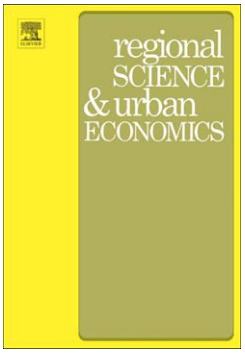
Local agglomeration, entrepreneurship and the 2008 recession: evidence from Italian industrial districts



Local agglomeration, entrepreneurship and the 2008 recession: Evidence from Italian industrial districts

Giorgio Brunello, Monica Langella

PII: S0166-0462(16)30003-5
DOI: doi: 10.1016/j.regsciurbeco.2016.03.004
Reference: REGEC 3173

To appear in: *Regional Science and Urban Economics*

Received date: 16 November 2015
Revised date: 1 March 2016
Accepted date: 15 March 2016

Please cite this article as: Brunello, Giorgio, Langella, Monica, Local agglomeration, entrepreneurship and the 2008 recession: Evidence from Italian industrial districts, *Regional Science and Urban Economics* (2016), doi: 10.1016/j.regsciurbeco.2016.03.004

Local Agglomeration, Entrepreneurship and the 2008 Recession: Evidence from Italian Industrial Districts

by

Giorgio Brunello[§] and Monica Langella[^]

Abstract

We investigate whether the impact of recessions on entrepreneurship is affected by the presence of industrial districts, a source of local agglomeration economies. Using Italian Labour Force quarterly data from 2006 to 2011 and a "difference-in-differences" approach, we show that the share of entrepreneurs in local labour markets where industrial districts are present has declined more than in comparable areas after the beginning of the 2008 recession. The estimated negative differential effect ranges between 4.8 and 7.9 percent in absolute value. We examine alternative explanations - including differences in industrial specialisation and composition, access to credit propensity, exports, population density and the composition of talents - and conclude that our result is consistent with the intense social interactions typical of industrial districts, acting as a multiplier that amplifies the response to shocks.

Acknowledgements: we are grateful to the Editor, two anonymous referees, Marco Bertoni, Fiorenza Belussi, Giulio Cainelli, Giovanni Costa, Arnaldo Camuffo, Roberto Grandinetti, Simona Iammarino, Neil Lee, Stefano Magrini, Josè Hervas Oliver, Silvia Sedita and especially Lorenzo Rocco and Olmo Silva for detailed comments. We also thank the audiences at seminars at the LSE (Economic Geography WiP), Mannheim (EEA), Ljubiana (EALE), Napoli (Brucchi Luchino) and Padova for suggestions. The estimates presented in the paper were carried out at the ADELE laboratory of the Italian Statistical Institute in Venice. The usual disclaimer applies.

Keywords: industrial districts, 2008 recession, agglomeration effects

JEL code:

[§]University of Padova, Cesifo, IZA and ROA; giorgio.brunello@unipd.it
^University of Verona, Department of Economics and Centre for Economic Performance, The London School of Economics and Political Science; m.langella@lse.ac.uk

Introduction

Economic recessions have ambiguous effects on entrepreneurship. On the one hand, they decrease potential business income and wealth, thereby reducing the incentive to start or stay in business. On the other hand, they restrict employment opportunities, and consequently increase inflows into self-employment as alternatives to inactivity and unemployment (see Fairlie, 2013). Do these effects vary with local economic conditions and in particular with the presence of agglomeration economies?

There is ample evidence that these economies affect economic activity and entrepreneurship, because of the presence of consumer/supplier linkages, entrepreneurial and knowledge spillovers and labour market pooling. Rosenthal and Strange, 2004, Glaeser, Rosenthal and Strange, 2010, Combes, Duranton and Gobillon, 2011, and Combes and Gobillon, 2015, review the effects of local agglomeration on economic performance.[1] Glaeser and Kerr, 2009, identify as drivers of the geographical concentration of entrepreneurs: (i) demographic differences such as education and age; (ii) differences in natural resources; (iii) agglomeration economies. Delgado, Porter and Stern, 2010, argue that the presence of a cluster of related industries in a location can foster entrepreneurship by lowering the cost of starting a business, enhancing opportunities for innovation and enabling better access to a more diverse range of inputs and complementary products. The co-location of companies, customers and suppliers also increases the perception of business opportunities (see Porter, 1998).[2]

Less is known, however, about the effects of agglomeration economies on how entrepreneurs react to recessions. Previous work by Guiso and Schivardi, 2007 sheds some light on the issue, but it focuses on employment rather than entrepreneurship. In this paper, we look at the 2008 recession and at industrial districts, a source of local industrial agglomeration characterised by the prevalence of small and medium sized enterprises operating in the manufacturing sector, strong product specialisation, proximity and substantial social interactions. Silicon Valley, Route 128, the so-called Third Italy (Bagnasco, 1977) and the City of London (Inkpen and Tsang, 2005) are well-known examples of this type of industrial agglomeration.

[1] Ciccone and Hall, 1996, are among the first to study the relationship between local density and productivity, showing that the former positively affects the latter. More recently, Delgado et al., 2014, report that the presence of regional clusters – groups of closely related and complementary industries operating within a particular region – has positive effects on regional economic performance.

[2] As argued by Minniti, 2005, everything else being the same, the larger the number of entrepreneurs that the potential entrepreneur observes in the local area, the lower the ambiguity she experiences. By observing others, she acquires information and skills. Throughout this process her social environment becomes important, and her participation in a broadly defined network helps her to define the contour of the set of her entrepreneurial tasks. The existence of a significant number of entrepreneurs also legitimizes her activity and enables her to exploit a number of established routines. Areas with a higher density of entrepreneurs have a stronger entrepreneurial culture, which encourages entry.

Previous literature indicates several factors as candidates to explain why the effects of a recession on entrepreneurship could vary across areas that differ in their degree of agglomeration, some insulating local entrepreneurs, and some others favouring the propagation of the crisis. On the one hand, as remarked by Guiso and Schivardi, 2007, the intense social interactions within entrepreneurs that characterise industrial districts are likely to amplify the responses to shocks, because of the *social multiplier* and of information spillovers (see also Glaeser et al, 2003). Alternatively, higher local agglomeration may favour the entry of entrepreneurs by developing a culture of risk taking and reinforcing social models that individuals imitate. When the tide raises all boats, increasingly less talented individuals may be attracted into entrepreneurship. When a recession hits, these individuals are more likely to be swept away.

On the other hand, the presence of industrial agglomerations may reduce the costs of being an entrepreneur, and build a safety net of reciprocal support, thereby sustaining the ability to survive during a global recession. The literature on social capital suggests that industrial clusters are areas where the level of trust among people is higher (Putnam, 2000).[3] This may not only facilitate the access to credit (Guiso, Sapienza and Zingales, 2004b), but also improve the economic performance of local banks and facilitate access to credit, with positive effects on entrepreneurship when the local economy is in dire straits.

In our empirical investigation, we match micro data from Northern and Central Italy, where industrial districts are particularly widespread (Porter, 1998), with local labour market indicators. We use quarterly data from the Italian Labour Force Survey from 2006 to 2011 and a "difference-in-differences" approach (DiD) to compare the evolution of the share of entrepreneurs before and after the 2008 recession in two groups of areas, industrial districts (ID) and other comparable local labour markets (OLM). Local labour markets, as defined by the 2001 Italian Census, are travel to work areas and IDs are a subset of these areas characterised by strong product specialisation and firm size homogeneity.[4]

We focus on men aged 35 to 55 working in the Northern and Central areas of Italy, the bulk of Italian entrepreneurship. Our estimates show that the share of entrepreneurs has declined to a larger extent after the 2008 recession in areas with industrial districts than in comparable areas. Measured in terms of the pre-treatment average share, the estimated differential effect ranges between 4.8 and 7.9 percent (in absolute value), depending on the estimation method and on the definition of entrepreneur being used. There is also

[3] Social capital is the set of norms and values that creates the fabric of the society, glues individuals and institutions together and constitutes a necessary link for its governance (Soubeyran and Weber, 2002). Economic research investigating how social capital affects local economies includes Guiso et al., 2004b, who show that the heterogeneity of social capital across Italy explains the heterogeneity of financial development. Trigilia, 2001, and McEvily and Zaheer, 1999, find that industrial districts exhibit high levels of social capital, mutual trust and cooperation, and Molina-Morales and Martinez-Fernandez, 2010, argue that social capital is likely to affect the propensity of firms to innovate, and that firms in industrial districts are exposed to ties and links which are favourable to innovation.

[4] A travel to work area is a group of municipalities where at least 75% of the resident economically active population works. According to the 2001 Census, Italy has 686 local labour markets, 156 of them classified as industrial districts.

evidence that this effect is larger among entrepreneurs with longer tenure in their job.

After ruling out as alternative explanations of our findings the differences across treated and control areas in industrial specialisation and composition, the propensity to export, access to credit, population density and the composition of talents, we conclude that our results are consistent with the presence of social multiplier effects, as described by Guiso and Schivardi, 2007. In models where such effects are present, agents face a common problem in an uncertain environment and each agent has a piece of private information, which can be inferred from the actions of other agents. The possibility of observing the behaviour of others provides an incentive to delay adjustments in order to gather more information. Once someone acts, the information revealed could trigger further actions, and start a self-reinforcing process that prompts many agents to undertake the adjustment within a short time span. We believe that the intense social interactions typical of industrial districts facilitate information flows, thereby amplifying the effects of a shock in closely connected economies.

While entrepreneurship has declined more in ID than in comparable areas as a consequence of the economic recession, employment has increased relatively more. We also show that annual average flows from entrepreneurship to employment have increased after the start of recession in ID areas, and declined in other areas, with the bulk of the increase in the former areas occurring within the same industrial sector. We interpret this as a typical labour pooling effect, indicating that the web of inter-personal relationships that characterises the thick labour markets of industrial districts have facilitated the flow of workers across firms, and in particular the transitions from entrepreneurship to employment.

According to the cleansing hypothesis, recessions are times of accelerated productivity - enhancing reallocation (see Foster, Grim and Haltiwanger, 2014). Our findings on the responses of different local labour markets to the 2008 recession suggest that, by facilitating exit from entrepreneurship and promoting labour reallocation, industrial districts may have fostered local productivity.[5] They also indicate that entrepreneurship is more responsive to the business cycle in industrial districts than in comparable areas. If this is the case, we might expect that, in the event of an economic expansion, the share of entrepreneurs will increase faster in the former areas.

The paper is organized as follows. In Sections 1 and 2 we define industrial districts and present the data. The empirical strategy is described in Section 3 and results are presented and discussed in Section 4. Conclusions and an Appendix follow.

[5] The response to the economic recession may differ, however, from the response to long-term globalization shocks. Di Giacinto et al, 2013, investigate the patterns of productivity during the period 1996-2005 in Italian urban areas, industrial districts and other local areas, and conclude that firms operating in urban areas have shown a higher degree of resilience to globalization than firms operating in districts.

1. The Definition of Industrial Districts

According to Porter, 2000, industrial districts, or clusters, are "…geographical concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and institutions […] in a particular field that compete, but also cooperate". As pointed out by Soubeyran and Weber, 2002, districts are much more than a cluster of production factors. Firms in the district are connected by dense networks of social, institutional, cultural and technical links that lead to the creation of social capital. The network ties between members of an industrial district are often established as a result of interpersonal relationships developed from informal social gatherings and meetings (Inkpen and Tsang, 2005).

The traditional social capital perspective (Coleman, 1988) stresses the positive effects of a dense structure, since it generates social norms and sanctions that promote trust and cooperative exchange. The strong ties perspective suggests the industrial districts have two main advantages. First, strong ties are associated with the exchange of high quality information and tacit knowledge. Second, they also serve as a control mechanism for governing relationships among partners. As pointed out by Molina-Morales and Martinez-Fernandez, 2009, the characteristics of these networks are ideal for 'exploiting' the opportunities that already exist by sharing information and knowledge in co-operative exchanges.

As in Di Giacinto et al, 2013, we allocate local labour markets to areas with and without industrial districts using the 2001 Italian Census classification, which identifies 156 industrial districts in a set of 686 local labour markets. Since this allocation is based on the 2001 Census, well before the period under study, covering the years from 2006 to 2011, we can safely treat it as exogeneous with respect to the 2008 recession. In the Census, industrial districts are local labour markets that satisfy the following criteria:

a) specialisation in the manufacturing sector, i.e. $l_a = \frac{x_{am}/x_a}{x_m/x} > 1$, where x_{am} and x_a denote the number of manufacturing employees and total employment in area *a*, and $x_{.m}$ and x are the corresponding figures at the national level;

b) relative high share of small and medium firms, or $s_a = \frac{x_{am}^{small}/x_{am}}{x_{.m}^{small}/x_{.m}} > 1$, where the superscript "small" indicates the number of employees in small and medium-sized enterprises;

c) presence of a dominant manufacturing industry. Letting $l_{as} = \frac{x_{as}/x_{am}}{x_{.s}/x_{.m}}$ denote the location quotient for each specific manufacturing industry *s*, the dominant manufacturing industry d is such that $l_{ad} > 1$ and the level of employment is maximum among the local specialized industries. For *d*, the following condition

must hold: $s_{ad} = \frac{x_{ad}^{small}}{x_{ad}} > 0.5$;

d) where there is only one medium-sized enterprise, the share of employment in small enterprises must exceed half that of the medium-sized firm.

In words, industrial districts are local labour markets where small and medium firms have a significant employment share both in manufacturing as a whole and in the sector of specialization. Figure 1 shows the map of industrial districts in Italy. These agglomerations are virtually absent in the South and tend to concentrate in Lombardy and Veneto in the North, and in Tuscany and Marche in the Centre. Notice that condition a) nearly automatically rules out the possibility that urban areas fall under the definition of industrial districts, since the former are usually characterised by an extensive presence of services.

According to the 2001 Census, the dominant manufacturing industry in industrial districts was textiles and apparel (45 out of 156 districts, or 28.9%), machinery and equipment (38 districts, or 24.3%), furniture and house goods (32 districts, or 20.5%), leather and related products (20 districts, or 12.8%), food products (7 districts, or 4.5%) and other products (14 districts, or 9%). Districts are dominated by very small firms: on average, close to 93 percent of all production units have less than 10 employees. These firms cover about 47 percent of total employment in the local labour market. Their average number in 2001 was 6,993 per industrial district, compared to 6,195 in OLMs.

Di Giacinto et al, 2013, compare industrial districts with urban areas and other local labour markets using several indicators, including local human and social capital, average plant size and the relative weight of manufacturing. As shown in Table 1, which we take from the online Appendix of their paper, industrial districts stand out for their share of employment in manufacturing, for their higher specialisation in a specific manufacturing sector and for a measure of social capital – civic-ness, obtained as the percentage of voters in the 2001 political elections. Compared to urban areas, they have lower population density, lower human capital, as measured by average years of schooling, and lower average plant size.

2. The Data

Our data are drawn from the Italian Labour Force Survey, a quarterly survey on labour market conditions covering a representative sample of almost 77,000 households and 175,000 individuals per quarter. We have access to the micro data from the first quarter of 2006 to the last quarter of 2011, about three years before and after the start of the Great Recession, which is usually placed in the third quarter of

2008.[6]

Using the available information on the place of residence, we assign individuals to local labour markets.[7] In line with the existing literature, we define as *entrepreneurs* the individuals who work in their own business or professional practice for the purpose of earning a profit, with or without employees. As discussed by Faggio and Silva, 2014,[8] the empirical literature tends to identify entrepreneurship with self-employment. Yet the two measures are hardly equivalent, for instance because some self-employment spells are originated by the lack of alternative employment opportunities, especially during recessions. These spells do not square well with the classical view of entrepreneurs as talented individuals who can obtain a higher total factor productivity if they start a business (Lucas, 1978).

In this paper, we treat as entrepreneurs the individuals who meet all the following criteria: (i) self-employment status; (ii) decide their working time; (iii) work more than 480 hours per year; (iv) neither work exclusively on the customer's premises nor are employed by a temporary agency; (v) operate as managers, professionals, or in other skilled jobs. Criteria (ii) to (iv) exclude those who report self-employment status but are working as employees. Criterion (v) is used also by Faggio and Silva, 2014, and allows us to exclude the bulk of self-employed who have selected this status because alternative employment opportunities are not available.[9]

We further classify entrepreneurs in two groups, depending on whether they have employees or not. We present our key results both for all entrepreneurs and for entrepreneurs with employees, but for the sake of brevity we limit the presentation of our sensitivity analysis to the former (broader) group. We retain only males aged 35 to 55 who are employed, self-employed, unemployed or inactive at the time of the interview, and exclude those working in the public sector. We exclude females because of their low labour force participation, individuals younger than 35 because in several local labour markets there are few entrepreneurs in this age group, and workers older than 55 because of their attrition into retirement.[10] Finally, we exclude Southern Italy because of its structural economic difference with the rest of the country.

We compare how entrepreneurship responds to a recession in ID and OLM areas using a "difference-in-differences" approach. The main identifying assumption in our setup is that entrepreneurship in the two

[6] In the Labour Force Survey, sampled households are interviewed for two consecutive quarters, excluded from the interview in the next two quarters, and re-interviewed again for two additional quarters. In this paper, we use the longitudinal dimension of the dataset only to compute year-to-year labour market flows.
[7] By definition of travel to work area, place of residence and place of work coincide for the large majority of individuals.
[8] See also Glaeser and Kerr, 2009.
[9] As discussed below, using a broader definition (self-employment status) does not affect qualitatively our empirical results.
[10] The average share of entrepreneurs with employees in 2006 was 11.5 percent for individuals aged 35 to 55, 6.4 for those aged 30 to 34 and 3.1 percent for individuals aged 25 to 29.

groups of areas would have developed in a parallel fashion had they not been hit by the recession. The difficulty of this exercise is that areas differ in several dimensions other than the presence of districts. To enhance comparability, we proceed as follows: first, we exclude metropolitan areas, which are clearly different from the rest of the sample, as shown by Di Giacinto et al, 2013; second, we use a propensity score specification to define the common support for the treatment and control group and exclude from the estimation sample the local labour markets lying outside this support. This procedure is discussed in more detail in the next section. Since the Labour Force Survey randomly selects a sample of municipalities, we can only identify 540 local labour markets in the data, out of a total of 686. The elimination of Southern Italy, of large urban areas,[11] and of the areas outside the common support further reduces the sample to 247 local labour markets, 98 with industrial districts and 149 without districts.

Table 2 shows the share of all entrepreneurs and of entrepreneurs with employees before and after the 2008 recession in the treated and control areas. These shares are computed using as denominator the sum of the self-employed, the employed in the private sector and the unemployed or inactive in the final sample, after conditioning on the common support. During the three years after the recession, the share of male entrepreneurs showed a 4.2 percentage points decline (from 22.6 to 18.4 percent) in areas with industrial districts and a 3.4 percentage points decline (from 22.7 to 19.3) in comparable areas. In the case of entrepreneurs with employees, the share declined from 11.5 to 9.8 percent in industrial districts and from 11.1 to 10.1 in comparable local labour markets.

Figure 2 shows the hump – shaped distribution of the share of entrepreneurs by age before the recession[12]. The peak close to age 45 is not surprising. On the one hand, senior males have accumulated the relevant human capital and the experience required to start a business, in other terms they have higher entrepreneurial ability. On the other hand, they are likely to have higher access to the financial resources required to set up a business venture. The figure also shows that the share of all entrepreneurs is slightly higher in control areas until the mid-forties, and significantly higher in areas with industrial districts among individuals aged 50 plus. When we restrict our attention to entrepreneurs with employees, we find that their share is always higher, or at least as high as, in areas with industrial districts than in comparable areas.

Figure 3 illustrates how the raw share of entrepreneurs has changed in treated and control areas during the period 2006-2011, before and after the 2008 recession. The panel to the left refers to all entrepreneurs, with and without employees, and the panel to the right focuses on entrepreneurs with employees. In both panels, we also show the 95 percent confidence intervals. The figure shows that – for both groups of entrepreneurs - pre-recession trends are not statistically different across treated and control areas, which

[11] We exclude the urban areas of Turin, Milan, Venice, Genoa, Bologna, Florence and Rome.
[12] We use the years 2006 and 2007.

supports our "difference-in-differences" strategy.[13] Before the recession, the share of entrepreneurs with and without employees was very similar in both areas. After the recession, it remained more or less stable in control areas and declined in treated areas. Because of this, a statistically significant gap between the two shares emerged in 2010 and early 2011. On the other hand, the share of entrepreneurs with employees was higher in treated than in control areas before the recession, but lower after the recession, because of the sharper fall of the share in treated areas. The difference in the raw shares, however, is never statistically significant.

3. The Empirical Model

As discussed in the introduction, the effects of a recession can differ across areas that vary in their degree of agglomeration, with some factors insulating local entrepreneurs, and some others favouring the propagation of the crisis. In the ensuing empirical analysis, we compare the evolution of the share of entrepreneurs before and after the 2008 recession in areas with and without industrial districts. We estimate the following equation

$$E_{iat} = \beta_0 + \beta_1 Post2008.Q3_t * ID_{ia} + \beta_2 X_{it} + \phi_t + \lambda_a + u_{iat} \qquad (1)$$

where E_{iat} is a dummy equal to one if individual *i* in area *a* at time *t* is an entrepreneur (with or without employees) and to zero otherwise (private sector employment, unemployment or inactivity), ID_{ia} is the treatment dummy, that identifies the presence of industrial clusters in the area, $Post2008.Q3_t$ is a dummy taking value one since the beginning of the 2008 recession, which we set in the fourth quarter of 2008 (see D'Amuri, 2010), and zero otherwise, X_{it} is a vector of covariates, which includes individual variables (age, education, marital status, the presence of children in the household and nationality)[14], and ϕ_t and λ_a are period (year by quarter) and area fixed effects respectively.

We estimate (1) using both a linear probability and a probit specification. Since neighbouring areas share a similar institutional setup, assuming that errors are independent across local labour markets is overly restrictive. Therefore, we cluster standard errors at the level of the province.[15] The key parameter in this

[13] Formal tests of the hypothesis that pre-treatment tests are parallel are discussed below.
[14] We have also experimented with richer specifications that include the log of regional real GDP in manufacturing and services, the log of regional exports, and the local unemployment rate, with no qualitative change of results.
[15] We have 68 clusters, well above the minimum level indicated by Angrist and Pischke, 2009.

regression is β_1, which measures the differential effect of the recession in treated and control areas. As mentioned above, a difficulty of this empirical analysis is that geographical areas may not be completely comparable, due to intrinsic differences not fully captured by the degree of agglomeration measured by the dummy *ID*. To increase the comparability between treatment and control areas, we exploit matching techniques and drop areas falling outside the propensity score common support.

We proceed as follows. First, we estimate a probit model on our sample of local labour markets during the pre-treatment period, that goes from the first quarter of 2006 to the third quarter of 2008, using as dependent variable the dummy *ID* and as control variables log regional real exports and GDP, the local unemployment rate, the index SP of industrial specialisation, computed as $SP_{cs} = \frac{L_{cs}}{L_c}$, where L_{cs} is the sum of employees and self-employed workers in local area *c* and sector *s*, and L_c is the total number of workers in the area (Cingano and Schivardi, 2004), the prevailing industrial sector, population density, dummies for the macro area (North-West, North-East or Centre) and period dummies. Second, we compute the propensity score,[16] the distribution of which is shown in Figure 4, and eliminate from our sample the 13 local labour markets with a propensity score falling outside the intersection of the support for the treated and the control group (Sianesi, 2005). These areas are not comparable to the rest in terms of the selected vector of observables.

We find that the average difference in the observables between treated and control areas after restricting the sample to the common support is reduced. Still, as reported in Table 3, important differences remain. For example, the local unemployment rate is 2.8 percent in treatment areas and 3.2 percent in control areas (t-test of the absolute difference: 1.57);[17] regional real exports are higher on average in the areas with industrial districts (t-test of the absolute difference: 2.81); the percentage of individuals with a college degree is 7 and 9 percent in the treated and control areas respectively (t-test of the absolute difference: 2.85); population density (inhabitants per 100 km^2) is significantly higher in treated areas (230.2 inhabitants per squared kilometre versus 140.5 in control areas – t-test of the absolute difference: 2.24), and the index of economic specialisation is 0.24, not statistically different in the two groups (t-test of the absolute difference: 0.42). We control for these differences by including the variables in the table in the vector X.

Our identification assumption is

$$E[u_{i1} - u_{i0} \mid ID = 1, X] = E[u_{i1} - u_{i0} \mid ID = 0, X] \qquad (2)$$

[16] The propensity score is defined as $e(x) = \text{Prob}(ID = 1 \mid X = x)$, the probability of being treated conditional on observables X.

[17] The low rate might seem surprising. Notice however that unemployment in Italy is highest among those living in the South, who are excluded from our sample.

where the index "1" is for the post-recession and "0" is for the pre-recession period, implying that selection on untreated outcomes is ruled out in first differences and after conditioning on the vector X (Blundell and Costa Dias, 2009).

4. Results

"Difference-in-differences" estimates identify the effect of the treatment if pre-treatment trends in the treated and control group are parallel. To test whether this is the case, we consider the pre-treatment period, regress entrepreneurship on the vector of controls *X*, area fixed effects, a quadratic trend and the interactions of the trend with the treatment dummy, and test whether these interactions are jointly equal to zero, as they should be in the case of parallel trends. In support to our empirical strategy, we never reject the null, as the p-values of the tests are equal to 0.37 for all entrepreneurs and to 0.23 for entrepreneurs with employees respectively.

We also apply Autor's procedure (Autor, 2003), which consists of adding to Eq.(1) *m* leads and *q* lags of the treatment effect. Let γ_j be the coefficient on the *j*th lead or lag. A test of the "difference-in-differences" assumption is $\gamma_j = 0, \ \forall j < 0$, i.e. the coefficients on all leads of the treatment should be zero.

We use as leads all the quarters from the second quarter of 2006 to the second quarter of 2008, and never reject the null that they are not statistically different from zero at the 5 percent level of confidence.[18] We take this as further evidence that pre-treatment trends are parallel.

Table 4 presents our baseline results, which we organise in six columns. We report the linear probability estimates based on individual data and the probit marginal effects (evaluated at sample means) in columns (1) and (2) for all entrepreneurs, and in columns (4) and (5) for entrepreneurs with employees. Columns (3) and (6) show instead for the two groups the OLS estimates using data aggregated at the local labour market level. We find that entrepreneurship is higher for natives, for those who are married and for the better educated. There is also evidence that it increases with age and the presence of children, although this is not the case when we use grouped data.

We estimate that the differential effect of the recession on entrepreneurship in treated areas relative to control areas - β_1 in Eq. (1) – is negative and statistically significant at conventional levels. For all

[18] For the case of entrepreneurs with and without employees, the t-tests (in absolute value) of the relevant leads are: 0.62 (2006.Q2), 0.55 (2006.Q3), 0.92 (2006.Q4), 0.95 (2007.Q1), 1.14 (2007.Q2), 0.65 (2007.Q3), 0.42 (2007.Q4), 0.50 (2008.Q1) and 0.07 (2008.Q2).

entrepreneurs, and evaluating percent chances at the pre-treatment sample mean,[19] we estimate that the probability of being an entrepreneur after the recession is between 4.85 (0.011/0.227) and 5.73 (0.013/0.227) percent lower in the areas with industrial districts than in comparable areas. For entrepreneurs with employees, the gap is larger and ranges between 7.08 and 7.96 percent. These findings - that vary only marginally with the level of aggregation of our data - point out that the share of entrepreneurs in industrial districts has suffered more than in comparable areas because of the recession.

Using the broader sample of entrepreneurs with and without employees, we also run separate regressions by the length of tenure in the job, distinguishing between those with less than 10 years and those with at least 10 years of tenure, and find no statistically significant differential effect in treated areas for the sub-group of entrepreneurs with less than 10 years of tenure and a negative and statistically significant effect for the sub-group with at least ten years of tenure (see Table 5).[20]

How do we explain that entrepreneurship has declined more after the recession in areas with industrial districts than in comparable areas? The literature suggests as a candidate the higher level of production specialisation typical of industrial clusters. Glaeser et al, 1992, for instance, find that industries grow slower in places where they are over-represented. There is also some evidence that specialisation accelerates firm exit.[21] We believe that there are two reasons to exclude specialisation as the explanation of our findings: first, we detect no difference in the level of specialisation between treated and control areas (see Table 3). Second, we re-define the common support by excluding the specialisation index from the set of covariates determining the propensity score and add as additional regressor in the linear probability specification of Equation (1) the interaction between *Post2008.Q3* and a dummy variable equal to one for individuals living in local labour markets with a specialisation index above its median value before the recession, and to zero otherwise. If specialisation was the story driving our results, we should find that the coefficient of this additional interaction is negative and statistically significant, and that the coefficient associated to the interaction *Post2008.Q3*ID* becomes statistically not significant. However, as shown in the first column of Table 6, our results are virtually unaffected.

Alternatively, our findings could be driven by the fact that industrial districts concentrate in specific production sectors, which may have been hit especially hard by the recession. As shown above, the main sectors that characterise industrial districts are: textiles and apparel, furniture and house goods, leather and

[19] This mean is equal to 0.227 for all entrepreneurs and to 0.113 for entrepreneurs with employees.

[20] However, since the estimate of the key coefficient in the sub-sample with less than 10 years of tenure is rather imprecise, we cannot reject the null hypothesis that the estimated DiD effect is the same across tenure groups.

[21] Staber, 2001, finds that belonging to a specialized industrial district in Germany reduces firm survival. See also the discussion in Antonietti et al, 2013. On the other hand, Delgado et al., 2010, find that, after netting out the convergence dynamics across areas, the presence of industrial clusters accelerates the growth of newly established firms and their performances.

related products, machinery and equipment and food products. To verify this hypothesis, we apply the same procedure used for the specialisation index, adding to the baseline regression the interaction between the recession dummy and a dummy equal to one for local labour markets where the sectors above have an important share of total employment, and to zero otherwise. Again, our results are qualitatively unchanged (Table 6, column 2), although the relevant coefficient becomes larger in absolute value.[22]

Using employment data for the period 2008-2009, we also select the sectors that experienced declines in employment higher than the median. These are: mining, utilities, retail and wholesale trade, transportation equipment, rubber and plastic products, textiles and apparel, furniture and house goods and machinery and equipment. We interact the recession dummy with a dummy equal to one for local labour markets where these sectors are important, and to zero otherwise. As reported in column (3) of Table 6, adding this interaction does not alter the estimated "difference-in-differences" effect.

The differential effect of the recession in areas with industrial districts could also be driven by the fact that firms in these areas have a higher propensity to export than firms in other areas, and therefore have been more exposed to the contraction of international demand. To illustrate, consider the four regions where industrial districts are more widespread (Lombardy, Veneto, Tuscany and Marche) and the four regions where they are less present (Liguria, Trentino, Umbria and Lazio). If we compare real GDP growth between 2007 (before the recession) and 2009 (after the recession) in the two groups of regions, we find that real GDP in manufacturing declined by 17.8% in the former group and by 19.1% in the latter group. Services were less affected, with a decline equal to 5.0% and 6.1% respectively. These differences are small when compared with the performance of real exports, which plummeted during the same period by 20.1% in the regions where industrial districts prevail and by 9.0% in the other regions. We verify whether our findings are driven by different propensities to export by including real regional exports in our regression. If our results were driven by exports, this inclusion should affect in a significant way the estimate of β_1. Yet column (4) in Table 6 shows that this is not the case.[23]

Following Guiso et al, 2004a, our results could also be driven by differences in the access to credit across local labour markets rather than by the presence of industrial districts. To address this possibility, we collect two measures of local credit accessibility for the pre-treatment period: a) the local number of bank

[22] The number of observations in Table 4, column (1), and Table 6 may differ because of differences in the common support identified by the propensity score.

[23] As in the previous experiments, as a preliminary step we re-define the common support by excluding exports from the vector of covariates defining the propensity score. We have also experimented with real 2007 exports per local inhabitant rather than log real exports, with no qualitative change. Results are available from the authors upon request.

branches per thousand inhabitants; b) the local loan – deposit ratio.[24] For each variable we construct a dummy variable equal to one for values above the median and to zero otherwise, and interact these dummies with the recession dummy *Post2008.3* in Eq. (1). If access to credit was driving the uncovered differences, we should find that adding these interactions significantly reduces or even eliminates the differential effect associated to the presence of industrial districts. However, as shown in Table 6, column (5), this addition leaves our estimates broadly unaffected. We therefore rule out this explanation.

Furthermore, we investigate whether our estimated effects are due to differences in population density by proceeding as in the previous cases. First, we re-do our sample selection by excluding density from the probit equation defining the propensity score. Second, we add to Eq. (1) the interaction between the recession dummy *Post2008.Q3* and a dummy equal to one for the local labour markets where population density before the treatment was above the median, and to zero otherwise. As shown in Table 6, column (6), adding this interaction has virtually no effect on our estimates of coefficient β_1. Thus, differences in population density do not explain our results.

A key difference between population density and industrial clusters as measures of local agglomeration is that the second emphasizes production similarity as well as proximity. As remarked by Guiso and Schivardi, 2007, industrial districts are characterised by a high concentration of similar, supposedly connected firms, where social interaction is particularly intense. Several authors have also emphasized that districts have higher social capital and stronger interpersonal ties than comparable areas. Both production similarity and stronger social ties facilitate information flows between network members and accelerate learning. Intense interaction gives rise to amplified responses to shocks, because "..the initial impulse is magnified by the response of the other members of the reference group". (p.70). In their own study of Italian industrial districts, the authors find that firms in these areas "..should display a lower sensitivity to aggregate shocks in non-adjustment years and a higher sensitivity in adjustment years, because those should be the years in which the response to shocks is amplified by information flows.." (p.88). Our results are consistent with Guiso and Schivardi, 2007, inasmuch as we interpret the years after the 2008 recession as adjustment years.

Another candidate explanation of our results is that in areas with industrial districts the higher density of entrepreneurs[25] and the stronger entrepreneurial culture may attract into entrepreneurship relatively less talented individuals. In other areas, these individuals typically work as employees. When a recession hits,

[24] Measures (a) and (b) are calculated for the time interval 2004-2005 using municipal data (source: Banca d'Italia), which we aggregate at the local labour market level.

[25] In 2006 the number of entrepreneurs (with and without employees) per squared kilometre was 8.93 in district areas and 5.36 in other areas.

less talented entrepreneurs in industrial districts lose or leave their business (turning perhaps into employees), with larger negative effects on the overall share of entrepreneurs. This explanation, however, requires that a recession in treated areas affects negatively mainly those with lower tenure, which is not consistent with our findings in Table 5. These findings hint instead to the possibility that longer experience improves the ability to interpret and handle relevant information, and by so doing increases social multiplier effects.

In the thick labour markets that characterise industrial districts, the amplified response of entrepreneurs to negative economic shocks may also affect private employment as well as the transitions from entrepreneurship to employment, for instance because entrepreneurs closing their business in these areas find more easily a new job – as employees - in another firm in the same manufacturing industry, that demands the same industry – specific skills and is part of a common web of inter-personal relationships. The relevant literature defines this as a labour pooling effect.[26]

We explore this possibility by looking at the effect of the economic recession on private sector employment and on the transitions into and from entrepreneurship in ID and OLM areas. Table 7 presents our estimates of equation (1) when the dependent variable is private employment, showing that the estimated value of β_1 is positive and statistically significant at the 10 percent level of confidence – see column (1).[27] Table 8 presents instead the year-to-year flows from entrepreneurship to private employment and vice-versa.[28] On the one hand, we find that inflow rates from employment into entrepreneurship have declined both in industrial districts and in other areas, with a sharper effect in the former (from 1.43 to 0.93 percent) than in the latter (from 1.05 to 0.76 percent). On the other hand, the outflow rates from entrepreneurship into employment have increased in areas with industrial districts (from 1.26 to 1.95 percent), and decreased in other OLM areas (from 1.61 to 0.81 percent).[29] This is consistent with the positive differential effect of the recession on employment in industrial districts.

We also find that in industrial districts, the increase in the flows from entrepreneurship to employment after the crisis is driven mainly by flows within the same industrial sector (from 0.65 to 1.29 percent), contrary to other areas, where these flows have declined (from 0.71 to 0.36 percent), suggesting that the agglomeration of firms in a dominant manufacturing industry – a typical feature of industrial districts – creates a pooled market for specialized workers and entrepreneurs with industry – specific skills, which

[26] Labour pooling as a feature of Italian industrial districts has been investigated by Di Addario, 2011, who finds that living in an ID area increases the probability of finding a job, and by Andini, De Blasio, Duranton and Strange, 2012, who conclude that labour pooling and ID are broadly unrelated.

[27] The estimated differential effect for the inactive (column (2) of the table) is very small and imprecisely estimated.

[28] These rates are computed by dividing the flows by the state variable in the previous year.

[29] At the same time, outflows from entrepreneurship to inactivity have declined in industrial districts (from 1.42 to 1.35 percent) and increased in other areas (from 0.98 to 1.14 percent).

facilitates mobility within the same industry.[30]

Since sectors within the same industrial district are often connected by input-output linkages, these relations could facilitate labour market flows from entrepreneurship to employment during a recession. To investigate this, we select for each district its dominant two-digit industry and use the national 2008 input – output tables to identify the industries that are most connected to the dominant one because of purchases or sales of intermediate products. For instance, firms in districts where the main industry is the manufacture of machinery and equipment are mainly connected to firms that manufacture vehicles and to building firms.[31] We re-compute the flows from entrepreneurship to employment within the same sector by using a broader definition of the receiving sector, which encompasses the most connected sectors as well.[32] If input-output linkages improved the reallocation of labour within an industrial district, we should find that these flows increase. Yet, we observe very little changes with respect to the standard flows.[33]

We test the robustness of our key results by conducting several exercises. First, we interact the local labour market dummies with trends. As shown in the first column of Table 9, our estimates lose precision due to the large number of additional regressors, but remain qualitatively unchanged. Second, we run a placebo experiment by randomly assigning the treatment status to individuals in our sample. With random assignment, we should not find any significant difference between the two groups in the effects of the recession on entrepreneurship. The second column in Table 9 confirms that this is the case, as the estimated interaction between the randomly assigned start of the treatment and the ID dummy is very close to zero and not statistically significant. Third, we exclude from the sample the small percentage (less than 3 percent) of individuals who have changed region of residence for work - related reasons, in order to verify whether the differential effects estimated in Table 4 are driven by endogenous mobility patterns. As shown in column (3) of the table, our qualitative results are again the same. Next, we estimate (1) using the full sample, without excluding areas lying outside the common support and large urban areas. As shown in column (4) of the table, results are qualitatively unchanged. Finally, we use self-employment rather than our definition of entrepreneurship, but obtain qualitatively similar results (column (5)).

[30] See Di Addario and De Blasio, 2005.

[31] Unfortunately, the input output information is not available at the local labour market level. The two digit industries that are most connected with the dominant industry in the district are: hotels and restaurants for food products; manufacture of vehicles and wholesale trade for textiles and leather products; printing material for the manufacture of paper; building and manufacture of vehicles for rubber and plastic goods; building for furniture and other house goods, building and manufacture of vehicles for machinery and equipment.

[32] For instance, if sectors A and B are linked by purchases or sales, we compute the year-to-year flows from sector A to sectors A and B.

[33] Detailed results are available from the authors upon request.

Conclusions

In this paper, we have investigated whether the presence of industrial districts – a source of local agglomeration effects - attenuates or amplifies the response of local entrepreneurship to an economic recession. Using data from the Italian *Labour Force Survey* and a "difference-in-differences" approach that compares the probability of being an entrepreneur before and after the 2008 recession in areas where industrial districts are present and in comparable areas, we have shown that entrepreneurship has suffered more after the recession in treated than in control areas, especially among more experienced individuals. We have explored alternative explanations of this differential effect, including industrial specialisation and composition, the sector of production, differences in the level of exports, credit accessibility and the composition of talents. Our results suggest that none of these channels can credibly account for our findings.

We have argued that the *social multiplier* could explain, at least in part, our results. The social multiplier effect suggests that the intense social interaction typical of industrial districts can amplify the effects of a shock in closely connected economies, mainly by accelerating information flows. Since the multiplier operates also in the presence of positive aggregate shocks, this mechanism leads us to speculate that the positive response of entrepreneurs to an economic expansion might be stronger in areas where industrial districts prevail.

A few questions remain unanswered. First, our evidence refers to a particular type of local agglomeration, the one associated to the presence of industrial districts. Whether these results extend also to other types of agglomeration – such as cities – is an open issue. Similarly, the question naturally arises whether the estimated differential effects of the 2008 recession are temporary or permanent. To answer this, we need longer data than those currently available, and the ability to control for the emergence of other confounding factors as time goes by. Last but not least, our empirical investigation has focused on labour market stocks. Further insight on how industrial districts respond to a recession most likely requires that we complement this investigation with one that explores the demography of firms and illustrates how firm revenues and costs vary over the business cycle. We plan to pursue some of these questions in our future research.

References

Andini, M., De Blasio, G., Duranton, G. and Strange, W., 2012, "Marshallian labour market pooling: Evidence from Italy", *Temi di Discussione* Banca d'Italia, n.922, Rome

Angrist, J. D. and Pischke J.S. (2010). *Mostly harmless econometrics*. Princeton University Press.

Antonietti, R., Cainelli, G., and Lupi, C. (2013). "Vertical disintegration and spatial co-localization: The case of Kibs in the metropolitan region of Milan". *Economics Letters*, vol. 118, no. 2, pp. 360-363.

Autor, D. H. (2003). "Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing". *Journal of Labor Economics*, vol. 21, no. 1, pp. 1-42.

Bagnasco, A. (1977). *Tre Italie, la problematica territoriale dello sviluppo italiano*. Il Mulino, Bologna.

Blundell, R, and Costa Dias, M. (2009). "Alternative approaches to evaluation in empirical microeconomics". *Journal of Human Resources*, vol. 44, no. 3, pp. 565-640.

Ciccone, A. and Hall, R. E. (1996). "Productivity and the density of economic activity". *The American Economic Review*, no. 86, no. 1, pp. 54-70.

Cingano, F. and Schivardi, F. (2004). "Identifying the sources of local productivity growth". *Journal of the European Economic Association,* vol. 2, no. 4, pp. 720-742.

Coleman, J.S. (1988). "Social capital in the creation of human capital". *American Journal of Sociology*, vol. 94, pp.S95-S120.

Combes, P.P., Duranton, G., and Goubillon, L. (2011). "The identification of agglomeration economies". *Journal of Economic Geography*, vol. 11, no. 2, pp. 253-266.

Combes, P.P. and Goubillon, L. (2015). "The empirics of agglomeration economies", in Duranton, G.,Henderson, V. and Strange, W., *Handbook of Regional and Urban Economics*, Volume 5A, Ch.5.

D'Amuri, F (2010), "The impact of the Great Recession on the Italian labour market", mimeo, Bank of Italy.

Delgado, M., Porter, M. E., and Stern, S. (2010). "Clusters and entrepreneurship". *Journal of Economic Geography*, vol. 10, pp. 495-518.

Delgado, M., Porter, M. E., and Stern, S. (2014). "Clusters, convergence and economic performance". *Research Policy*, vol. 43, pp. 1785-1799.

De Blasio, G. and Di Addario, S., 2005. "Do Workers Benefit from industrial agglomeration?", *Journal of Regional Science*, Wiley Blackwell, vol. 45, n.4, pp. 797-827.

Di Addario, S., 2011. "Job search in thick markets", *Journal of Urban Economics*, , vol. 69, n. 3, pp. 303-318

Di Giacinto, V., Gomellini, M., Micucci, G., and Pagnini, M. (2013). "Mapping local productivity advantages in Italy: industrial districts, cities or both?" *Journal of Economic Geography*.

Faggio, G. and Silva, O., (2014). "Self-employment and entrepreneurship in urban and rural labour markets", *Journal of Urban Economics,* 84, 67-85.

Fairlie, R. W. (2013). "Entrepreneurship, economic conditions, and the great recession". *Journal of Economics & Management Strategy*, vol. 22, no. 2, pp. 207-231.

Foster, L., Grim, C. and Haltiwanger, J., (2014), Reallocation in the Great Recession: cleansing or what?, NBER Working Paper no. 20247.

Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., and Shleifer, A. (1992). "Growth in cities". *Journal of Political Economy*, vol. 100, no. 6, pp. 1126-1152.

Glaeser, E. L. and Kerr, W. R. (2009). "Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain?" *Journal of Economics & Management Strategy*, vol. 18, no. 3, pp. 623-663.

Glaeser, E. L., Rosenthal, S. S. & Strange, W. C. (2010). "Urban economics and entrepreneurship", *Journal of Urban Economics*, vol. 67, no. 1, pp. 1-14.

Glaeser, E. L., Sacerdote, B. I. and Scheinkman, J.A., (2003), "The social multiplier", *Journal of the European Economic Association*, vol. 1, n. 2-3, 345-353.

Guiso, L., Sapienza, P., and Zingales, L. (2004a). "Does local financial development matter?" *The Quarterly Journal of Economics*, vol. 119, no. 3, pp. 929-969.

Guiso, L., Sapienza, P., and Zingales, L. (2004b). "The role of social capital in financial development". *The American Economic Review*, vol. 94, no. 3, pp. 526-556.

Guiso, L. and Schivardi, F. (2007). "Spillovers in industrial districts". *The Economic Journal*, vol. 117, no. 516, pp. 68-93.

Inkpen, A. and Tsang, E. W. K. (2005), "Social capital, networks, and knowledge", *The Academy of Management Review*, vol. 30, no. 1, pp. 146-165

Lucas, R. E. Jr (1978). "On the size distribution of business firms". *Bell Journal of Economics*, vol. 9, no. 2, pp. 508-523.

McEvily, B. and Zaheer, A. (1999). "Bridging ties: A source of firm heterogeneity in competitive capabilities", *Strategic Management Journal*, vol. 20, pp. 1133-1156.

Minniti, M. (2005). "Entrepreneurship and network externalities". *Journal of Economic Behavior & Organization*, vol. 57, no. 1, pp. 1-27.

Molina-Morales, X. and Martínez-Fernández, M. T. (2009), "Does homogeneity exist within industrial districts? A social capital-based approach", *Papers in Regional Science*, Volume 88.

Molina-Morales, X. and M. Teresa Martínez - Fernández, M. T. (2010), "Social networks: Effects of social capital on firm innovation", *Journal of Small Business Management*, vol. 48. No. 2, pp. 258-279.

Porter, M. E. (1998). *Competitive Advantage: Creating and Sustaining Superior Performance*. Simon & Schuster, New York.

Porter, M.E. (2000). "Location, competition, and economic development: Local clusters in a global economy", *Economic Development Quarterly*, vol. 14, no. 1, pp. 15-34.

Putnam, R. (2000), *Bowling Alone. The Collapse and Revival of American Community*. Simon & Schuster, New York.

Rosenthal, S.S. and Strange, W.C. (2004). "Evidence on the nature and sources of agglomeration economies", *Handbook of Regional and Urban Economics*, vol. 4, Ch. 49.

Sianesi, B, (2005), "Propensity Score Matching". Institute for Fiscal Studies, mimeo.

Soubeyran, A. and Weber, W. (2002), "District formation and local social capital: a (tacit) co-opetition approach", *Journal of Urban Economics*, vol. 52, no. 1, pp. 65-92.

Staber, U. (2001). "Spatial proximity and firm survival in a declining industrial district: The case of knitwear firms in Baden-Württemberg". *Regional Studies*, vol. 35, no. 4, pp. 329-341.

Trigilia, C. (2001). "Social capital and local development", *European Journal of Social Theory*, vol. 4, no. 4, pp. 427-442.

Figure 1: Map of the Italian industrial districts (gray areas). Source: Istat, 8th Census of Industries and Services.

Figure 2: The distribution of entrepreneurship by age in industrial districts (IDs) and other local labour markets (OLMs). Pre-treatment period (2006 and 2007). Left panel: entrepreneurs with and without employees; right panel: entrepreneurs with employees only.

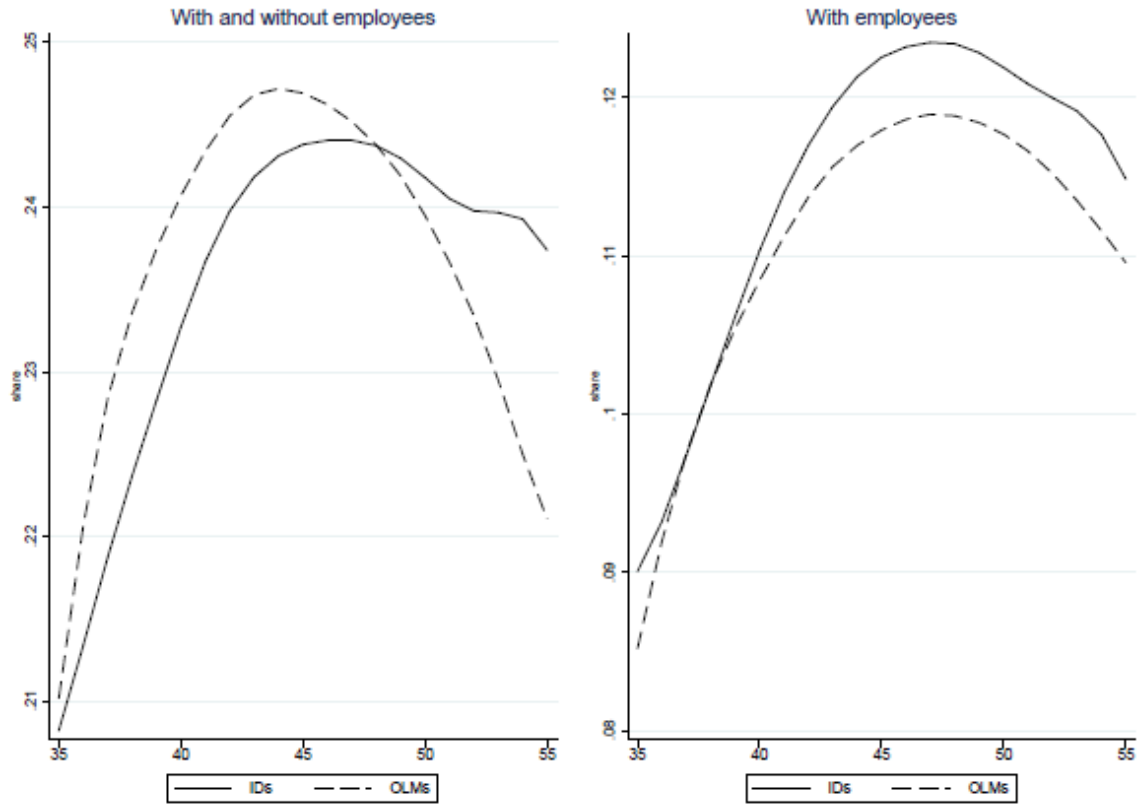


Figure 3: Local polynomial estimates of the share of entrepreneurs in industrial districts (IDs) and other local labour markets (OLMs). Left panel: entrepreneurs with and without employees; right panel: entrepreneurs with employees only.

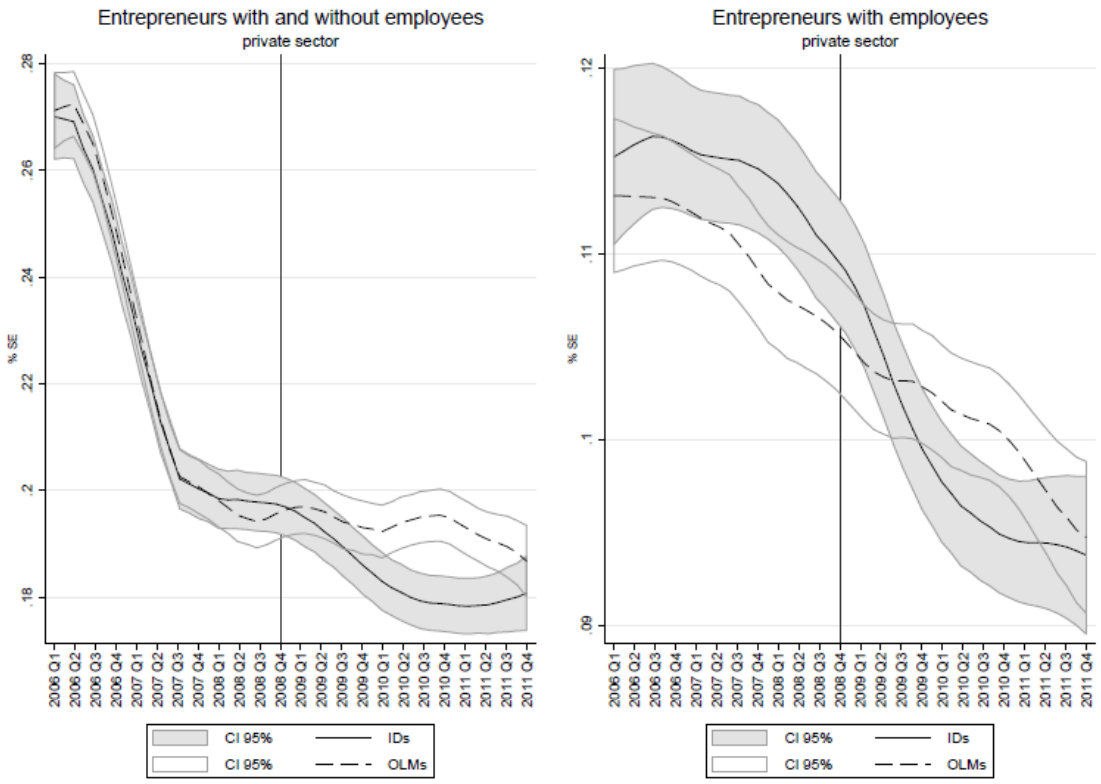


Figure 4: Propensity score distribution.

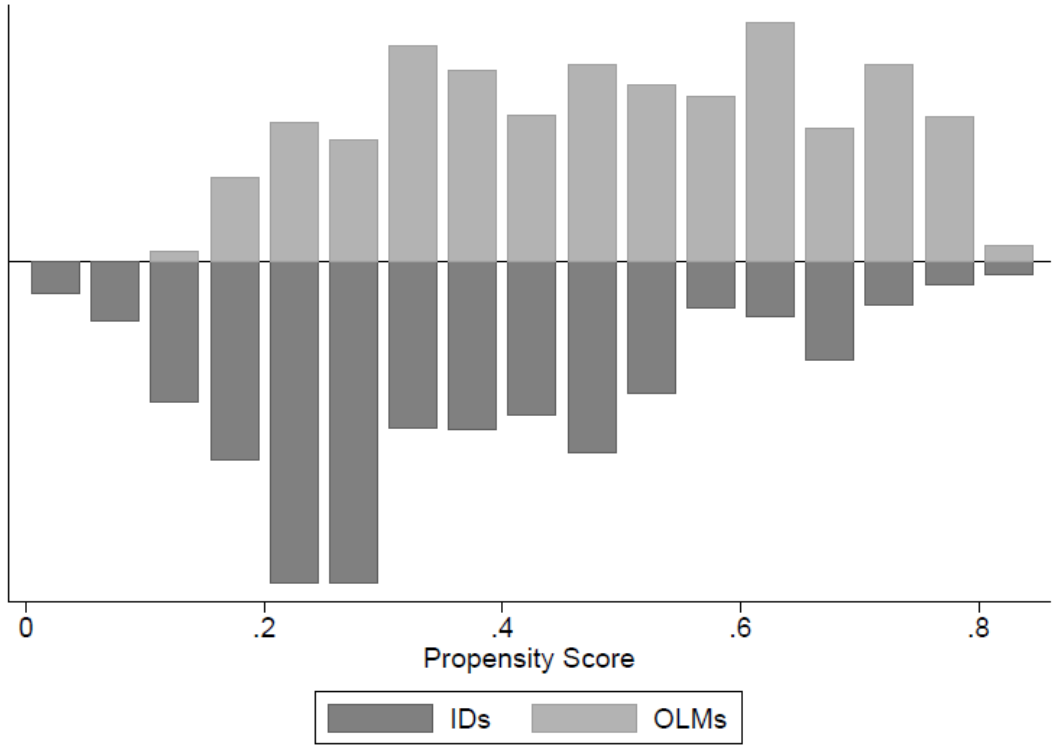


Table 1: Economic and social characteristics of urban areas, industrial districts and other local labour markets.

	Urban areas	Industrial Districts	Other local labour markets
Average years of schooling	9	8.1	8
Share employed in manufacturing	17.8	39.3	18.1
Average plant size	4.5	3.8	3.2
Average plant size manufacturing	18.6	9.7	6
Population density	1144.7	207.7	172.2
Density of employers	8.2	6.9	6.4
Index of civicness	81.7	83.2	77.2
Index of presence of mutual networks	4.4	6.5	6.6
Economic diversity	8.5	5.3	5.3
Index of specialisation in manufacturing	0.6	2.3	1.8
Number of local labour markets	11	156	519

Source: Di Giacinto et al., 2013.

Table 2: Share of entrepreneurs with employees before and after the recession. Treated: industrial districts. Control: other local labour markets.

		Before the crisis	After the crisis
With and without	Treated	22.64	18.42
employees	Control	22.71	19.33
With employees	Treated	11.53	9.82
	Control	11.05	10.08

Table 3: Summary statistics.

	Industrial districts	Other local labour markets	T-test of differences (in absolute value)
Age	44.66	44.65	0.17
	(5.88)	(5.92)	
Native	0.90	0.91	
			1.55
	(0.28)	(0.30)	
Has children	0.64	0.61	
			2.63
	(0.48)	(0.49)	
Married	0.71	0.68	
			2.76
	(0.45)	(0.47)	
Lower secondary education	0.44	0.43	1.50
	(0.50)	(0.49)	
High school	0.41	0.42	0.95
	(0.49)	(0.49)	
University degree	0.07	0.09	2.84
	(0.26)	(0.28)	
log GDP	10.79	10.50	1.73
	(1.02)	(0.99)	
log real exports	2.20	2.13	3.03
	(0.11)	(0.12)	
specialisation index	0.24	0.24	0.42
	(0.07)	(0.06)	
Population density	230.2	140.5	2.24
	(215.4)	(121.8)	
Unemployment rate	0.028	0.032	1.57

	(0.02)	(0.02)	

Notes: Standard deviations in parentheses.

Table 4 Difference-in differences estimates of the differential effect of the economic re-cession on the probability of being an entrepreneur in IDs and OLMs. Linear Probability Models, Probit and OLS on grouped data. Males aged 35 to 55.

	(1) (2) (3) With and without employees			(4) (5) (6) With employees only		
	LPM	Probit	OLS (grouped data)	LPM	Probit	OLS (grouped data)
Post2008.Q3*ID	-0.012	-0.013	-0.011	-0.009	-0.009	-0.008
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
	**	**	**	**	**	*
Native	0.147	0.210	0.163	0.079	0.116	0.078
	(0.004)	(0.008)	(0.024)	(0.003)	(0.006)	(0.021)
	***	***	***	***	***	***
Children	0.009	0.009	-0.021	0.009	0.008	-0.025
	(0.003)	(0.003)	(0.017)	(0.003)	(0.003)	(0.012)
	***	***		***	***	*
Age	0.001	0.001	-0.001	0.001	0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
	***	***		***	***	
Married	0.029	0.031	0.062	0.031	0.033	0.051
	(0.003)	(0.004)	(0.019)	(0.003)	(0.003)	(0.016)
	***	***	***	***	***	***
Lower secondary	0.056	0.077	0.057	0.034	0.047	0.034
	(0.005)	(0.006)	(0.032)	(0.004)	(0.005)	(0.021)
	***	***	*	***	***	
High school	0.103	0.124	0.109	0.055	0.067	0.055
	(0.006)	(0.007)	(0.028)	(0.004)	(0.005)	(0.021)
	***	***	***	***	***	***
University	0.218	0.222	0.244	0.077	0.085	0.096
	(0.010)	(0.009)	(0.043)	(0.008)	(0.008)	(0.031)
	***	***	***	***	***	***
N	218,998	218,998	4,786	218,998	218,989	4,786
R-squared	0.044		0.473	0.020		0.291
ME as % of the mean	-.052	-.057	-0.048	-.078	-.079	-0.070
Mean	0.227	0.227	0.227	0.113	0.113	0.113

Notes: LPM is for Linear Probability Model. Marginal effects for the Probit model. ME: Marginal Effect. Robust standard errors clustered at the province level within parentheses. *** p<0.01, ** p<0.05, * p<0.1. Columns (1) to (3) are for entrepreneurs with and without employees, and columns (4) to (6) for entrepreneurs with employees only. Columns (1), (2), (4) and (5), are based on individual data, and columns (3) and (6) on data aggregated at the local labour market level. All regressions include local labour market and period (year by quarter) dummies. Post2008.QS*ID: the interaction between the dummy Post2008.Q3 (equal to 1 after the last quarter of 2008 and to 0 otherwise) and a dummy indicating industrial district areas (ID). Native: a dummy equal to 1 for individuals born in Italy; Children: dummy indicating whether the individual has children; Age: age at the time of the interview, in years; Married: a dummy for marital status; Lower secondary: a dummy equal to 1 for

individuals with lower secondary education; High school: dummy equal to 1 for individuals with high school or equivalent; University: dummy equal to 1 for individuals with college degree or higher.

Table 5 Difference-in-differences estimates of the differential effect of the economic re-cession on the probability of being an entrepreneur in IDs and OLMs. Linear Probability Models by tenure. Males aged 35 to 55.

	(1) Tenure < 10	(2) Tenure >=10
Post2008.Q3*ID	-0.009	-0.014**
	(0.008)	(0.006)
Native	0.113***	0177***
	(0.004)	(0.005)
Children	0.005	0.009**
	(0.005)	(0.004)
Age	-0.001**	0.001***
	(0.000)	(0.000)
Married dummy	-0.001	0.049***
	(0.005)	(0.004)
Lower secondary	0.042***	0.062***
	(0.006)	(0.006)
High school	0.088***	0.107***
	(0.008)	(0.007)
University	0.151***	0.273***
	(0.012)	(0.012)
N	82,507	136,491
R-squared	0.046	0.049

Notes: Robust standard errors clustered at the province level within parentheses. *** p<0.01, ** p<0.05, * p<0.1. All regressions include local labour market and period (year by quarter) dummies. Post2008.QS*ID: the interaction between the dummy Post2008.Q3 (equal to 1 after the last quarter of 2008 and to 0 otherwise) and a dummy indicating industrial district areas (ID). Native: a dummy equal to 1 for individuals born in Italy; Children: dummy indicating whether the individual has children; Age: age at the time of the interview; Married: a dummy for marital status; Lower secondary: a dummy equal to 1 for individuals with lower secondary education; High school: dummy equal to 1 for individuals with high school or equivalent; University: dummy equal to 1 for individuals with college degree or higher.

Table 6: Difference-in-differences estimates of the differential effect of the economic recession on the probability of being an entrepreneur in IDs and OLMs. Linear probability models. Males aged 35 to 55. Each regression includes alternative confounding factors.

	(1)	(2)	(3)	(4)	(5)	(6)
	Interaction with high specialisation areas	Interaction with ID industries	Interaction with declining industries	Adding real exports	Interaction with credit access	Interaction with population density
Post2008. Q3*ID	-0.012**	-0.015**	-0.012**	-0.012**	-0.011**	-0.012**
	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Post2008. Q3*Special	-0.007					
	(0.006)					
Post2008.Q3*Sector A		0.006				
		(0.008)				
Post2008.Q3*Sector B			0.006			
			(0.009)			
Exports				0.091		
				(0.376)		
Post2008. Q3*Branches					0.0004	
					(0.004)	
Post2008. Q3*Credit					0.003	
					(0.004)	
Post2008.Q3*Pop dens						-0.000
						(0.007)
N	218,998	222,933	222,933	219,072	201,143	216,180
R-squared	0.044	0.045	0.045	0.044	0.044	0.044

Notes: See notes to Table 5. Special: a dummy equal to 1 if the index of specialisation in the local labour market is higher than the median. Sector A: a dummy equal to 1 if the predominant industry in the area is one that is traditionally related to industrial districts (food products, textiles and apparel, leather and related products, machinery and equipment, and furniture). Sector B: a dummy equal to 1 if the predominant industry in the area has had higher than the median employment and self employment losses from 2008 to 2009 (mining, utilities, wholesale and retail trade, transportation and storage, rubber and plastic products, mineral products, motor vehicles, textiles and apparel, machinery and equipment, and furniture and other house goods) .Branches: a dummy equal to 1 for local labour markets where the presence of bank branches is higher than the median. Exports: real annual exports at the regional level. Credit: a dummy equal to 1 for local labour markets where the credit to loan ratio of the banks is higher than the median, Pop dens: a dummy equal to 1 if the population density in the area is higher than the median.

Table 7: Difference-in-differences estimates of the differential effect of the economic recession on employment and inactivity in IDs and OLMs. Linear probability models. Males aged 35 to 55.

	(1) Employed	(2) Inactive
Post2008.Q3*ID	0.012*	0.003
	(0.007)	(0.003)
Native	-0.087***	-0.055***
	(0.007)	(0.005)
Children	-0.011**	0.004
	(0.005)	(0.003)
Age	-0.006***	0.005***
	(0.000)	(0.000)
Married	0.073***	-0.104***
	(0.005)	(0.004)
Lower secondary	0.022***	-0.080***
	(0.008)	(0.006)
High school	0.029***	-0.116***
	(0.008)	(0.006)
University	-0.079***	-0.117***
	(0.010)	(0.006)
N	218,998	218,998
R-squared	0.029	0.059

Notes: see notes to Table 4.

Table 8: Average annual inflow and outflow rates between entrepreneurship and employment within the same industrial sector and between sectors. Entrepreneurs with and without employees. Percent values.

Industrial Districts	Pre-crisis	Crisis
Entrepreneurship to employment - same sector	0.65	1.29
Entrepreneurship to employment - different sectors	0.61	0.66
Employment to entrepreneurship - same sector	0.87	0.48
Employment to entrepreneurship - different sectors	0.56	0.45
Other comparable areas		
Entrepreneurship to employment - same sector	0.71	0.36
Entrepreneurship to employment - different sectors	0.90	0.45
Employment to entrepreneurship - same sector	0.81	0.48
Employment to entrepreneurship - different sectors	0.24	0.28

Notes: Our computations based on micro data from the Italian Labour Force Survey, quarterly data, years 2006-2011.

Table 9: Robustness analysis.

	(1) Local labour market specific trends	(2) Random assignment	(3) No movers	(4) Full sample	(5) Self employment
Post*ID	-0.008	0.001	-0.012**	-0.011**	-0.017***
	(0.008)	(0.002)	(0.005)	(0.005)	(0.006)
N	218,998	218,998	213,619	271,849	218,998
R-squared	0.049	0.045	0.044	0.046	0.033

Notes: Robust standard errors, clustered at the province level, within parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table 5 for details on the control variables included. Column (1): local labour market-specific trends included; Column (2): random reassignment of the treatment group dummy; Column (3): without people who moved during the year before the interview; Column (4): including observations outside the common support and big urban areas. The dependent variable in columns (1) to (4) is a dummy equal to 1 if the respondent is an entrepreneur with or without employees, and 0 otherwise; Column (5): using self employment as dependent variable.

Highlights

- We investigate whether the impact of recessions on entrepreneurship is affected by the presence of industrial districts
- We Use Italian Labour Force quarterly data from 2006 to 2011 and a "difference-in-differences" approach
- We show that the share of entrepreneurs in local labour markets where industrial districts are present has declined more than in comparable areas after the beginning of the 2008 recession.
- The estimated negative differential effect ranges between 4.8 and 7.9 percent in absolute value.
- Our result is consistent with the intense social interactions typical of industrial districts, acting as a multiplier that amplifies the response to shocks.