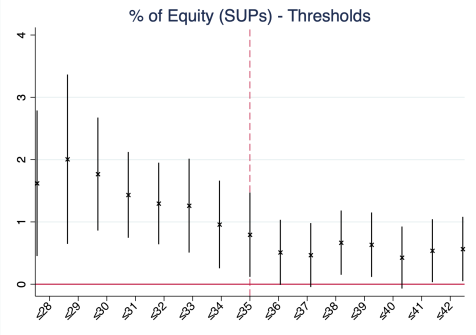
(a) Effects on the number of young entrepreneurs per 1000 young women.



(b) Effects on percentage of equity held by the average woman founder aged 35 or younger.



(c) Effects on the number of young innovators per 1000 young women.



(d) Effects on percentage of equity held by the average woman founder aged 35 or younger, in innovative start-ups.

Visual representation of the robustness of the main coefficients, estimated restricting and enlarging the sample of women considered. In the main analysis, the sample of women aged 35 or younger is the most affected (vertical dashed line). In the graphs, the cut-off age of 35 is moved to the left and to the right, to test the robustness of the effects to sample selection. Each coefficient represents the coefficient of interest estimated on a different sample, for different outcomes.

A.2 Tables

Table A1: BARRIERS TO ABORTION AND MUNICIPALITIES' CHARACTERISTICS

	(1) W_m	(2) W_m
% high school graduates (25-64)	0.0923***	-0.0125**
	(0.00683)	(0.00516)
% graduates (30-34)	0.00147	0.00827**
	(0.00609)	(0.00421)
Employment rate	-0.0604***	-0.0264***
	(0.00808)	(0.00599)
Income per-capita (Th. Euros)	-0.511***	0.0459*
	(0.0292)	(0.0277)
Population (Th.)	0.00341***	0.00194***
	(0.00102)	(0.000686)
Births per 1000 women	0.0252***	0.0109***
	(0.00371)	(0.00254)
% of childless couples	0.0709***	-0.0392***
	(0.0136)	(0.00975)
% women in town boards	-0.00419	-0.00534**
	(0.00313)	(0.00217)
% vote share of Right parties	0.0867***	0.00821**
	(0.00390)	(0.00345)
Firms per 100 residents	-2.30e-05	7.89e-05
	(0.00214)	(0.00148)
High-tech workers per 100 workers	0.00496	0.00893
	(0.0115)	(0.00770)
Female Ent. per 1000 Women	-0.00607	0.00562
	(0.0206)	(0.0138)
Female Ent. per 1000 Women $\leq$35	-0.00586	-0.000905
	(0.00487)	(0.00326)
Male Ent. per 1000 Men $\leq$35	-0.00143	0.00178
	(0.00270)	(0.00181)
Observations	7,560	7,560
R-squared	0.312	0.694
Region FE	NO	YES

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

Regression of barriers to abortion services (W_m) on various measures of employment, income and population at the municipality level. Column (2) includes region fixed effects. Regressions are cross-sectional and municipality-level variables are measured in 2014, the year before the liberalization of ECPs.

Table A2: SUMMARY STATISTICS OF FIRMS AND FOUNDERS

Panel A	Regular Entrepreneurship		Innovative Start-Ups	
Individual-level statistics	Mean	Median	Mean	Median
% of women founders	30.5%	-	20.0%	-
% of institutional investors	4.7%	-	3.0%	-
% of foreign born	15.6%	-	4.5%	-
% of equity (stake)	46.7%	49.0%	30.5%	24.0%
Age	40.94	40	42.09	41
Number of women	650,158	-	4,921	-
Number of founders	2,131,220	-	28,294	-
Panel B	**Regular Entrepreneurship**		**Innovative Start-Ups**	
Firm-level statistics	Mean	Median	Mean	Median
% of women founders	32.1%	0.0%	21.3%	0.0%
% of institutional investors	2.9%	0.0%	2.5%	0.0%
% of foreign born	18.4%	0.0%	3.9%	0.0%
% of equity (stake)	50.0%	59.9%	45.8%	33.3%
% of women-executives	30.2%	0.0%	17.2%	0.0%
Age	40.40	40	41.95	42
Number of founders	2.0	2	3.2	2
Number of executives	1.05	1	1.12	1
Number of firms	1,531,660	-	8,838	-

Summary statistics of individual founders and firms. Panel A reports statistics of founders of all firms (regular entrepreneurship) and of innovative start-ups only. Institutional investors are defined as financial corporations holding equity in newly founded firms. Panel B collects summary statistics of the founders of the average new firm and new innovative start-up.

Table A3: FIRMS' SECTORS AND GEOGRAPHY

Panel A - Sector Description (NACE)	General E.	Innovative E.
A - Agriculture, forestry and fishing	8.64%	0.59%
C - Manufacturing	7.64%	17.43%
D - Electricity, gas and steam supply	0.27%	1.22%
E - Water, sewerage and waste management	0.16%	0.44%
F - Construction	13.15%	1.17%
G - Wholesale and retail trade;	30.45%	4.70%
H - Transportation and storage	2.15%	0.34%
I - Accommodation and food service activities	11.39%	0.62%
J - Information and communication	3.02%	42.47%
K - Financial and insurance activities	2.98%	0.16%
L - Real estate activities	2.54%	0.09%
M - Professional, scientific and technical activities	4.75%	23.50%
N - Administrative and support service activities	5.47%	3.04%
P - Education	0.46%	0.72%
Q - Human health and social work activities	0.62%	0.69%
R - Arts, entertainment and recreation	1.60%	0.43%
S - Other service activities	4.68%	0.38%
Panel B - Macroregion (NUTS1)	**General E.**	**Innovative E.**
ITC - Northwest	25.36%	31.56%
ITH - Northeast	17.88%	25.50%
ITI - Centre	22.30%	20.00%
ITF - South	24.11%	16.46%
ITG - Insular Italy	10.35%	6.48%

Sector and geographic distribution of the population of new firms (regular entrepreneurship) and innovative start-ups (innovative entrepreneurship). Sectors are defined using the level 1 NACE codes (equivalent to NAICS sectors), while macro-regions are defined using the NUTS1 level of administrative nomenclature (equivalent to Census Bureau designated regions in the US).

Table A4: CONTRACEPTION SUBSTITUTION

DDD (1000 inhab.)	(1) Oral Contraceptives	(2) Oral Contraceptives
$W_r \times$ POST	17.40	17.40
	(78.93)	(21.34)
POST	-20.44	
	(55.56)	
W_r	-304.9***	
	(70.60)	
Constant	267.8***	
	(49.69)	
Observations	105	105
R-squared	0.468	0.970
Region FE	NO	YES
Year FE	NO	YES
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		
Economic Magnitudes	1.75%	1.75%

Effect of liberalizing emergency contraception on the defined daily dose (DDD) per 1000 inhabitants of oral contraceptives. Data on oral contraceptives is available at the region-level for the years 2014-2018. Access to abortion at the region level (W_r) is calculated as the weighted average access to abortion of the region's municipalities (W_m), weighted by the share of fertile women of the region living in each municipality. The estimation is repeated both including and excluding region and year fixed effects. Economic magnitudes are calculated as the interaction coefficient on $W_r \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. The difference-in-differences regression equation is: $y_{rt} = \alpha + \beta_{rt}(POST_t \times W_r) + \rho_r + \tau_t + \epsilon_{rt}$

Table A5: ECPs AND FERTILITY

Births (/1000 women)	(1) ≤49	(2) ≤35
$W_m \times$ POST	-7.481**	-18.21**
	(3.009)	(7.179)
Observations	48,211	48,204
R-squared	0.327	0.317
Municipality FE	YES	YES
Year FE	YES	YES
Region#POST FE	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		
Economic Magnitudes	-0.87%	-0.92%

Effect of liberalizing emergency contraception on birth rates of women younger than 49 years old and women aged 35 or younger. Economic magnitudes are calculated as the regression coefficient on the interaction $W_m \times$ POST, times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$

Table A6: GENDER EQUITY GAP

Equity Stake	(1) 36-49 LLCs	(2) 36-49 ULPs	(3) ≤35 LLCs	(4) ≤35 ULPs	(5) 36-49 SUPs	(6) ≤35 SUPs
Female Dummy	-1.899***	-0.422***	-1.619***	-0.409***	-2.432***	-2.118*
	(0.127)	(0.0418)	(0.142)	(0.0373)	(0.895)	(1.166)
Observations	119,946	222,368	81,491	211,251	2,746	1,833
R-squared	0.635	0.868	0.672	0.894	0.670	0.671
Fixed Effects:	*Age, # of founders, municipality, industry, legal form, quarter of incorporation*					
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						
Economic Magnitudes	-4.04%	-0.46%	-3.47%	-0.44%	-8.34%	-7.54%

Regression of individual founders' shares of equity on a dummy which equals one if the founder is a woman, including fixed effects for founder's and firm's characteristics to match female founders to similar male founders. The regression coefficient of the dummy measures the gap in equity holding associated with being a woman. The estimation is repeated for founders aged between 36 and 49, and aged 35 or less of limited liability companies, unlimited liability partnerships and innovative start-ups. Economic magnitudes are calculated by dividing the coefficient on the dummy Female, by the mean of the dependent variable when the dummy equals 0. The regression equation is: $Equity_{ijmt} = Female_i + \gamma_m + \tau_t + FEs_j + FEs_i + \epsilon_{ijmt}$

Table A7: REGULAR ENTREPRENEURSHIP - EXTENSIVE MARGIN

Ent. (/1000 women)	(1) Entrepreneurs All	(2) Entrepreneurs ≤35	(3) Executives ≤35	(4) Entrepreneurs 36-49	(5) Entrepreneurs ≥50
$W_m \times$ POST	0.0448	1.122*	1.024*	-0.439	-0.0720
	(0.176)	(0.612)	(0.598)	(0.553)	(0.125)
Observations	160,740	160,720	160,480	160,720	160,740
R-squared	0.096	0.069	0.070	0.071	0.062
Municipality FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	0.26%	3.10%	4.01%		

Difference in differences estimation at the municipality level of the effect of ECP availability on the number of women who start a new business, standardized per 1000 women living in the municipality. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$

Table A8: REGULAR ENTREPRENEURSHIP - EQUITY

Equity Stake	(1) All All	(2) ≤35 All	(3) 36-49 All	(4) ≥50 All	(5) ≤35 LLCs	(6) ≤35 ULPs
$W_m \times$ POST	0.00803	0.0234**	-0.0106	0.0147	0.0633**	0.00451
	(0.00698)	(0.0107)	(0.0130)	(0.0196)	(0.0295)	(0.00859)
Observations	620,811	234,750	239,964	143,881	71,250	161,703
R-squared	0.828	0.859	0.824	0.805	0.655	0.897
FEs:	*Quarter, municipality, NACE core code*					
Interacted FEs:	*# of founders, region, legal form*					
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						
Economic Magnitudes	0.05%	0.14%			0.61%	0.02%

Difference in differences estimation at the founder level of the effect of ECP availability on the percentage of equity held by women founders. The analysis is repeated for different age groups of women: women aged between 36 and 49, women 35 years old or younger and women aged 50 or older, and different legal forms of the firm (limited liability companies and unlimited liability partnerships). Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt}$

Table A9: REGULAR ENTREPRENEURSHIP - DDD

	(1) Equity 36-49 (LLCs)	(2) Equity ≤35 (LLCs)	(3) Equity ≤35 (ULPs)	(4) Main Owner ≤35 (LLCs)	(5) Main Owner 36-49 (LLCs)
F × W_m × POST	-0.0336	0.0544*	0.00194	0.135**	-0.0521
	(0.0275)	(0.0301)	(0.00644)	(0.0595)	(0.0616)
W_m × POST	0.0159	-0.00726	0.00668	0.00320	0.00478
	(0.0174)	(0.0164)	(0.00430)	(0.0477)	(0.0420)
F × POST	0.0260	-0.0382*	-0.000479	-0.101**	0.0390
	(0.0201)	(0.0220)	(0.00476)	(0.0437)	(0.0447)
F × W_m	0.0295	-0.0435**	0.00411	-0.0611	0.0716
	(0.0234)	(0.0217)	(0.00526)	(0.0454)	(0.0532)
Observations	289,002	222,485	502,303	222,485	289,002
R-squared	0.660	0.675	0.904	0.290	0.284
FEs:	*Quarter, municipality, NACE core code, female dummy*				
Interacted FEs:	*# of founders, region, legal form*				

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Difference in difference in differences (DDD) estimation at the founder level of the effect of ECP availability on the percentage of equity in the hands of women founders and their likelihood to be main owners relatively to men founders for limited liability companies. Main owners are defined as those founders who hold the biggest stake of equity in the founding team. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{imt}(POST_t \times W_m \times F_i) + \beta_{mt}(POST_t \times W_m) + \beta_{it}(POST_t \times F_i) + \beta_{im}(W_m \times F_i) + F_i + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt}$

Table A10: REGULAR ENTREPRENEURSHIP - FIRM LEVEL

LLCs	(1) Total Women Equity	(2) Woman Control	(3) Max Woman Stakee	(4) Women Control	(5) % of Women
$W_m \times$ POST	0.0726**	0.0689*	0.0252	0.0713*	0.0575*
	(0.0331)	(0.0383)	(0.0271)	(0.0374)	(0.0296)
Observations	387,626	387,626	170,607	387,626	360,346
R-squared	0.065	0.107	0.576	0.074	0.061
FEs:	*Quarter, municipality, NACE core code*				
Interacted FEs:	*# of founders, region, legal form*				
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	1.19%	1.19%	0.21%	1.09%	1.03%

Difference in differences estimation at the firm level of the effect of ECP availability on different measures of women involvement in limited-liability companies only. The dependent variables considered are: total percentage of equity owned by women, probability of one woman having 50% or more of equity, the maximum stake of equity owned by a female founder in the firm, probability of having 50% or more of equity owned by women and the percentage of founders who are women. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{jmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{jmt}$

Table A11: INNOVATIVE ENTREPRENEURSHIP - EXTENSIVE MARGIN

Found. (/1000 women)	(1) Founders All	(2) Founders ≤35	(3) Founders 36-49	(4) Founders ≥50
$W_m \times$ POST	0.0312**	0.103*	0.0179	0.0188
	(0.0133)	(0.061)	(0.0221)	(0.0121)
Observations	130,582	130,578	130,580	130,582
R-squared	0.118	0.142	0.09	0.117
Municipality FE	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	31.96%	39.60%		

Difference in differences estimation at the municipality level of the effect of ECP availability on the fraction of women living in a given municipality who start a new innovative start-up. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$

Table A12: INNOVATIVE ENTREPRENEURSHIP - EQUITY

Equity Stake	(1) All	(2) ≤35	(3) ≤35	(4) 36-49	(5) ≥50
$W_m \times$ POST	0.582**	0.795*	0.746*	0.102	0.656
	(0.234)	(0.410)	(0.408)	(0.453)	(0.588)
Observations	3,658	978	942	1,293	632
R-squared	0.283	0.386	0.380	0.327	0.410
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES
One-founder Firms	YES	YES	NO	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	10.11%	17.35%	14.04%		

Difference in differences estimation at the founder level of the effect of ECP availability on the stake of equity (in percentage) held at founding by women founders of innovative start-ups. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. In Column 3 one-founder firms are excluded from the analysis. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A13: INNOVATIVE ENTREPRENEURSHIP - MAIN OWNERSHIP

Main Owner	(1) All	(2) ≤35	(3) ≤35	(4) 36-49	(5) ≥50
$W_m \times$ POST	0.495	1.584**	1.620**	0.512	-0.989
	(0.389)	(0.783)	(0.807)	(0.719)	(1.223)
Observations	3,662	978	942	1,293	634
R-squared	0.285	0.414	0.413	0.335	0.394
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES
One-founder Firms	YES	YES	NO	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	5.92%	16.46%	17.87%		

Difference in differences estimation at the founder level of the effect of ECP availability on the probability of a woman founder of an innovative start-up to be the main owner of the firm. A founder is considered a main owner if her equity stake is the biggest among all founders. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. In Column 3 one-founder firms are excluded from the analysis. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A14: INNOVATIVE ENTREPRENEURSHIP - EXECUTIVES

Executive	(1) All	(2) ≤35	(3) 36-49	(4) ≥50
$W_m \times$ POST	0.304	1.234*	0.294	-0.658
	(0.355)	(0.677)	(0.559)	(1.072)
Observations	3,662	978	1,293	634
R-squared	0.231	0.298	0.282	0.408
Town FE	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	9.63%	43.42%		

Difference in differences estimation at the founder level of the effect of ECP availability on the probability of a woman founder of an innovative start-up to also be the executive of the company. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A15: INNOVATIVE ENTREPRENEURSHIP - EQUITY VALUE

Equity (Th. Euros)	(1) All	(2) ≤35	(3) ≤35	(4) 36-49	(5) ≥50
$W_m \times$ POST	-23.83	24.86	18.03*	-53.16	18.67
	(35.77)	(20.53)	(10.29)	(72.02)	(33.08)
Observations	3,343	885	859	1,168	564
R-squared	0.333	0.512	0.408	0.240	0.619
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES
One-founder Firms	YES	YES	NO	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	-23.47%	33.33%	24.22%		

Difference in differences estimation at the founder level of the effect of ECP availability on the Euro-value (in thousands of Euros) of the stake of equity held at founding by women founders of innovative start-ups. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. In Column 3 one-founder firms are excluded from the analysis. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A16: INNOVATIVE ENTREPRENEURSHIP - AGE

Age	(1) All	(2) ≤35	(3) 36-49	(4) ≥50
$W_m \times$ POST	0.510	10.66*	-1.661	-23.50
	(9.203)	(6.149)	(5.314)	(14.79)
Observations	3,658	978	1,293	632
R-squared	0.270	0.397	0.320	0.347
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	0.06%	1.61%		

Difference in differences estimation at the founder level of the effect of ECP availability on the age at founding of women founders of innovative start-ups. The analysis is repeated for different age groups of women: women 35 years old or younger, women aged between 36 and 49, and women aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A17: INNOVATIVE ENTREPRENEURSHIP - FIRM LEVEL (A)

	(1) Total Women Equity	(2) Woman Control	(3) Max Woman Stake	(4) Women Control	(5) % of Women
$W_m \times$ POST	0.187	-0.0446	-0.212	0.0710	0.246*
	(0.150)	(0.159)	(0.145)	(0.171)	(0.145)
Observations	7,362	7,362	2,396	7,362	7,362
R-squared	0.173	0.209	0.609	0.179	0.181
FEs:	*Quarter, municipality, NACE core code*				
Interacted FEs:	*# of founders, region*				
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	5.19%	-1.80%	-2.79%	2.09%	6.32%

Difference in differences estimation at the start-up level of the effect of ECP availability on different measures of women involvement. The dependent variables considered are: total percentage of equity owned by women, probability of one woman having 50% or more of equity, the maximum stake of equity owned by a female founder in the firm, probability of having 50% or more of equity owned by women and the percentage of founders who are women. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{jmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{jmt}$

Table A18: INNOVATIVE ENTREPRENEURSHIP - FIRM LEVEL (B)

	(1) Total Women Equity	(2) Woman Control	(3) Max Woman Stake	(4) Women Control	(5) % of Women
$W_m \times$ POST	0.220	-0.0466	-0.202	0.129	0.300**
	(0.142)	(0.148)	(0.147)	(0.173)	(0.143)
Observations	5,772	5,772	2,227	5,772	5,772
R-squared	0.178	0.234	0.416	0.192	0.181
FEs:	*Quarter, municipality, NACE core code*				
Interacted FEs:	*# of founders, region*				
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	5.63%	-1.86%	-2.98%	3.52%	7.08%

Difference in differences estimation at the start-up level of the effect of ECP availability on different measures of women involvement, excluding one-founder start-ups. The dependent variables considered are: total percentage of equity owned by women, probability of one woman having 50% or more of equity, the maximum stake of equity owned by a female founder in the firm, probability of having 50% or more of equity owned by women and the percentage of founders who are women. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{jmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{jmt}$

Table A19: LABOR MARKET - GENDER GAP

Labor Outcomes	(1) Employment ≤35	(2) Employment ≤35 (Rel.)	(3) Entrepreneurs ≤35	(4) Entrepreneurs ≤35 (Rel.)
Female Dummy	-0.106***	-0.225***	-0.00546***	-0.00691***
	(0.00436)	(0.00862)	(0.00106)	(0.00242)
Observations	114,646	31,963	114,646	31,963
R-squared	0.209	0.257	0.061	0.099
Economic Magnitudes	-17.61%	-31.75%	-26.58%	-29.18%
Labor Outcomes	(5) Hours ≤35	(6) Hours ≤35 (Rel.)	(7) Salary ≤35	(8) Salary ≤35 (Rel.)
Female Dummy	-6.059***	-8.422***	-0.951***	-1.600***
	(0.0829)	(0.143)	(0.195)	(0.258)
Observations	188,682	61,274	154,401	50,705
R-squared	0.115	0.196	0.117	0.140
Economic Magnitudes	-16.81%	-23.42%	-3.06%	-4.77%
Fixed-Effects:	*municipality, quarter, age class, education level, family type, marital status, foreign born, region, citizenship, profession*			
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Regression of several labor market outcomes on a dummy which equals one if the individual is a woman, including fixed effects for location, time and individual characteristics (e.g. education and marital status). The regression coefficient of the dummy measures the gap in the outcomes of interest associated with being a woman. Economic magnitudes are calculated by dividing the coefficient on the dummy Female, by the mean of the dependent variable when the dummy equals 0. The regression equation is: $y_{imt} = Female_i + \gamma_m + \tau_t + FEs_i + \epsilon_{imt}$

Table A20: LABOR MARKET - ENTREPRENEURSHIP

	(1) Entrepreneur ≤35	(2) Entrepreneur ≤35 - (Rel.)	(3) Self-Employed ≤35 - (Rel.)	(4) Ent. Hours ≤35	(5) Ent. Hours ≤35 - (Rel.)	(6) S.E. Hours ≤35 - (Rel.)
$W_m \times$ POST	0.0227	0.0917**	0.00693	16.73	40.41*	3.044
	(0.0193)	(0.0404)	(0.0544)	(14.56)	(21.03)	(13.12)
Observations	141,521	49,227	49,227	2,830	1,092	5,843
R-squared	0.068	0.098	0.067	0.406	0.586	0.337
FEs:	*Quarter, municipality*					
Interacted FEs:	*Age class, education level, family and marital status, foreign born, region, citizenship*					
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						
Economic Magnitudes	4.86%	17.78%	0.63%	2.18%	5.42%	0.34%

Estimation of the effect of ECPs' liberalization on the probability of a woman being an entrepreneur and on the number of hours worked (weekly) by women entrepreneurs. The analysis is repeated using all women aged 35 or younger and women below age 35 who are in a relationship (Rel.). In columns (3) and (6) the effect of interest is estimated on younger women who are self-employed rather than entrepreneurs. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{imt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + FEs_i + \epsilon_{imt}$.

Table A21: LABOR MARKET - PAID EMPLOYMENT

	(1) Employment ≤35	(2) Employment ≤35 - (Rel.)	(3) Hours ≤35	(4) Hours ≤35 - (Rel.)
$W_m \times$ POST	-0.00617	0.156	-1.072	0.414
	(0.0786)	(0.114)	(2.241)	(3.598)
Observations	141,521	49,227	80,457	30,864
R-squared	0.207	0.238	0.069	0.128
FEs:	*Quarter, municipality*			
Interacted FEs:	*Age class, education level, family status, marital status, foreign born, region, citizenship*			
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	-0.05%	1.12%	-0.15%	0.06%

Estimation of the effect of ECPs' liberalization on the probability of a woman being employed and on on the number of hours worked (weekly) by employed women. The analysis is repeated using all women aged 35 or younger and women below age 35 who are in a relationship (Rel.). Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{imt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + FEs_i + \epsilon_{imt}$.

A.2.1 Supplementary Tables

Table A22: START-UP ITALY ACT SUMMARY

Panel A. Start-Up Italy Requirements	
All of the following:	- Incorporation in Italy as an independent private limited company by less than 5 years; - "Technological innovation" as main business objective; - Value of production $<$ € 5M; - No dividend distribution.
At least one of the following:	- R&D expenses for more than 15% of the biggest between value or cost of production; - A patent granted or a software trademark registered; - At least a third of all collaborators holding a PhD or two thirds holding a master degree.
Panel B. Start-Up Italy Incentives	
Financial Constraints:	- Preferential access to the Government Guarantee Fund for bank credit and loans; - Tax breaks for private and professional equity investors.
Bureaucracy:	- Favorable employment law, incentives for equity-based compensation; - Easier and faster bankruptcy procedures; - Exemption from several administrative expenditures and red tape (e.g. stamp duties).

Summary of the requirements (Panel A) that firms have to satisfy in order to be incorporated under the *Start-Up Italy Act* (SIA) and incentives (Panel B) start-ups receive under the program.

Table A23: LABOR MARKET - FIXED EFFECTS

Variables	**Values**
Age class:	5 year intervals, from 18 to 108.
Citizenship:	Italian, EU country, other.
Education level:	ISCED 1-6 (primary education, lower secondary education, upper secondary education, post-secondary education, tertiary education, second stage of tertiary education).
Family type:	Single without children, single with children, in a relationship without children, in a relationship with children.
Foreign born:	yes, no.
Marital status:	Bachelor, married in a household, married not in a household, legally separated, divorced, widow.
Region:	20 Italian regions (administrative division analogous to US states).

List of variables used as fixed effects when estimating regressions on the sample of women from *Quarterly Cross-sectional Labour Force Survey* and their range of values.

Table A24: LABOR MARKET - SUMMARY STATISTICS

	Full Sample	Men	Women
No. of obs.	3,042,088	1,440,205	1,601,883
Gender	-	47.3%	52.7%
Age	46.9	45.2	48.4
Monthly wage (€)	1308.0	1463.4	1168.2
Employment rate	76.7%	80.9%	73.0%
% of entrepreneurs	4.4%	5.5%	3.4%
% of parents	32.8%	-	-
% of singles	49.5%	-	-

Summary statistics of the sample of individuals in the *Quarterly Cross-sectional Labor Force Survey* and the sub-samples of men and women.

Table A25: ROBUSTNESS - EXTENSIVE MARGIN

Found. (/1000 women)	(1) ≤ 35	(2) ≤ 35	(3) ≤ 35	(4) ≤ 35	(5) ≤ 35
$W_m \times$ POST	0.103*				
	(0.0610)				
$W_L \times$ POST		0.0895			
		(0.115)			
$W_{Min} \times$ POST			0.0191**		
			(0.00914)		
$W_{m,\,4h} \times$ POST				0.0901	
				(0.0577)	
$W_{L,\,4h} \times$ POST					0.178
					(0.153)
Observations	130,578	130,578	130,578	130,578	130,578
R-squared	0.142	0.142	0.142	0.142	0.142
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Clustered standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Estimation of the effect of ECPs' liberalization on the number of innovative founders, aged 35 or younger, standardized by the number of women living in the municipality. In the first row, access to abortion is measured as in the main analysis. In the second row, access to abortion is calculated using linear weighting as: $W_L = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j$, where $w_{mj} = \frac{t_{max} - t_{mj}}{t_{max}}$ and t_{max} is the maximum travel time between any municipality and municipality m. In the third row, access to abortion is measured as the share of conscientious objectors among gynecologists in the nearest hospital. Lastly, in the last two rows access to abortion is calculated as in the main analysis and as in the second row, respectively, but excluding any hospital farther than 4 hours travel time.

Table A26: ROBUSTNESS - EQUITY

	(1)	(2)	(3)	(4)	(5)
Equity Stake	≤ 35	≤ 35	≤ 35	≤ 35	≤ 35
$W_m \times$ POST	0.795*				
	(0.410)				
$W_L \times$ POST		16.73**			
		(7.052)			
$W_{Min} \times$ POST			0.150		
			(0.134)		
$W_{m,\,4h} \times$ POST				0.764**	
				(0.333)	
$W_{L,\,4h} \times$ POST					4.362*
					(2.453)
Observations	978	978	978	978	978
R-squared	0.386	0.388	0.384	0.387	0.386
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation of the effect of ECPs' liberalization on the stake of equity in innovative start-ups of the average female founder, aged 35 or younger. In the first row, access to abortion is calculated as in the main analysis. In the second row, access to abortion is calculated using linear weighting as: $W_L = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j$, where $w_{mj} = \frac{t_{max} - t_{mj}}{t_{max}}$ and t_{max} is the maximum travel time between any municipality and municipality m. In the third row, access to abortion is measured as the share of conscientious objectors among gynecologists in the nearest hospital. Lastly, in the last two rows access to abortion is calculated as in the main analysis and as in the second row, respectively, but excluding any hospital farther than 4 hours travel time.

Table A27: ROBUSTNESS - MAIN OWNERSHIP

Main Owner	(1) ≤ 35	(2) ≤ 35	(3) ≤ 35	(4) ≤ 35	(5) ≤ 35
$W_m \times$ POST	1.584**				
	(0.783)				
$W_L \times$ POST		26.29**			
		(10.66)			
$W_{Min} \times$ POST			0.392		
			(0.303)		
$W_{m,\,4h} \times$ POST				1.383**	
				(0.640)	
$W_{L,\,4h} \times$ POST					6.279
					(4.209)
Observations	978	978	978	978	978
R-squared	0.414	0.414	0.413	0.414	0.413
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation of the effect of ECPs' liberalization on the probability of the average female founder, aged 35 or younger, to be main owner of her innovative start-up. In the first row, access to abortion is calculated as in the main analysis. In the second row, access to abortion is calculated using linear weighting as: $W_L = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j$, where $w_{mj} = \frac{t_{max} - t_{mj}}{t_{max}}$ and t_{max} is the maximum travel time between any municipality and municipality m. In the third row, access to abortion is measured as the share of conscientious objectors among gynecologists in the nearest hospital. Lastly, in the last two rows access to abortion is calculated as in the main analysis and as in the second row, respectively, but excluding any hospital farther than 4 hours travel time.

Table A28: ROBUSTNESS - EXECUTIVES

Executive	(1) ≤ 35	(2) ≤ 35	(3) ≤ 35	(4) ≤ 35	(5) ≤ 35
$W_m \times$ POST	1.234*				
	(0.677)				
$W_L \times$ POST		23.03***			
		(8.083)			
$W_{Min} \times$ POST			0.271*		
			(0.151)		
$W_{m,\,4h} \times$ POST				1.028*	
				(0.582)	
$W_{L,\,4h} \times$ POST					4.900*
					(2.576)
Observations	978	978	978	978	978
R-squared	0.298	0.299	0.296	0.298	0.297
Town FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation of the effect of ECPs' liberalization on the probability of the average female founder, aged 35 or younger, to be the executive of her innovative start-up. In the first row, access to abortion is calculated as in the main analysis. In the second row, access to abortion is calculated using linear weighting as: $W_L = \frac{1}{\sum_j w_{mj}} \sum_j w_{mj} CO_j$, where $w_{mj} = \frac{t_{max} - t_{mj}}{t_{max}}$ and t_{max} is the maximum travel time between any municipality and municipality m. In the third row, access to abortion is measured as the share of conscientious objectors among gynecologists in the nearest hospital. Lastly, in the last two rows access to abortion is calculated as in the main analysis and as in the second row, respectively, but excluding any hospital farther than 4 hours travel time.

A.2.2 Tables of the Analysis on Men

Table A29: REGULAR ENTREPRENEURSHIP - EXTENSIVE MARGIN

Ent. (/1000 men)	(1) Entrepreneurs All	(2) Entrepreneurs ≤35	(3) Executives ≤35	(4) Entrepreneurs 36-49	(5) Entrepreneurs ≥50
$W_m \times$ POST	0.114	1.261	0.836	-0.638	-0.0242
	(0.335)	(1.179)	(0.958)	(0.889)	(0.260)
Observations	160,740	160,728	160,488	160,740	160,740
R-squared	0.146	0.098	0.085	0.114	0.074
Municipality FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	0.19%	1.07%	3.28%		

Difference in differences estimation at the municipality level of the effect of ECP availability on the fraction of men living in a given municipality who start a new business (analogous to Table A7). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$

Table A30: REGULAR ENTREPRENEURSHIP - EQUITY

Equity Stake	(1) All All	(2) ≤35 All	(3) 36-49 All	(4) ≥50 All	(5) ≤35 LLCs	(6) ≤35 ULPs
$W_m \times$ POST	-0.00200	-0.00116	0.00310	0.00791	-0.0213	-0.00860
	(0.00420)	(0.00669)	(0.00780)	(0.00530)	(0.0189)	(0.0131)
Observations	1,316,671	454,063	538,433	314,884	137,189	323,064
R-squared	0.856	0.885	0.856	0.912	0.700	0.825
FEs:	*Quarter, municipality, NACE core code*					
Interacted FEs:	*# of founders, region, legal form*					
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						
Economic Magnitudes	-0.01%	-0.01%			-0.21%	-0.06%

Difference in differences estimation at the founder level of the effect of ECP availability on the percentage of equity in the hands of men founders (analogous to Table A8). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older and different legal forms of the firm (limited liability companies and unlimited liability partnerships). Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + POST_t \times FEs_j + \epsilon_{ijmt}$

Table A31: INNOVATIVE ENTREPRENEURSHIP - EXTENSIVE MARGIN

Found. (/1000 men)	(1) Founders All	(2) Founders ≤35	(3) Founders 36-49	(4) Founders ≥50
$W_m \times$ POST	-0.000340	-0.105	-0.0424	0.0338
	(0.0376)	(0.161)	(0.0592)	(0.0301)
Observations	130,582	130,582	130,582	130,582
R-squared	0.152	0.194	0.111	0.097
Municipality FE	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	-1.81%	-8.98%	-	

Difference in differences estimation at the municipality level of the effect of ECP availability on the fraction of men living in a given municipality who start a new innovative start-up (analogous to Table A11). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{mt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + \epsilon_{mt}$

Table A32: INNOVATIVE ENTREPRENEURSHIP - EQUITY

Equity Stake	(1) All	(2) ≤35	(3) ≤35	(4) 36-49	(5) ≥50
$W_m \times$ POST	0.0803	0.0502	0.0916	0.158	0.0400
	(0.144)	(0.192)	(0.169)	(0.234)	(0.267)
Observations	16,419	4,334	4,131	6,501	3,720
R-squared	0.185	0.264	0.251	0.240	0.262
Municipality FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES
One-founder Firms	YES	YES	NO	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	1.29%	0.80%	1.60%		

Difference in differences estimation at the founder level of the effect of ECP availability on the fraction of equity held at founding by men founders of innovative start-ups, both including and excluding one-founder firms (analogous to Table A12). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A33: INNOVATIVE ENTREPRENEURSHIP - MAIN OWNERSHIP

Main Owner	(1) All	(2) ≤35	(3) ≤35	(4) 36-49	(5) ≥50
$W_m \times$ POST	0.160	0.502	0.496	0.215	-0.281
	(0.193)	(0.422)	(0.419)	(0.327)	(0.441)
Observations	16,449	4,334	4,585	6,501	3,751
R-squared	0.166	0.245	0.235	0.222	0.248
Municipality FE	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES
One-founder Firms	YES	YES	NO	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Economic Magnitudes	1.64%	4.87%	5.04%		

Difference in differences estimation at the municipality level of the effect of ECP availability on the probability of a man founder of an innovative start-up to be the main owner of the firm, both including and excluding one-founder firms (analogous of Table A13). A founder is considered a main owner if her stake of equity is the biggest among all founders. The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A34: INNOVATIVE ENTREPRENEURSHIP - EXECUTIVES

Executive	(1) All	(2) ≤35	(3) 36-49	(4) ≥50
$W_m \times$ POST	0.0924	0.176	0.0657	0.517
	(0.157)	(0.323)	(0.260)	(0.333)
Observations	16,438	4,334	6,501	3,739
R-squared	0.156	0.231	0.210	0.231
Municipality FE	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES
Region#POST FE	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	2.37%	4.30%		

Difference in differences estimation at the founder level of the effect of ECP availability on the probability of a man founder of an innovative start-up to also be the executive of the company (analogous to Table A14). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older. Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{ijmt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + \sigma_s + POST_t \times \rho_r + \epsilon_{ijmt}$

Table A35: LABOR MARKET - ENTREPRENEURSHIP

Entrepreneur	(1) ≤35	(2) ≤ 35 - (Rel.)	(3) 36-49	(4) ≥50
$W_m \times$ POST	0.00368	-0.0388	0.0236	-0.00895
	(0.0193)	(0.0573)	(0.0157)	(0.0263)
Observations	167,141	36,051	448,633	253,551
R-squared	0.066	0.116	0.093	0.177
FEs:	*Quarter, municipality*			
Interacted FEs:	*Age class, education, family and marital status, foreign, region, citizenship*			
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				
Economic Magnitudes	0.82%	-7.17%		

Estimation of the effect of ECPs' liberalization on the probability of a man being an entrepreneur (analogous to Table A20). The analysis is repeated for different age groups of men: men 35 years old or younger, men aged between 36 and 49, and men aged 50 or older, and men who are in a relationship (Rel.) Economic magnitudes are calculated as the interaction coefficient on $W_m \times$ POST times one cross-sectional standard deviation of W_m, divided by the mean of the dependent variable before the liberalization of ECPs. Standard errors are clustered at the municipality level. The difference-in-differences regression equation is: $y_{imt} = \alpha + \beta_{mt}(POST_t \times W_m) + \gamma_m + \tau_t + POST_t \times \rho_r + FEs_i + \epsilon_{imt}$

A.3 Abortion Procedure in Italy

In this appendix, I outline the procedure that a woman in Italy has to fulfill to get a voluntary abortion. The procedure is outlined in Law 194, enacted in 1978 and subsequently minorly amended. The Law has the goal to guarantee women's reproductive freedom under the constraint of minimizing abortions.

In Italy, abortion is legal within 90 days since the start of the pregnancy (voluntary abortion). In case of grave dangers to the woman's life or severe congenital anomalies and conditions of the fetus, abortion is legal up to when the fetus would be able to live autonomously outside the woman's uterus (therapeutic abortion). Here I focus exclusively on voluntary abortion.

The count of the 90 days begins not with the conceiving act but rather with the first date of the last menstruation, namely the first day of the last menstrual flow (not to be confused with the day last menses ended). Within this term, a woman who wants to have an abortion must approach a Family Contraceptive Clinic (equivalent to Planned Parenthood in the US). Here, a doctor certifies her pregnancy status and she could also run a blood test for the hormone Beta-hCG, to date the pregnancy more accurately. Conventionally, the start of the pregnancy can also be dated to days of life of the fetus plus two weeks.

Once the doctor establishes that a woman is pregnant and within the term to obtain a voluntary abortion, she has to ask the woman the causes that originate her choice. The doctor may ask to involve the man in the process, even if the woman can refuse. The Law also requires that the doctor informs the woman of all the possible help the woman can get from the state, certifying the use of abortion as *extrema ratio*. If the woman decides to go ahead, the doctor must giver her a certificate that attests the woman's status and decision to get an abortion. Before the woman can effectively book surgery at a public hospital, she has to wait at least seven days, during which she is usually invited by the clinic for counseling sessions. After the seven days, she can effectively book an appointment at a hospital of her choosing, even if some clinics may manage the booking themselves in accordance with neighboring hospitals.

Law 194 also accounts for the possibility of a gynecologist to object against performing abortion procedures. Doctors' conscientious objection impacts on the ability of a woman getting an abortion at two stages: the clinic and the hospital. At the hospital level, a high number of conscientious objectors causes

longer waiting times for surgery. Also, in Italy abortions are still largely obtained trough surgical procedure (pharmaceutical abortions in 2015 accounted for 15% of the total, and by law they can be performed only within 49 days from the start of the pregnancy), which means women have to find a hospital with both a free operating room and a bed for the night. It is important to note that the deadline of 90 days is a hard constraint, and the law requires the woman to get the surgery, not the certificate, within 90 days. Therefore if waiting times are particularly long, they can spike up to 30 days or longer, a woman may not be able to get the surgery in time. This can force the woman to visit neighboring hospitals, sometimes even outside her own region, in the hope to find a suitable day for the surgery, all the while wasting precious days. Therefore, casting aside the psychological consequences of such an excruciating journey, getting an abortion in certain areas of the country can be physically hard or impossible, depending on the time available to the woman.

It is important to notice that in Italy, a woman cannot get an abortion independently in the private sector. While the national health-care system allows some private clinic to provide the service, it is nonetheless regulated by the Law 194, which means the woman has to go through the same procedure no matter where she ends up having the abortion. Therefore the difficulties in accessing abortion services impact women from all social and economic statuses.

The other dimension how conscientious objection affects women's ability to get an abortion is at the family contraceptive clinic level. Before the end of 2016, doctors and personnel of the clinic could refuse to certify the pregnancy status of the woman or to giver her the necessary certificate. This possibility has been struck down by the Supreme Court in 2016 as a misinterpretation of Law 194. I do not take into account this second dimension in the analysis for three reasons: first, the problem seems to have been less severe with respect to hospitals, since around 15% of personnel in 2015 declared conscientious objection; the second reason is that in certain situations the contraceptive clinic can be sidelined, as a woman can also ask her GP (General Practitioner) to certify her status and decision; lastly, data coverage on contraceptive clinics is scarce, as the Ministry of Health reports data about conscientious objection for only 80% of them with serious data quality issue in certain regions. Therefore, the measure of access to abortion I use represents a conservative measure of women's barriers to effectively get an abortion.

A.4 Theoretical Intuition à la Goldin (2014)

In this appendix, I augment and reinterpret the theoretical framework of Goldin (2014) to account for maternity risk.

Following Goldin (2014), I construct a model where occupations have convex payoffs in time spent at work (t). Entrepreneurship pays a fixed dividend d times the amount of time committed by the entrepreneur, conditional on her having enough time to invest ($t \geq \hat{t}$). Similarly, employment pays a wage w times the amount of time spent at work, if it exceeds a certain threshold ($t \geq \bar{t}$). If the agent does not have enough time to commit to the workplace, both entrepreneurship and employment pay less per unit of time, respectively $(1-\beta)d$ and $(1-\alpha)w$. Payoffs (Y) from the two different careers can be summarized as follows:

$$\text{Employment } Y(t) = \begin{cases} tw & \text{if } t \geq \hat{t} \\ t(1-\alpha)w & \text{if } t < \hat{t} \end{cases}$$

$$\text{Entrepreneurship } Y(t) = \begin{cases} td & \text{if } t \geq \bar{t} \\ t(1-\beta)d & \text{if } t < \bar{t} \end{cases}$$

The convexity of payoff fuctions is given by the discontinuities around the two thresholds. The intuition is that an employee has to spend enough time at work to progress in her career and achieve higher payoffs. Conversely, I can also interpret the convexity of payoffs as employers punishing disproportionately workers in need of flexibility. I apply such intuition, outlined in Goldin (2014), to entrepreneurship.

Regarding the parameters of the model, I make the following assumptions:

1. $d > w$
2. $(1-\alpha)w > (1-\beta)d$, where $1 > \beta > \alpha > 0$
3. $\hat{t} < \bar{t} < T$

I assume that entrepreneurship is a more rewarding career than paid employment (Assumption 1). But entrepreneurship is also a career choice that punishes more those who cannot commit enough time to it (Assumption 2). At the same time, the amount of time to commit to entrepreneurship for it to be successful is higher than for paid employment (Assumption 3).

I also augment Goldin (2014) framework by adding maternity risk. Motherhood reduces the time available to the woman from T to δT, where $\delta < 1$. Furthermore, motherhood is random and happens with probability $p < 1$. I make the following assumption about δ:

4. $\delta T < \hat{t} < \bar{t} < T$

Assumption 4 makes maternity risk relevant for women's career choices. Figure A11 offers a visual representation of the payoffs of entrepreneurship and paid employment as a function of the time available to spend at work.
Since there is no outside option for the use of time, an agent will always spend all the time available to her on the workplace. If a woman has her full time T to spend at work, she would always go for entrepreneurship, it being the most profitable career per unit of time. Once I add the possibility of maternity risk hitting the woman with probability p, her choice could change. Assuming women to be risk-neutral, her payoffs under maternity risk becomes:

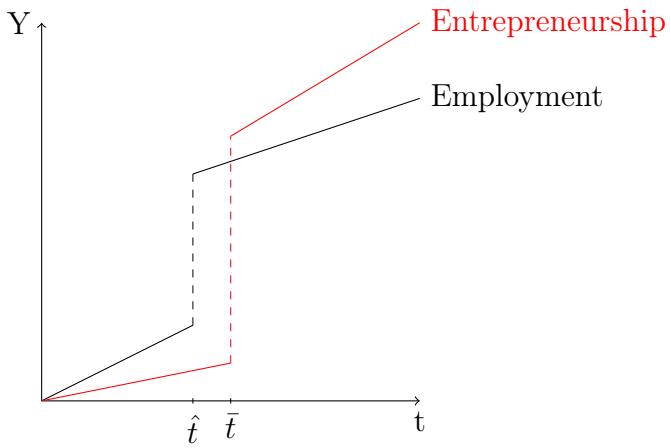
- Employment: $Y_{Emp} = (1-p)Tw + p(1-\alpha)\delta Tw$
- Entrepreneurship: $Y_{Ent} = (1-p)Td + p(1-\beta)\delta Td$

Being a rational agent, a woman will choose entrepreneurship only if $Y_{Ent} > Y_{Emp}$, a condition which depends on the magnitude of p. Therefore, p represents what I call maternity risk throughout the paper. Easily, it can be proven that:

Result 1. *If* $p > \bar{p} = \frac{d-w}{d-w+\delta(w(1-\alpha)-d(1-\beta))}$ *then* $Y_{Ent} > Y_{Emp}$. *Therefore, paid employment is preferred to entrepreneurship.*

In other words, when maternity risk is sufficiently high, women select out of entrepreneurial careers. Interpreting the result in light of the main empirical analysis, I can say that when maternity risk is reduced women are more likely to join entrepreneurship and committing more time and resources to it. What makes maternity risk problematic for selection into entrepreneurship is the convexity of entrepreneurial careers' payoffs, and in particular the fact that entrepreneurship has a more convex payoff than paid employment. This stems from the lower payoff earned when the time committed to the project is lower, and from the fact that an entrepreneur has to commit more time to her career. Such assumption is consistent with the view of entrepreneurial roles as 24/7 jobs and with the absence of paid maternity leave for entrepreneurs.

Figure A11: PAID EMPLOYMENT VERSUS ENTREPRENEURSHIP

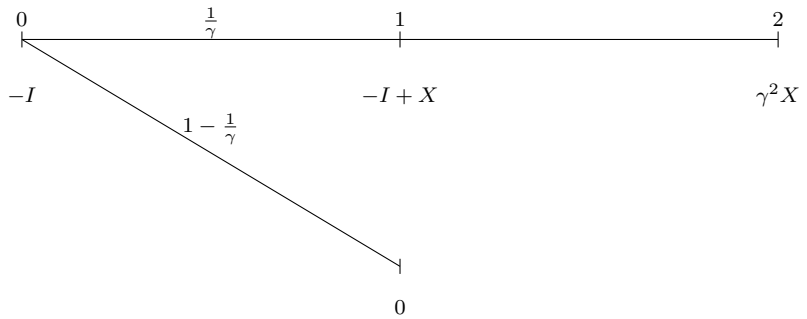


Visual representation of the convexity of the payoffs entrepreneurship and employment as functions of time spent at work. Entrepreneurial careers have a more convex payoff compared to paid employment.

B. Appendix to Lend Me a Hand - Banks Rent Extraction and Policies for Start-Ups

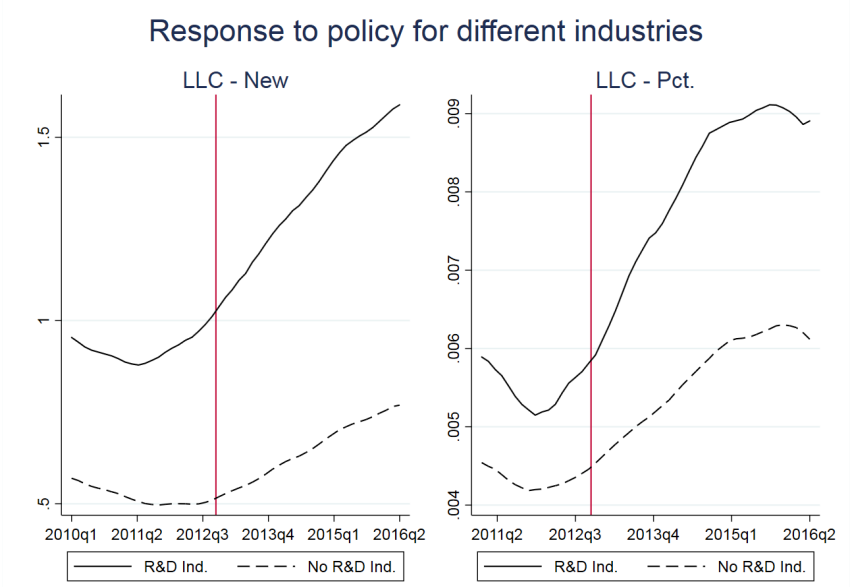
B.1 Figures

Figure B1: CASHFLOWS IN THE MODEL



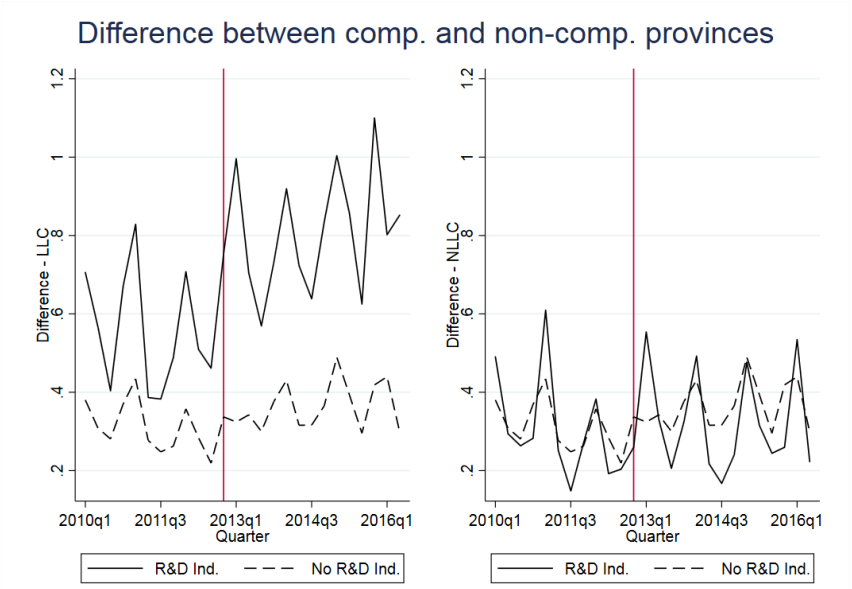
Time-line of the cashflows of the entrepreneur's project. The project needs to be financed at time 0 and refinenced at time 1. It produces a risky cashflow at time 1 and a safe one at time 2. The parameter γ measures the level of innovativeness of the firm, making it more risky in the first period (i.e.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

Figure B2: PARALLEL TRENDS - POLICY



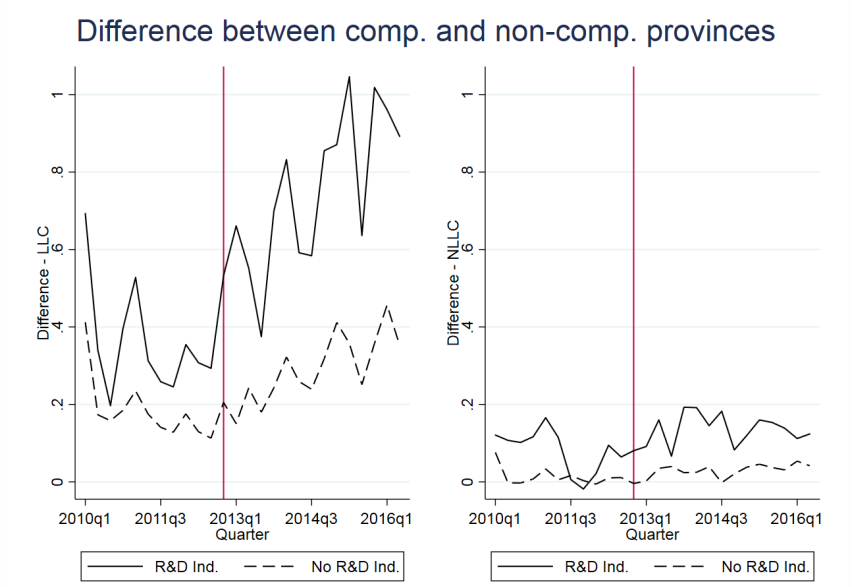
Local polynomial smooth (to smooth seasonality) of numbers and percentages (of total firms registered) of newly incorporated LLCs around the policy, in R&D-oriented and other industries. The difference in incorporations between the two groups of industries widens after the passing of the policy, showing its effectiveness.

Figure B3: PARALLEL TRENDS - DDD



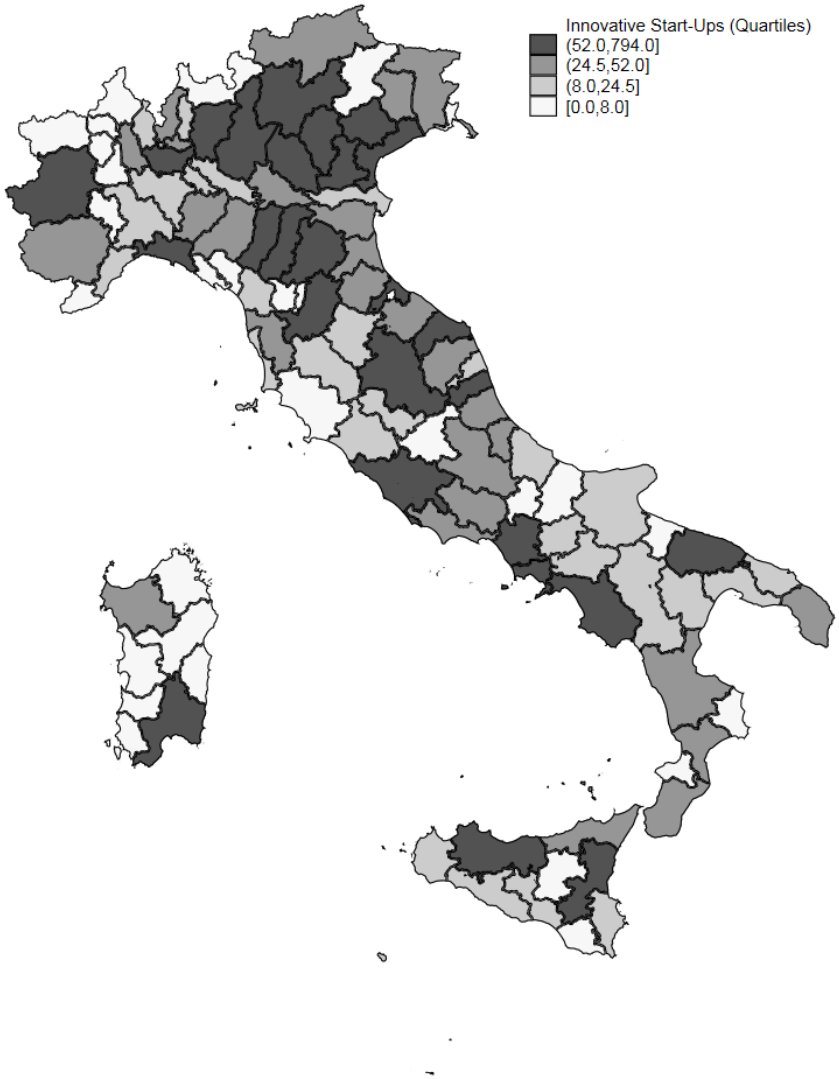
Difference between high and low rent provinces for R&D oriented industries (blue) and not R&D oriented (red) in newly incorporated limited (left) and non-limited liability companies (right). The graph shows a graphical representation of the triple-diff setting: the difference between the two groups remains flat in the control (dashed) and shows an upward trend in the treated industries (solid) after the passing of the policy (red vertical line), but only for LLCs. For NLLCs there is no difference before and after the passing of the policy. Since NLLCs are not affected by the policy, this constitutes a placebo test.

Figure B4: PARALLEL TRENDS - DDD (REGION)



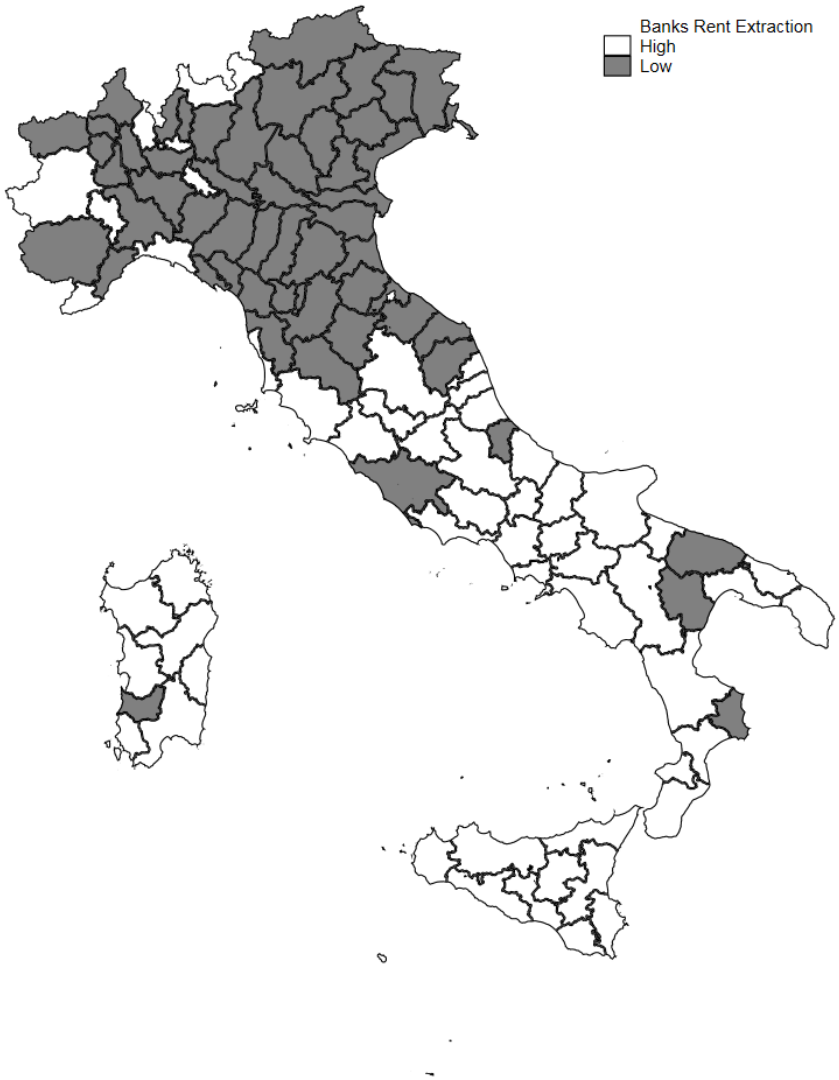
Difference between high and low rent provinces provinces for R&D oriented industries (blue) and not R&D oriented (red) in newly incorporated limited (left) and non-limited liability companies (right). The graph has the same interpretation of Figure B3 but here the rent extraction dummy is defined at the regional level.

Figure B5: GEOGRAPHIC DISTRIBUTION OF START-UPS



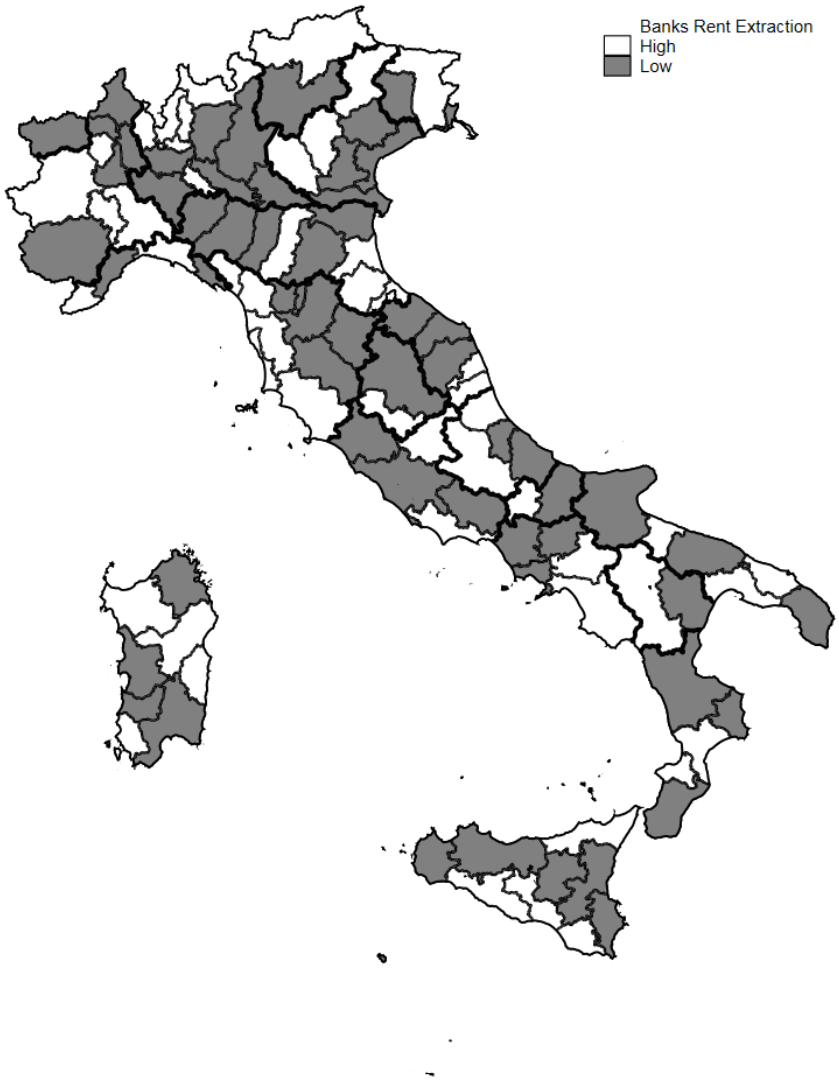
Map of Italian provinces ranked by the number of start-ups incorporated under the *Start-Up Italy* policy. Provinces are divided in quartiles.

Figure B6: GEOGRAPHIC DISTRIBUTION OF RENTS



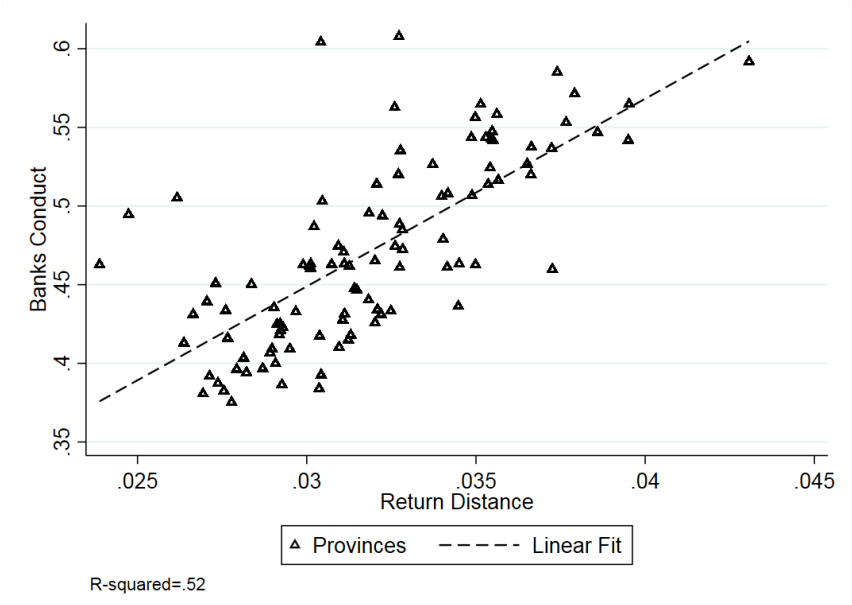
Map of Italian provinces ranked by the average return distance between 2010 and 2012, as a proxy for rent-extraction by banks. Grey provinces are scoring above the national median and are classified "high-rent" provinces.

Figure B7: GEOGRAPHIC DISTRIBUTION OF RENTS (REGION)



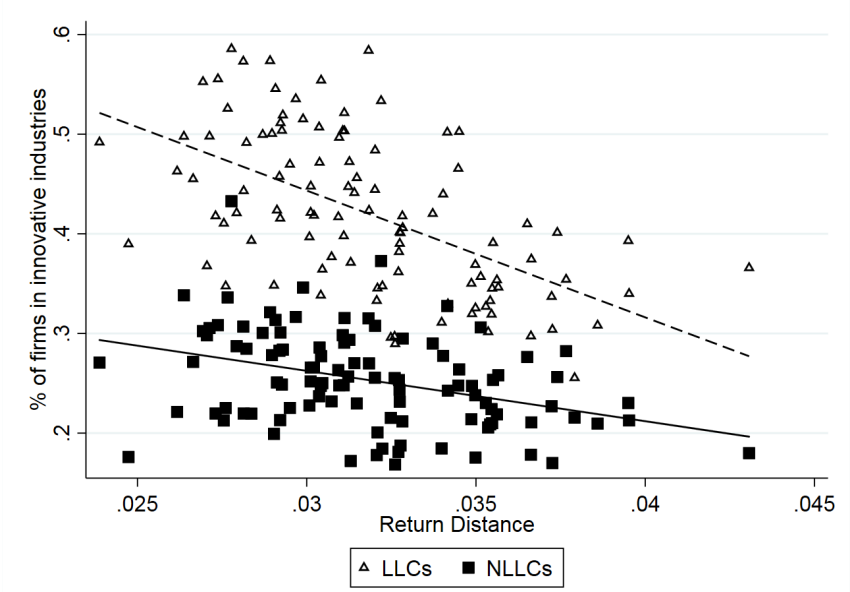
Map of Italian provinces, as per Figure B6, but where the ranking of provinces is done using regional median. Regional boundaries are outlined in black.

Figure B8: RETURN DISTANCE AND BANKS' CONDUCT



Scatter plot of the return distance against banks' conduct in Italian provinces in the period 2010-2012, as estimated by Coccorese (2008).

Figure B9: RETURN DISTANCE AND INNOVATIVE FIRMS



Correlation between return distance and percentage of total firms registered that operate in R&D-oriented industries. Provinces in which banks are more competitive tend to have higher share of firms in innovative industries. The negative correlation between innovation and banks' rent-extraction is stronger for limited liability companies than for non-limited liability ones.

B.2 Tables

Table B1: R&D-ORIENTED INDUSTRIES

Innovative and R&D-oriented Industries	*Two-Digits NACE Codes*
Manufacture of basic pharmaceutical products and pharmaceutical preparations	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

List of industries which are considered innovative or R&D-oriented, in order to match those most represented in the sample of start-ups taking up the program.

Table B2: SECTOR DISTRBUTION OF FIRMS

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%

Percentages of start-ups incorporated under the *SIA* policy in different sectors, compared to the sectors' distribution of all Italian firms.

Table B3: SOURCES OF FUNDING

Source of Funding	*N. of Operations*	*N. of Recipients*	*Total (mil.)*
Gurantee on Bank Loans	3,872	2,410	688.54
External Equity Financing	197	137	64.7

Numbers of deals, recipients and Euro values of founding for start-ups participating in the *SIA* program, by source.

Table B4: T-TESTS - 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 (Eur)	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

*p<0.10, **p<0.05, ***p<0.01

T-tests for differences between low-rent and high-rent provinces in several economic indicators 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-rent and high-rent categories using regional medians.

Table B5: T-TESTS - 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 Pct.	0.28*	0.52***	0.07
Banks - Foreign Pct.	2.09	3.46**	-0.77
Banks - Relationship Pct.	-11.99*	-16.84***	2.01
Branches - Relationship Pct.	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

*p<0.10, **p<0.05, ***p<0.01

T-tests for differences between low-rent and high-rent provinces in several banking-sector outcomes 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-rent and high-rent categories using regional medians.

Table B6: 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	0.0336
	(0.467)	(0.179)
Agr. share of workf. 1936	0.113	0.0733
	(0.182)	(0.0698)
Factory share of workf. 1936	0.0771	0.0737
	(0.221)	(0.0850)
Region V.A. per capita 1938	3.65e-05	1.07e-05
	(3.93e-05)	(1.51e-05)
Region V.A. per worker 1938	-9.76e-06	-5.51e-06
	(1.76e-05)	(6.76e-06)
Constant	-0.0324	-0.0947
	(0.201)	(0.0772)
Observations	104	104
R-squared	0.236	0.276
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

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.

Table B7: DIFFERENCE-IN-DIFFERENCES

	(1) LLC - New	(2) LLC - Pct.	(3) NLLC - Pct.
Policy × *Industry*	0.108***	0.00140***	-0.000177
	(0.0295)	(0.000463)	(0.000543)
Observations	134,784	120,332	112,722
R-squared	0.322	0.020	0.010
Quart. FE	YES	YES	YES
Ind. FE	YES	YES	YES
Prov. FE	YES	YES	YES
Clustered standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Estimates of the effect of the policy on incorporations of new firms in innovative industries, using a DID approach. Incorporations are expressed both in numbers and percentages of firms registered four quarters before. In column 3 the estimation is performed on NLLCs as a placebo test, since NLLCs are not included in the *SIA* policy.

Table B8: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - NATIONAL

	(1) LLC - New	(2) NLLC - New	(3) LLC - New	(4) NLLC - New	(5) LLC - Pct.
Rent × *Policy* × *Industry*	-0.132**	-0.0103	-0.262**	-0.0384	-0.00286*
	(0.0548)	(0.0176)	(0.118)	(0.0368)	(0.00149)
Observations	129,792	129,792	129,792	129,792	112,839
R-squared	0.897	0.869	0.913	0.893	0.443
Quart.*Prov. FE	YES	YES	YES	YES	YES
Quart.*Ind. FE	YES	YES	YES	YES	YES
Prov.*Ind. FE	YES	YES	YES	YES	YES
Quart*Prov.*Sect. FE	YES	YES	YES	YES	YES
Quart*Reg.*Ind. FE	NO	NO	YES	YES	YES

Clustered standard errors in parentheses
*p<.1; **p<.05; ***p<.01

Main DDD regression to estimate the causal effect of banks' rent-extraction on the effect of the policy, measured in terms of new incorporations in R&D-oriented sector. Incorporations are measured both in numbers (columns 1-4) and percentage of registered firms four quarters before (column 5). The dummy *Rent* is calculated using the median return distance at the national level. In addition to the baseline fixed-effects structure, columns 3-5 includes *Quarter* × *Region* × *Industry* fixed-effects. Columns 2 and 4 use as outcome variable incorporations of non-limited liability companies (NLLCs), that being excluded from the policy constitute a placebo test.

Table B9: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - REGIONAL

	(1) LLC - New	(2) NLLC - New	(3) LLC - Pct.	(4) NLLC - Pct.
$Rent_r \times Policy \times Industry$	-0.153***	-0.0274	-0.00208**	-0.00176
	(0.0500)	(0.0183)	(0.000953)	(0.00119)
Observations	129,792	129,792	112,839	104,994
R-squared	0.913	0.893	0.443	0.447
Quart.*Prov. FE	YES	YES	YES	YES
Quart.*Ind. FE	YES	YES	YES	YES
Prov.*Ind. FE	YES	YES	YES	YES
Quart*Prov.*Sect. FE	YES	YES	YES	YES
Quart*Reg.*Ind. FE	YES	YES	YES	YES

Clustered standard errors in parentheses
*p<.1; **p<.05; ***p<.01

DDD regression to estimate the causal effect of banks' rent-extraction on the effect of the policy, measured in terms of new incorporations in R&D-oriented sector. Incorporations are measured both in numbers (columns 1 and 2) and percentage of registered firms four quarters before (columns 3 and 4). The dummy *Rent* is calculated using the median return distance at the regional level. Columns 2 and 4 use as outcome variable incorporations of non-limited liability companies (NLLCs), that being excluded from the policy constitute a placebo test.

Table B10: INSTRUMENTAL VARIABLES - 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		-

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation of the effect of banks' rent-extraction 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 the number of new incorporations in innovative sectors using the difference-in-differences framework in Equation 2.26. For reference, column 7 collects estimate of the basic OLS regression of the policy's effects on the return distance.

Table B11: INSTRUMENTAL VARIABLES - 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		-

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation of the effect of banks' rent-extraction 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 percentages of firms registered four quarters before. To estimate the effect of *SIA*, I use the difference-in-differences framework in Equation 2.26. For reference, column 7 collects estimate of the basic OLS regression of the policy's effects on the return distance.

Table B12: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - SOUTH

	(1) LLC - New	(2) LLC - Pct.	(3) LLC - New	(4) LLC - Pct.
$Rent \times Policy \times Industry$			-0.157**	-0.00296**
			(0.0748)	(0.00144)
$South \times Policy \times Industry$	-0.0291	0.00224**	0.0504	0.00373**
	(0.0570)	(0.00108)	(0.0755)	(0.00147)
Observations	129,792	114,349	129,792	114,349
R-squared	0.897	0.296	0.897	0.297
Quart.*Prov. FE	YES	YES	YES	YES
Quart.*Ind. FE	YES	YES	YES	YES
Prov.*Ind. FE	YES	YES	YES	YES
Quart*Prov.*Sect. FE	YES	YES	YES	YES

Clustered standard errors in parentheses
*p<.1; **p<.05; ***p<.01

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 and 2) and as a control (columns 3 and 4). Outcome variables are new incorporations, expressed both in numbers (columns 1 and 3) and as percentage of registered firms four quarters before (columns 2 and 4).

Table B13: DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCES - WITHOUT FEs

	(1) LLC - New	(2) LLC - New Pct.	(3) LLC - New	(4) LLC - New Pct.
$Rent \times Policy \times Industry$	-0.125**	-0.00125		
	(0.0576)	(0.000916)		
$Rent_r \times Policy \times Industry$			-0.126**	-0.00180**
			(0.0550)	(0.000895)
$Rent \times Policy$	-0.0492	0.000111		
	(0.0486)	(0.000434)		
$Rent_r \times Policy$			-0.0932*	-0.000625
			(0.0479)	(0.000447)
$Rent \times Industry$	-0.326**	-0.000853		
	(0.147)	(0.000554)		
$Rent_r \times Industry$			-0.155	-0.000372
			(0.141)	(0.000583)
$Industry \times Policy$	0.170***	0.00203***	0.166***	0.00224***
	(0.0516)	(0.000695)	(0.0492)	(0.000682)
$Industry$	0.279*	0.00161***	0.188	0.00135***
	(0.142)	(0.000314)	(0.134)	(0.000277)
$Policy$	0.144***	0.000901***	0.162***	0.00124***
	(0.0346)	(0.000222)	(0.0333)	(0.000212)
$Rent$	-0.299*	-0.000861*		
	(0.151)	(0.000440)		
$Rent_r$			-0.169	0.000757
			(0.146)	(0.000458)
Constant	0.674***	0.00470***	0.603***	0.00392***
	(0.138)	(0.000193)	(0.129)	(0.000220)
Observations	134,784	120,332	134,784	120,332
R-squared	0.007	0.002	0.004	0.001

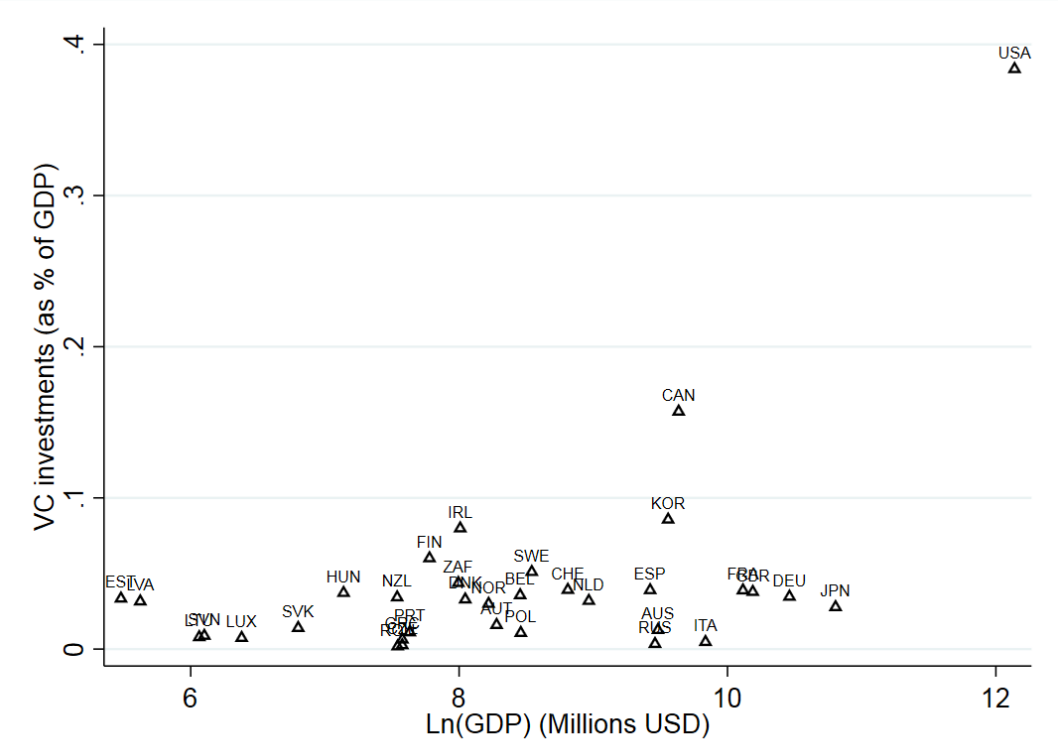
Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

DDD regressions estimated without the use of any fixed-effect, to asses the robustness of estimation to the fixed-effect structure considered.

C. Appendix to Liaisons Dangereuses - Relationship Banking and Venture Capital

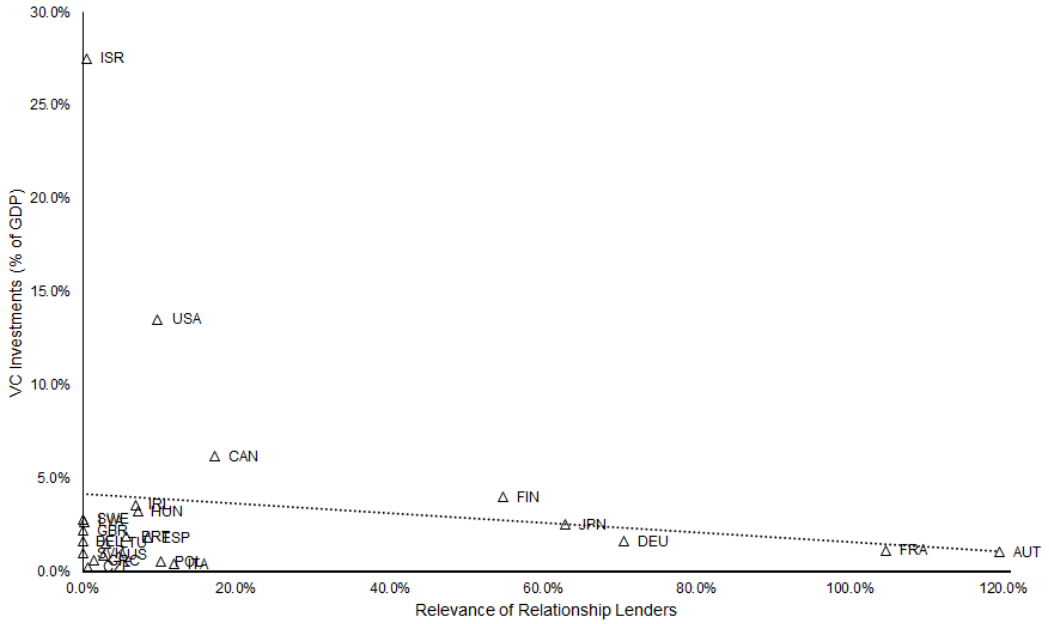
C.1 Figures

Figure C1: VC INVESTMENT AND GDP



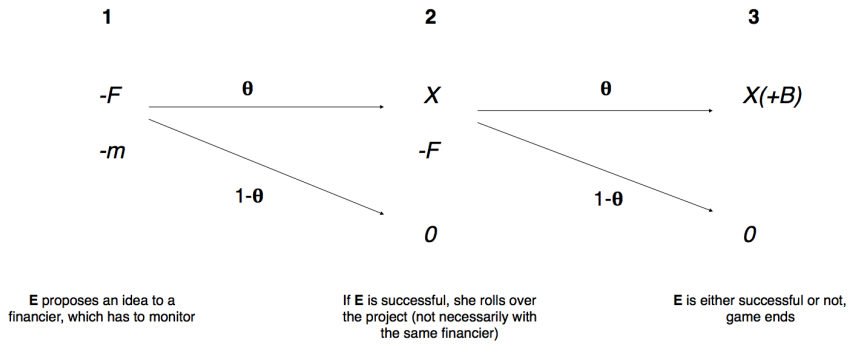
Scatter plot of VC investments as % of GDP and natural logarithm of GDP (in millions USD) among OECD countries. Data on VC investments and countries' GDP comes from the OECD data bank.

Figure C2: VC INVESTMENT AND RELATIONSHIP LENDING



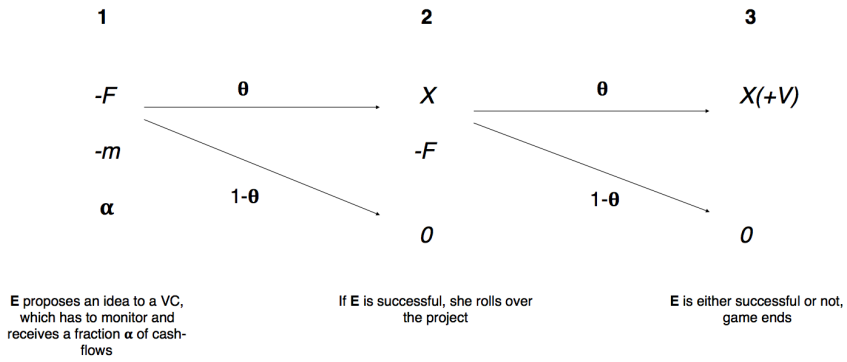
Scatter plot of VC investments as % of GDP and importance of relationship lenders in the banking market among OECD countries. The latter is calculated as the ratio of the sum of loans and deposits made by relationship lenders to the sum of loans and deposits made by non-relationship lenders. Data on VC investments comes from the OECD data bank, data on relationship lenders comes the IMF Finance Access Survey.

Figure C3: CASHFLOWS - BANK FINANCING



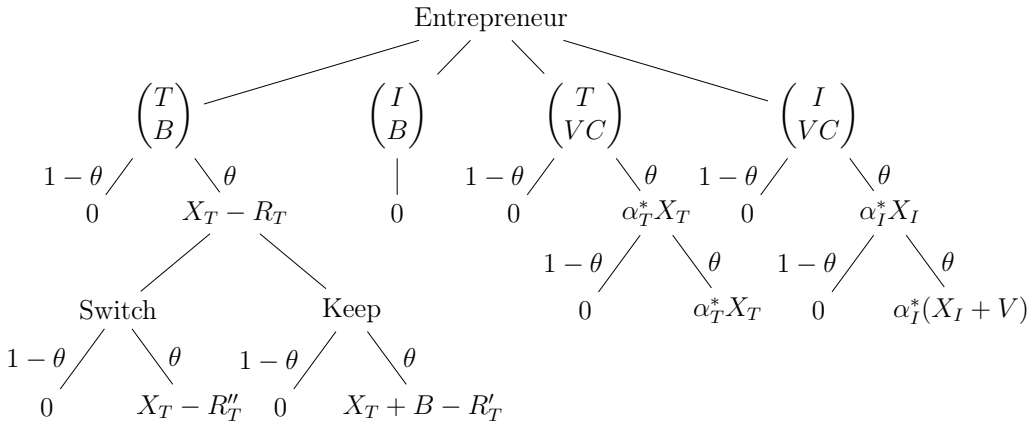
Cashflow profile and probabilities of success of the entrepreneur for a generic project under bank financing.

Figure C4: CASHFLOWS - VC FINANCING



Cashflow profile and probabilities of success of the entrepreneur for a generic project under VC financing.

Figure C5: DECISION TREE OF THE ENTREPRENEUR



Full tree of the model as a game. The tree represents the choices and pay-offs available to the entrepreneur, conditional on financiers best responses.