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Self-employment and entrepreneurship in urban and rural labour markets ☆

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ABSTRACT

We study the link between self-employment and some salient aspects of entrepreneurship – namely business creation and innovation – in urban and rural labour markets. In order to do so, we combine individual and firm-level data for Britain aggregated at the Travel-to-Work Area level. We find that a higher incidence of self-employment positively and strongly correlates with business creation and innovation in urban areas, but not in rural areas. We also document that more rural than urban workers become self-employed in areas with comparably poor labour market opportunities, although this heterogeneity is not evident when focussing on entrepreneurship. Finally, we show that the misalignment between self-employment and our proxies for entrepreneurship in rural areas disappears once we account for local labour market conditions. Our results suggest that self-employment, business creation and innovation are well lined-up in urban areas because they capture the same economic phenomenon – namely, genuine entrepreneurship. This is not the case for rural areas.

1. Introduction

Since the writings of Marshall (1890) and Schumpeter (1921), entrepreneurship is believed to be a key determinant of the economic success of a country or region and a crucial factor in shaping the spatial distribution of economic activities on the national territory. Entrepreneurs are not only responsible for the creation of new firms, but also for their technological lead and success as well as for the creation of new jobs. In a nutshell, entrepreneurs are engines of economic growth and differences in levels of entrepreneurial activities bear important implication for disparities in income across countries and regions.[1]

Unsurprisingly, policy makers devote substantial attention to business start-ups and have set in place a number of institutions aimed at promoting entrepreneurship. In the US, the federally funded Small Business Administration (SBA) agency was created in 1953 with the aim of helping Americans to "start, build and grow businesses". In the UK, the Department for Business, Innovation and Skills (BIS) assists small businesses through the Enterprise and Business Directorate with the aim of "enabling more people (...) to start their business" and "boosting enterprises, start-ups and small business growth". Particular emphasis is put on promoting entrepreneurship in rural and lagging areas as a way of 'closing the gap' with the most dynamic urban regions (see DEFRA, 2011).

Despite its relevance to both economic thinking and policy making, academic research on entrepreneurship is partly impaired by fundamental issues surrounding the definition of entrepreneur and the identification of entrepreneurial individuals in available

☆ This work was based on data from the Business Structure Database (ONS, 2011a), Community Innovation Survey (ONS, 2011b) and Quarterly UK Labour Force Survey (ONS, 2011c) produced by the Office for National Statistics (ONS) and supplied by the Secure Data Service at the UK Data Archive. The data are Crown Copyright and reproduced with the permission of the controller of HMSO and Queen's Printer for Scotland. The use of the data in this work does not imply the endorsement of ONS or the Secure Data Service at the UK Data Archive in relation to the interpretation or analysis of the data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

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[1] See Aghion and Howitt (1992), Audretsch (2007) and Michelacci (2003) for a discussion of the role of entrepreneurs in growth models, and Acs and Audretsch (2003) for some empirical evidence.

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data. The majority of the empirical work has focused on self-employment.[2] However, according to the seminal writings by Knight (1921) and Schumpeter (1921), entrepreneurs are individuals who bring innovations to the market in a process of creative destruction and bear the risk of the uncertainty surrounding entrepreneurial success (see also Kanbur, 1979; Kihlstrom and Laffont, 1979) – and clearly not all self-employed individuals are entrepreneurs. Alba-Ramirez (1994), Earle and Sakova (2000), Martinez-Granado (2002) and Santarelli and Vivarelli (2007) show that some self-employment spells can be explained by lack of employment opportunities.[3] Similarly, Baumol (2005) distinguishes between 'innovative' and 'replicative' entrepreneurs and suggests that only the former are key to an economy's long-run success by supplying new ideas. Conversely, replicative entrepreneurs predominantly respond to local demand and growing population, and are therefore symptoms of a growing economy rather than causes.[4] Recent work by Hurst and Pugsley (2010) and Sanandaji (2010) cast further doubts on the mapping between self-employment and innovative entrepreneurship.

In this paper, we investigate the link between self-employment and entrepreneurship in urban and rural labour markets by combining three data sources, namely the UK Labour Force Survey (LFS), the Business Structure Database (BSD), and the Community Innovation Survey (CIS). We use information contained in the LFS over the period 1995–2009 to identify individuals who are: (i) independent self-employed (i.e. excluding freelancers, subcontractors and agency workers; more details in Section 2); and (ii) self-employed who own their business or a controlling majority of the business where they work. The LFS includes a large and representative sample of individuals in the UK, and these definitions are similar to those adopted by previous studies that analyse entrepreneurship using data on self-employment. We also use information contained in the BSD over the period 1997–2008 to identify how many firms open and close every year, and compute proxies for firm creation. The BSD is an administrative dataset that covers almost all businesses in the UK, including both single and multi-plant enterprises. Finally, we use data from the CIS in 2001, 2005, 2007 and 2009 to identify firms that innovate by creating new products or new processes of production. The CIS sample is representative of small, medium and large businesses across all UK regions and core industry sectors, and this data has been extensively used to study firms' innovative behaviour (see D'Este et al., 2012). By combining these data sources, we investigate how self-employment 'lines up' with some of the most salient aspects of a dense entrepreneurial environment, namely firm creation and innovation. These two proxies have been widely used in the literature to capture entrepreneurship (Audretsch, 2007; Glaeser and Kerr, 2010; Santarelli and Vivarelli, 2007).

In order to compare the incidence of self-employment with the intensity of business start-ups and innovative behaviour, we aggregate individual-level and firm-level data at the Travel-to-Work Area (TTWA) level. These areas are functional geographical units that can be considered as self-contained labour markets and economically relevant aggregates. TTWAs are roughly equivalent to the US Metropolitan Statistical Areas (MSAs).

Our results show that self-employment is positively and significantly correlated with both the rate of firm creation and the incidence of innovation in *urban* areas. However, this is not the case for *rural* areas. This distinction is not explained by differences in the sectoral composition of businesses: we find similar results when we distinguish between services and manufacturing across urban and rural areas. Similarly, our findings are robust to alternative definitions of self-employment and different ways of aggregating the data.

In order to shed some light on this urban/rural heterogeneity, we exploit additional information contained in the LFS and compute a number of proxies that focus on the lack of employment opportunities at the TTWA level. In particular, we identify: (i) the incidence of individuals who work part-time because of lack of full-time employment opportunities; (ii) the unemployment rate in the working-age population; and (iii) the inactivity rate among working-age individuals. We show that these proxies are uniformly negatively associated with entrepreneurship in both urban and rural areas. We also show that these variables are strongly and negatively linked with self-employment in urban areas, but this association is significantly flatter in rural areas. Finally, we show that the urban/rural heterogeneity disappears once we pool data across all TTWAs and investigate the relationship between self-employment and entrepreneurship *while controlling* for local labour market conditions. There are two possible interpretations to these findings. Firstly, our results are consistent with the idea that in urban areas characterised by stronger labour market conditions more workers 'take their chances' as self-employed and this in turn leads to higher levels of entrepreneurship. However, this positive dynamics does not take place in rural TTWAs. Secondly, our findings are also consistent with the idea that relatively more rural than urban workers are self-employed of last resort – i.e., fewer rural than urban workers are discouraged from becoming self-employed in areas with poor labour market conditions because they lack of better employment opportunities. Either way, our results clearly suggest that self-employment, business creation and innovation are well lined-up in urban areas because they capture the same economic phenomenon – namely real entrepreneurship. This is, however, not true for rural TTWAs. These results carry important implications for the academic debate on entrepreneurship, as well as for the design of policies that promote self-employment with the aim of stimulating business creation and innovation – especially in lagging and remote regions.

In relation to the existing literature, our work is closely linked – and in part comparable – to Hurst and Pugsley (2010) and Sanandaji (2010). Hurst and Pugsley (2010) show that the vast majority of US small businesses do not innovate, do not want to innovate, do not significantly grow in size and do not want to expand. This suggests that most US self-employed workers are hardly entrepreneurial from the perspective of innovation and job creation. Although we cannot measure small entrepreneurs' intentions to grow and innovate, we can link the incidence of self-employment to net firm creation – related to firm survival and expansion – and innovative activities, thus looking at these issues from a similar angle. Sanandaji (2010) uses cross-country data to document that the correlation between the incidence of self-employment and billionaires who became rich by setting up their own business (as listed in Forbes Magazine) is negative and significant. In this respect, we follow a similar approach by comparing the spatial distribution of self-employment to other proxies for entrepreneurship. However, our work has the advantage of focusing on one single country, thus abstracting from problems with cross-country differences in institutions and culture. Furthermore, our measures of firm creation and innovation are better

[2] Examples include Blanchflower and Shadforth (2007) and Evans and Leighton (1989) on trends in entrepreneurship in the UK and the US; Blanchflower and Oswald (1998), Evans and Jovanovic (1989), Holtz-Eakin et al. (1994a, 1994b), Hurst and Lusardi (2004) and Michelacci and Silva (2007) on the role of credit constraints; Cagetti and De Nardi (2009) and Carroll et al. (2000) on the role of taxation; and Ardagna and Lusardi (2008), Lazear (2004) and Silva (2007) on the role of skills and individual characteristics.

[3] A related strand of literature investigates whether disadvantaged ethnic-minority workers are more or less likely to be self-employed depending on the strength of consumer discrimination and size of the local ethnic-minority population (e.g., Black et al., 2001; Borjas and Bronars, 1989; Fairlie and Meyer, 1996).

[4] Nevertheless, it should be noted that replicative entrepreneurship could have beneficial effects on economic efficiency by promoting division of labour, providing goods and services and fostering input–output linkages.

proxies for entrepreneurship than 'entrepreneurial stardom' (i.e. the incidence of billionaires). Previous research has shown that the density of all businesses – including *small* ones – is an important force determining agglomeration economies (Ellison et al., 2010; Glaeser, 2009; Glaeser and Kerr, 2010), and that small businesses disproportionately contribute to net job creation (Neumark et al., 2011). Recently, Haltiwanger et al. (2013) show that young small firms account for the largest portion of employment creation through an 'up-or-out' dynamics. The authors find that every year start-ups create a substantial number of jobs only to destroy them in the subsequent year. However, the surviving young firms grow astonishingly fast and create vast amounts of employment. On the one hand, our findings for urban areas are consistent with those of Haltiwanger et al. (2013). On the other hand, our results for rural TTWAs reveal that the parallel between self-employment and job creation cannot be taken to hold universally.

The remainder of the paper is structured as follows. Section 2 describes the data that we use in detail while Section 3 provides general descriptive statistics. Section 4 presents our analysis on the relationship between self-employment, firm creation and innovation in urban and rural labour markets. Following that, Section 5 investigates which factors account for the urban/rural heterogeneity. Section 6 concludes.

2. Data construction

In this section, we describe the data that we use to carry out our analysis. More details can be found in the working paper version of this article (Faggio and Silva, 2012).

2.1. UK Labour Force Survey (LFS)

The UK Labour Force Survey (LFS) is a quarterly representative survey of households living at private addresses in the United Kingdom and is conducted by the Office for National Statistics (ONS) to collect information about individuals' labour market experiences. For our analysis, we use the years between 1995 and 2009, and focus on the Spring quarter since this is the part of the survey where the richest and most consistent information is available.

Each Spring quarter contains between 64,000 (earlier years) and 52,000 (later years) households, equivalent to about 120,000–150,000 individuals. We focus on people aged between 16 and 65, and on individuals either working as employees or as self-employed. In order to assign each individual to a TTWA, we retain individuals living in England, Scotland and Wales (LFS data for Northern Ireland have poor coverage), and with a valid geographical identifier (ward of residence, roughly equivalent to a US census tract). Additionally, we select individuals with non-missing information on: (i) gender, age and ethnicity; (ii) marital status, household size and number of children; (iii) educational qualifications; (iv) housing tenure status; (v) working full-time or part-time; (vi) holding or not a second job.[5] Finally, following previous work in the literature (Glaeser, 2009; Glaeser and Kerr, 2010), we exclude individuals working in one of the following sectors: Agriculture; Hunting and Forestry; Fishing; Public Utilities (Electricity, Gas and Water); Public Administration and Defence; Private Households with Employees; and Extra-Territorial Organization and Bodies. These sectors either contain negligible amounts of self-employment (e.g., public administration) or are characterised by high self-employment rates dictated by sector-specific features, not necessarily indicative of dense entrepreneurial environments (e.g., agriculture and fishing).

These restrictions leave us with a set of approximately 700,000 individuals, of which 540,000 and 160,000 live in urban and rural areas, respectively. Using this sample, we construct the following two measures of self-employment. First, we exploit information about methods of payments for self-employed workers to create a binary variable taking value one for individuals who: "Are a sole director of their own limited business"; "Run a business or a professional practice"; "Are a partner in a business or a professional practice"; "Work for themselves". This definition excludes self-employed workers who are "Paid a salary or wage by an agency", "Sub-contractors", or "Doing free-lance work", plus another residual category ("None of the above"). We label this group 'Independent Self-Employed'. Our second measure of self-employment exploits answers to the question: "Do you own the business or have a controlling interest in the company you work for?". Using this detail, we construct a second proxy labelled 'Owners'. Since information on methods of payments and on business ownership was not asked every year, we end up with approximately 500,000 individuals. Descriptive statistics for these variables aggregated at the TTWA level will be discussed in Section 3.[6]

2.2. The Business Structure Database (BSD)

The second dataset we use is the Business Structure Database (BSD) over the period 1997–2008. The data is an annual snapshot (taken in April at the closing of the fiscal year) of the Inter-Departmental Business Register (IDBR), which consists of constantly-updated administrative data collected for revenues and taxation purposes. Any business liable for value-added taxation (VAT) and/or with at least one employee registered for tax collection will appear on the IDBR. For the year 2012, the VAT threshold for registration was a turnover of taxable goods and services of £77,000. This implies that the BSD does not sample very small self-employed ventures. Nevertheless, the ONS estimated that for 2004 the businesses listed on the IDBR accounted for almost 99% of economic activity in the UK.

The data is structured into enterprises and local units. An enterprise is the overall business organisation; the local unit can be thought of as a plant or firm. In the remainder of the paper, we use the words plant and firm interchangeably. In approximately 70% of the cases, enterprises only have one local unit, while the remaining 30% of the cases represent enterprises with multiple local units. For each local unit, information is available on employment, industrial activity, year of birth (start-up date) and death (termination date), as well as postcodes. We use the latter detail to assign each local unit active in England, Wales and Scotland to a Travel-to-Work Area (TTWA).

The initial raw data includes approximately three million local units every year. In order to prepare the data for analysis, we carry out a series of checks and drop a number of units. In particular, we drop cases where we identify establishments opening/closing in a specific year, disappearing/reappearing in a subsequent year only to open/close again in a subsequent wave. Stated differently, we only count firms' birth and death once. This approach follows Glaeser and Kerr (2010). Furthermore, we drop active units with zero employment (this figure includes the owners/managers of the establishment, so it cannot be zero for an active unit) and postcodes that include an anomalous number of units in the same industrial sector. Finally, we drop the same sectors we excluded from the LFS.

After applying these restrictions, our dataset still comprises of about 2.4 million plants annually over 12 years, which we use to

[5] See Table A2 for a list of all controls with descriptive statistics aggregated up to the TTWA level.

[6] In order to check the robustness of our results to other proxies used in the literature, we also consider all self-employed individuals and self-employed workers in professional and managerial positions. See Section 4.3.

derive proxies for gross and net firm creation. To begin with, we identify in each pair of adjacent years: (i) firms that were not present in year$_{t-1}$, but are present in year$_t$; and (ii) firms that were present in year$_{t-1}$, but are not present in year$_t$. We then count the number of establishments in (i) and (ii) at the TTWA level, and construct some proxies for the local intensity of business creation. Using information from the first group, we estimate the amount of *gross* firm creation in a given TTWA. Using instead data from both (i) and (ii), and subtracting the number of establishments destroyed from the number of establishments created, we create a proxy for the rate of *net* firm creation in a given TTWA. When we aggregate our data at the TTWA level, we express net and gross firm creation as a share of the average number of firms existing at time $t-1$ and t. This approach follows the literature on job creation and destruction (see Davis and Haltiwanger, 1992). We discuss the descriptive statistics of these proxies in Section 3.

2.3. Community Innovation Survey (CIS)

The last dataset we use is the Community Innovation Survey (CIS) for the years 2001, 2005, 2007 and 2009. The CIS sample is representative of small, medium and large businesses, across all sectors. These features are important in reducing biases affecting other databases that track innovation, e.g. patent data that focus on highly innovative companies and firms in manufacturing only. However, it should be noted that the CIS still under-represents very small firms with less than 10 employees. In terms of geographical coverage, the CIS is representative of broad geographical aggregates (i.e., UK administrative regions), while its detail becomes less precise at a smaller level of aggregation (see Iammarino et al., 2012). We will return to this point when presenting our results. Despite these limitations, the CIS survey is seen as an important tool for "measuring the level of innovation activity in the UK" (ONS, 2011b) and has been extensively used in the analysis of firms' innovative activities (see D'Este et al., 2012; Iammarino et al., forthcoming).

The original samples of the CIS varied between approximately 8000 firms in 2001 to approximately 15,000 firms in the following waves. One drawback of the CIS is that it does not include detailed geographical identifiers which are needed for our analysis. In order to recover this information, we use a unique firm identifier to match CIS firms to the BSD data described above. Given the quality of the BSD administrative data, the attrition from this matching is very small (below 1% in all years). However, the identifiers and the information contained in the CIS refer to the enterprise – not to the local unit. This means that when we match data from the CIS to the BSD, we assign the same information about innovative behaviour to all units belonging to a multi-plant enterprise since it is impossible to identify the local unit where the innovation actually took place. While this is not ideal, we believe this procedure is better than assigning information based on the location of the enterprise headquarters. However, as a robustness check, we only match single-unit firms in the CIS with corresponding BSD firms, keeping approximately 75% of the CIS sample. Our findings are not affected when considering the innovative behaviour of single-plant firms only. We will return to this point in Section 4.3. Note finally that for consistency, we exclude the same sectors that we drop from the LFS and BSD.

In order to construct proxies for innovative behaviour, we use firms' answers to the following questions: (i) "During the three year period (prior to the survey), did your enterprise introduce any technologically new or significantly improved products (goods or services)?"; and (ii) "During the three year period (prior to the survey), did your enterprise introduce any new or significantly improved processes for producing or supplying products (goods or services)?". We combine answers from both questions to create a variable taking value one if the firm created either an innovative product or an innovative process. We label this variable 'Innovation'. We also create two further proxies where we separately consider whether the company successfully engaged in either product or process innovation. These variables are labelled 'Product Innovation' and 'Process Innovation'. We finally collapse the data at the TTWA level so that our indicators can be interpreted as fractions of innovative firms in a given area. Descriptive statistics for these variables are discussed in Section 3.

2.4. Travel-to-Work-Areas (TTWAs) and other geographical details

The level of geographical aggregation that we use in our analysis is the Travel-to-Work Area (TTWA). TTWAs are groups of wards for which at least 75% of the resident economically active population works in the area, and at least 75% of the people who work in the area also resides there. TTWAs were devised by the ONS to delineate areas that can be considered as self-contained labour markets and economically relevant aggregates.

As of 2007, there were 243 TTWAs within the United Kingdom. In our analysis, we only focus on England, Scotland and Wales. Moreover, we follow Gibbons et al. (2010) and re-aggregate some rural areas so that our final partition splits Great Britain into 158 local economic areas, of which 79 are single urban TTWAs (with population in excess of 100,000 residents), and 79 are rural areas created by combining TTWAs with low population counts. Differently from Gibbons et al. (2010), we distinguish between Inner and Outer London by splitting the London TTWA in two parts. We follow this approach because the density of start-ups and innovation differs between the core of London and its periphery. However, this distinction is not crucial to our analysis.

Urban TTWAs have substantially higher population density than rural areas. The average/median number of people per squared kilometre is 800.2/528.6 and 180.6/144.3 in urban and rural areas respectively, with standard deviations of 1073.7 and 140.8. Although there is more variation within the urban group, the 25th percentile of the population density distribution in urban areas (at 315.0) lies above the 75th percentile of the density distribution in rural areas (at 250.7). These comparisons are not significantly affected if we disregard London: the average and median urban population density become 651.8 and 510.7, with a standard deviation of 424.9.

Data from the BSD and the CIS are assigned to TTWAs based on the postcode at which firms are active. On the other hand, individuals in the LFS are assigned to TTWAs using postcodes of residence since detailed information about their place of work is not available. We do not see this as a major drawback. First, by construction, the TTWA of an individual's residence is likely to be the TTWA of her employment. Moreover, previous research shows that entrepreneurs tend to be local and set up their business in the location where they were born and still reside (Michelacci and Silva, 2007). We shed some light on this issue by using LFS data at the individual level to run some regressions that estimate the probability that an individual claims to: (i) work in the same Local Authority/District (LAD) where she lives; (ii) to work from the home address or to use home as the headquarters of her activities.[7]

Our evidence is presented in Table A1. Columns (1) to (4) focus on individuals in urban TTWAs, whereas Columns (5) to (8) concentrate on rural areas. Across all columns and irrespective of the inclusion of a detailed set of controls, we find that self-employed individuals are significantly more likely than employees to work

[7] There are approximately 400 Local Authority Districts and Unitary Authorities (England and Wales) and Council Areas (Scotland) in Great Britain for the time period we consider.

in the LAD where they live or to use their home as their workplace or the headquarters of their business. These differences are sizeable. Self-employed are 40–50% more likely to work in the LAD of residence than employees, both in urban and rural areas. Similarly, self-employed in both urban and rural areas are between five and ten times more likely than employees to work from home or use it as their headquarters. These results suggest that assigning self-employed workers to areas on the basis of their TTWA of residence does not introduce an important bias in the measurement of the spatial distribution of entrepreneurial activities based on self-employed individuals in the LFS.

3. Self-employment, business creation and innovation: descriptive facts

In this section, we present descriptive statistics of the variables created using the three datasets described here above. Our findings are presented separately for urban and rural TTWAs, and are depicted in Fig. 1 and tabulated in Table 1.

3.1. Self-employment in urban and rural TTWAs

We begin by discussing the descriptive statistics for the two measures of self-employment obtained from the LFS. The figures in the top panel of Table 1 (for 'Independent Self-Employed') confirm some facts about self-employment in the UK previously obtained using the LFS (Blanchflower and Shadforth, 2007) or other data (e.g., Bracke et al., 2012 using BHPS): over the period spanning the mid-1990s to the late 2000s, approximately 10–12% of workers are self-employed, with this number not being substantially different in urban and rural areas. Relative to the US, our data show that the rate of self-employment over the 1990s and 2000s has been higher in the UK with a gap of around 5 percentage points (irrespective of whether agricultural activities are included or excluded from the comparison). Moreover, for both the US and the UK, self-employed is higher among men, and increases with age.

Table 1 also reveals that there is quite a significant amount of heterogeneity in the incidence of self-employment across TTWAs, as shown in Columns (3) and (6). The coefficient of variation for the share of 'Independent Self-Employed' across TTWAs is approximately 19% and 24% in urban and rural areas, respectively. While the figures for rural areas might portray more variation than there actually is because of small numbers, this urban/rural ranking is repeated when we look at entrepreneurship measures derived from firm-level data later in this section. Similarly, there is substantial variation in the share of self-employed individuals when we consider manufacturing and services separately. We find that more individuals are self-employed in services than in manufacturing. This is consistent with previous evidence, for example Blanchflower and Shadforth (2007) for the UK and Hurst and Pugsley (2010) and Glaeser (2009) for the US. However, there is more variation across TTWAs in the share of self-employed in manufacturing than in services. The coefficient of variation in the share of self-employed is between 47% and 56% for manufacturing, and between 17% and 21% in services. One caveat in interpreting these patterns is that the amount of variation in the incidence of self-employment in manufacturing might be inflated by the smaller number of individuals working in manufacturing (relative to services) used to aggregate information at the TTWA level. Nevertheless, this finding is intuitive: the geographical distribution of services activities – including retail trade, entertainment, professional and personal services – arguably follows more the distribution of the population than does the distribution of manufacturing plants. The latter is instead influenced to a larger extent by agglomeration forces (Dopeso-Fernandez, 2010).

In the next panel of Table 1, we present descriptive statistics of our alternative proxy for self-employment, namely 'Owners'. This definition identifies fewer self-employed workers than 'Independent Self-Employed', but it still shows that there are no marked differences on average between urban and rural areas. 'Owners' is one of the most widely used proxies in US-based studies of the determinants of self-employment and entrepreneurship. For example, Hurst and Lusardi (2004) adopt this definition to study credit constraints. The authors find a slightly higher incidence of 'Owners' (at 13%) using the US Panel Study of Income Dynamics (PSID) data than we do using the LFS (at 9–10%).

As for our previous proxy, we find the amount of variation across TTWAs is substantial and more pronounced in rural areas (around 25%) than in urban areas (at approximately 21%). There are significantly fewer 'Owners' when focusing on manufacturing as opposed to services, with the shares of self-employed in manufacturing shrinking to 5.1% and 6.2% in urban and rural areas, respectively. The corresponding shares in services are 8.1% and 9.1%. Finally, we still find more spatial variation in manufacturing (40% and 49% in urban and rural areas, respectively) than in services (at 20% and 25%).

A graphical representation of these patterns is presented in Fig. 1, where we map the density of our proxies for self-employment across urban and rural TTWAs. The urban-area plots (left panels) confirm the common perception that London and the South-East are more 'entrepreneurial'. This is true for both definitions. Some expected patterns also emerge when focusing on the rural maps (right panels). These show a high density of self-employment along the South-West coast, in Cornwall and in parts of Wales and Scotland, which might be explained by the tourist industry. However, there is also a high incidence of self-employment in some northern areas along the corridor running east to west, and north of Hull, York, Manchester and Liverpool. Another finding that emerges from these plots is that the two measures of self-employment tend to highlight 'hot-spots' in similar areas. This is confirmed by the fact that the correlation between the two proxies is very high, at 0.92 and 0.85 in urban and rural areas, respectively.

We also investigate whether the geographical distribution of self-employment has been stable over time by cross-plotting average TTWA self-employment rates up to 2002 and after 2002. For urban areas, we find that TTWAs with more self-employed workers up to 2002 remained more 'entrepreneurial' in the subsequent years. London and the surrounding areas – e.g. Brighton, Tunbridge Wells, Guilford, Cambridge, Oxford and Slough – always rank at the top. Conversely, Dudley, Dundee, Bradford, Glasgow and Newport always feature near the bottom. As for rural areas, the intensity of self-employment before 2002 is similarly well in-line with the share of self-employment after that date, although the alignment is less precise than for urban areas. Cornwall, Devon, Kendal, parts of Wales and Yorkshire feature at the top of the rankings, whereas Scottish TTWAs tend to be at the bottom of the self-employment distribution.

3.2. Firm creation and innovation across TTWAs

In this section, we discuss the proxies for entrepreneurship we constructed by aggregating data from the BSD and CIS. Descriptive statistics are reported in the bottom two panels of Table 1.

We find that the annual rate of *net* firm creation is around 0.5% in both urban and rural areas, implying that at every point in time nearly as many firms enter as exit the market. Additional statistics presented in the working paper version of our research show that approximately 14% new firms are created every year in both urban and rural areas, and that the correlation between *net* and *gross* firm creation is approximately 0.65. We also find that the variation

Fig. 1. The spatial distribution of self-employment. *Note:* Shares calculated using Labour Forces Survey (LFS), Spring Quarters 1995–2009. Different definitions of self-employment explained in the text. Sectors excluded from calculations as follows: Agriculture, Hunting and Forestry; Fishing; Public Utilities (Electricity, Gas and Water); Public Administration and Defence; Private Households with Employees; and Extra-Territorial Organization and Bodies. Sample includes 79 Urban and 79 Rural Travel to Work Areas (TTWAs; TTWAs were regrouped following Gibbons et al., 2010; further: Inner and Outer London have been separated).

across TTWAs is very significant: the coefficients of variation for the net share of firm creation for urban and rural areas are respectively 89% and 93%. The larger dispersion in rural areas is in line with the findings discussed above for the LFS. We find a similar pattern when looking at the gross share of firm creation, although the extent of variation is smaller in both urban and rural areas. This suggests that part of the geographical differences in terms of net firm density is explained by survival rates.

Next, we partition our measures of firm creation between services and manufacturing. For services, we find that on average between 1997 and 2008, the number of establishments has been expanding in both urban and rural areas. The net rate of firm creation was in the order of 0.6–0.7% every year. On the other hand, manufacturing activities have been shrinking and more markedly so in urban TTWAs: the net rate was −2.4% in urban areas and −1.5% in rural areas. We also find more variation across TTWAs in net firm creation in the service industries than in manufacturing. This is in contrast with the results we obtained using the LFS, and might be partly explained by the general downward trend in manufacturing.

In the bottom panel of Table 1, we report descriptive statistics for the fraction of firms that innovate in a given TTWA. This proxy bundles together process and product innovation. The figures show that firms in urban areas innovate slightly more than those in rural

Table 1
Self-employment and entrepreneurship – urban and rural areas.

	Urban areas			Rural areas		
	Mean	Std. dev.	C. of V. (%)	Mean	Std. dev.	C. of V. (%)
Independent self-employed (no freelance and subcontractors; LFS)						
All sectors	0.104	0.020	18.91	0.120	0.028	23.75
Manufacturing only	0.048	0.022	46.76	0.062	0.034	55.89
Services only	0.098	0.017	17.09	0.111	0.023	21.00
Owners (self-employed owning or controlling the business; LFS)						
All sectors	0.086	0.018	21.35	0.097	0.024	25.13
Manufacturing only	0.051	0.021	40.25	0.062	0.030	48.93
Services only	0.081	0.016	20.02	0.091	0.023	25.17
Net firm creation (share of existing firms; BSD)						
All sectors	0.005	0.005	89.40	0.005	0.005	92.69
Manufacturing only	−0.024	0.007	29.93	−0.015	0.008	49.10
Services only	0.007	0.005	71.07	0.006	0.005	94.71
Share of innovative firms (product and process innovation; CIS)						
All sectors	0.304	0.025	8.16	0.295	0.035	12.01
Manufacturing only	0.461	0.055	11.96	0.462	0.079	17.21
Services only	0.284	0.028	9.78	0.268	0.034	12.83

Note: Figures calculated using Labour Force Survey (LFS), Spring Quarters 1995–2009; Business Structure Database (BSD) for the years 1997–2008; and Community Innovation Survey (CIS) 2001, 2005, 2007 and 2009. Sectors excluded from calculations as follows: Agriculture, Hunting and Forestry; Fishing; Public Utilities (Electricity, Gas and Water); Public Administration and Defence; Private Households with Employees; and Extra-Territorial Organization and Bodies. There are 79 Urban and 79 Rural Travel to Work Areas (TTWAs; some TTWAs were regrouped following Gibbons et al., 2010; further: Inner and Outer London have been separated).

areas, but these differences are not marked nor statistically significant (30.4% versus 29.5%). Furthermore, there is more dispersion in innovative activities across rural areas (coefficient of variation 12%) than urban areas (8.2%). This is in line with the picture presented so far. We also find that more firms innovate in manufacturing (approximately 46% in both rural and urban areas) than in services (around 26.8% and 28.4% in rural and urban areas). This is true even if we focus on *process* innovation for services and *product* innovation for manufacturing. Finally, there is more variation across TTWAs in manufacturing than in services. Although these figures might be affected by fewer manufacturing than service firms in the CIS (due to the representative nature of the survey), this pattern follows the trend documented for our other proxies.

Note that the innovation measures we obtain using the CIS are likely to be better at pinning down the extent of innovative activities than commonly-used alternatives derived from the Global Entrepreneurship Monitor (GEM) data. GEM data trace out the share of entrepreneurs that indicate that their product/service is new to at least some or all of their customers. Using GEM data for the UK and adopting this metric, we find that around 47% of would-be entrepreneurs and 27% of actual start-ups describe their products or processes as new. It is evident that would-be entrepreneurs substantially over-state the innovative content of their enterprise. At the same time, UK GEM actual start-ups report levels of innovative activities (at 27%) similar to those obtained using the CIS (at about 30%). Unfortunately, the publicly-available GEM data is not geo-coded and so cannot be used for our analysis.

3.3. The sectoral distribution of self-employed workers and firms

To conclude this section, we present descriptive statistics for the sectoral distribution of self-employed individuals in the LFS and firms in the BSD. In order to do so, we append all plants active in the BSD in the various years to add up to about 29 million observations (or 2.4 million per year). Our findings are presented in Table 2. Note that we re-group sectors to match Glaeser (2009) and Hurst and Pugsley (2010) on US data. More details are provided in the table.

Starting with the urban areas, the overall impression is that the match between the sectoral distribution of self-employed workers in the LFS and firms in the BSD is reasonably good. The biggest discrepancies are concentrated in Construction. The percentage of BSD units in Construction is 9.82%, while the corresponding figure is around 20% for self-employed workers in the LFS. Conversely, the incidence of Wholesale Trade; Finance, Insurance and Real Estate (FIRE); and Accommodation/Food Services is higher in the BSD than in the LFS.

As for rural areas, the differences between the BSD and LFS are similar to those detected in the urban sample. However, there is a higher incidence of both self-employed workers (LFS) and firms (BSD) in Construction; Retail Trade; and Accommodation and Food Services; and a smaller incidence of Professional Services. Some of these urban/rural differences are slightly more pronounced when considering the 'Owner' definition of self-employment, but broadly speaking similar patterns emerge when using this proxy.

It is instructive to compare the sectoral incidence of UK self-employment with figures provided in Glaeser (2009) and Hurst and Pugsley (2010) for the US. Glaeser (2009) tabulates the incidence of self-employed workers in non-agricultural sectors. Our figures are broadly comparable to his, although we tend to over-sample self-employed workers in Construction and have more self-employment in High-Tech Manufacturing, Accommodation and Food, and Health services. Conversely, we have less self-employed in Low-Tech Manufacturing. We also have a larger group of Professional and FIRE self-employed workers, which broadly speaking corresponds to Glaeser's High-Skill Information Services. Relative to Hurst and Pugsley (2010), LFS self-employed workers tend to feature more prominently in Construction, but also in allegedly more entrepreneurial sectors such as High-Tech Manufacturing and Professional Services. There are also some discrepancies in the share of self-employed workers in Transportation and Warehouse (more in the LFS, although this group also includes Communication Services in our data), and FIRE (less in the LFS). However, by and large, these comparisons reveal that the sectoral distribution of self-employed and small businesses in the US and the UK is remarkably similar.

4. Self-employment and entrepreneurship in urban and rural areas

4.1. Main results on urban and rural areas

In this section, we exploit information from the three datasets discussed above combined at the TTWA level to investigate how

Table 2
Sector distribution of self-employment and entrepreneurial ventures – urban and rural samples.

Industry	Urban areas			Rural areas		
	Independent self-emp. (LFS)	Owners (LFS)	Share of firms (BSD)	Independent self-emp. (LFS)	Owners (LFS)	Share of firms (BSD)
Mining and Quarrying	0.13	0.17	0.11	0.13	0.15	0.23
Construction	21.36	19.81	9.82	23.63	21.54	11.96
High-Tech Manufacturing	2.69	4.36	3.60	3.07	4.53	3.19
Low-Tech Manufacturing	4.18	5.58	4.69	4.92	6.23	5.04
Transport/Warehouse/Comm.	7.97	5.93	4.45	6.13	5.28	5.01
Wholesale Trade	5.54	6.91	9.20	6.16	7.51	9.60
Retail Trade	9.34	11.00	11.81	10.51	12.03	13.20
FIRE	3.97	4.43	7.51	3.63	3.99	6.31
Accommodation/Food Services	3.62	3.94	6.82	5.50	6.34	9.22
Entertainment Services	5.33	4.50	4.16	4.55	3.93	3.75
Professional and R&D Services	18.85	20.80	24.42	15.20	15.84	18.33
Health Care Services	8.21	5.67	5.42	8.01	5.74	5.91
General Services	8.80	6.90	7.98	8.55	6.89	8.24

Note: Cells tabulate percentages of self-employed people (LFS) and firms (BSD) operating in one of the listed sectors. Sectors have been regrouped using 2-digit SIC Code as follows: Mining and Quarrying: codes 10–14; Construction: code 45; High-Tech Manufacturing: codes 22–24, 29–35; Low-Tech Manufacturing: codes 15–21, 25–28, 36–37; Transport/Warehouse/Communication: codes 60–64; Wholesale Trade: codes 50–51; Retail Trade: code 52; FIRE: codes 65–71; Accommodation/Food Services: code 55; Entertainment Services: code 92; Professional Services: codes 72–74; Health Care Services: codes 85, 90; General Services: codes 80, 91, 93.

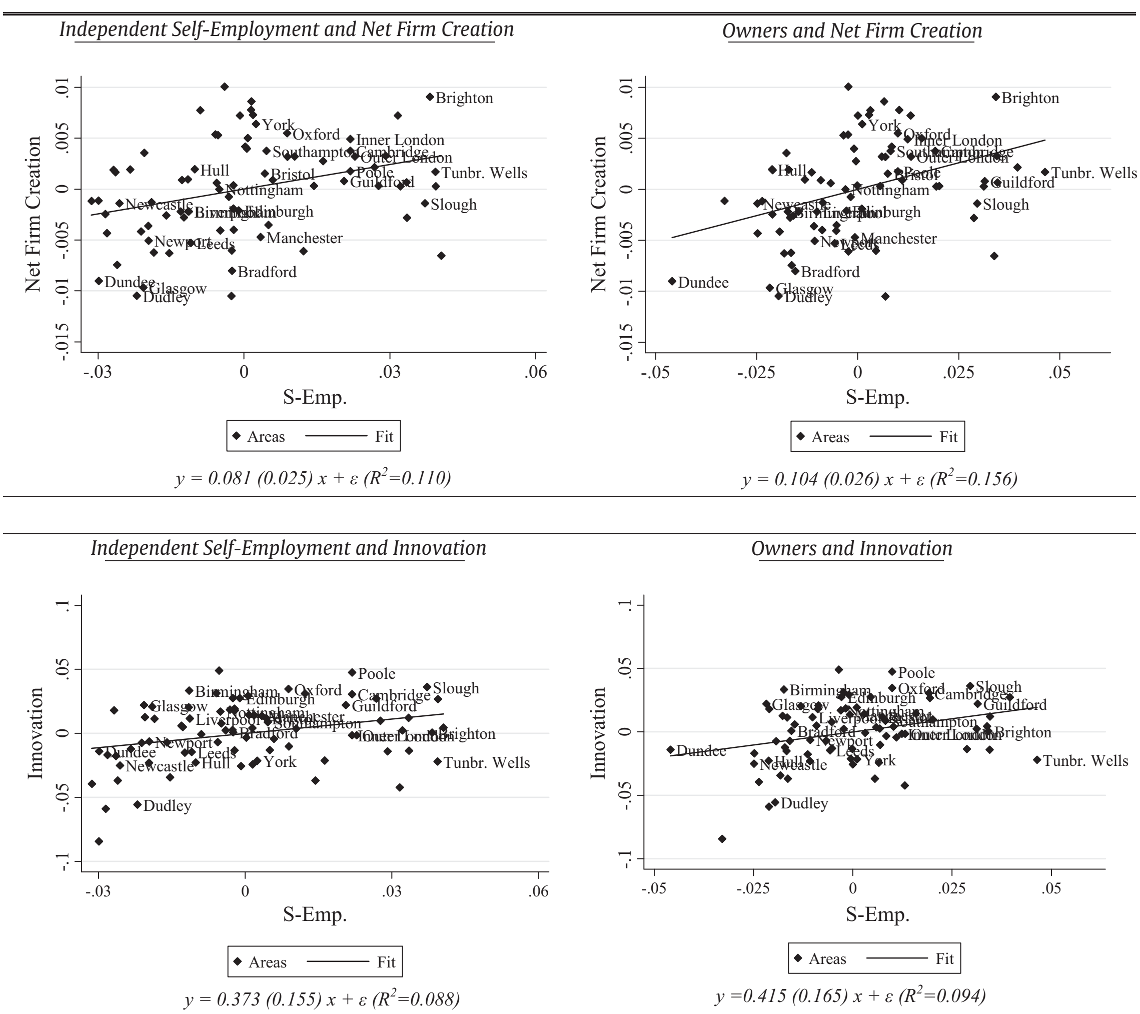

Fig. 2. Self-employment and entrepreneurship in urban areas. *Note:* Analysis includes 79 urban TTWAs only. All variables displayed in the panels have been demeaned. Equations report coefficients and standard errors of a regression of the variable on the vertical axis (*y*, e.g. share of innovative firms) on variable on the horizontal axis (*x*, i.e. a given measure of self-employment) plus a constant. Robust standard errors used.

the incidence of self-employment 'lines up' with business start-up rates and innovation density in urban and rural areas. Our findings are presented graphically by cross-plotting shares of self-employed workers against rates of firm creation and innovation. Results are organised as follows. Fig. 2 focuses on urban areas, whereas Fig. 3 concentrates on rural areas. The left panels of both figures focus on 'Independent Self-Employed', whereas the right panels display results for 'Owners'. Finally, the top panels present the alignment of self-employment with net firm creation, while the bottom plots depict the relationship between self-employment and the share of innovative firms. All variables have been demeaned so that the scale on the axis is in deviation from sample means. To assess the significance of the associations depicted in the graphs, we also run univariate regressions at the TTWA level of either firm creation rates or the incidence of innovation on local shares of self-employment. The numbers at the bottom of each panel report coefficients from these regressions, and the associated heteroskedasticity-robust standard errors (in parenthesis).

Starting with the urban plots, the panels of Fig. 2 depict a positive story: rates of self-employment are well aligned with firm creation and innovation. The relationship between the incidence of self-employed workers and net firm creation is always positive, and the regression coefficients reveal a significant association for both self-employment proxies with *t*-statistics in the range of 3.5–4. The regression coefficient of net firm creation on 'Independent Self-Employed' is 0.081 with a standard error of 0.025, further climbing to 0.104 (s.e. 0.026) when considering 'Owners'. The bottom panels of the figure presents the association between self-employment and innovation. In both plots, we find a positive relation between self-employment and the intensity of innovation, significant at the 1% level. When considering 'Independent Self-Employed', we find a coefficient of 0.373 (s.e. 0.155), further rising to 0.415 (s.e. 0.165) when focussing on 'Owners'.

Further results presented in Fig. A1 show that self-employment is positively associated with *gross* rates of firm creation, although the overall levels of significance are attenuated relative to those reported in Fig. 2. For example, the regression coefficient of gross firm entry on 'Owners' is 0.072 (s.e. 0.039), significant at the 10% level (see Fig. A1, bottom-left panel). The weaker relationship between self-employment and gross (as opposed to net) firm creation is partly explained by the fact that the incidence of firm destruction in urban areas is significantly and negatively correlated with the density of self-employment.

The positive findings for urban TTWAs no longer hold when focussing on rural areas. Looking at Fig. 3, we find that the share of self-employment in rural TTWAs is *not* positively and significantly associated with the rate of net firm creation. Although there is a positive association between net firm creation and our two proxies for self-employment, this relation is much flatter than for the urban sample and not significant at conventional levels. The

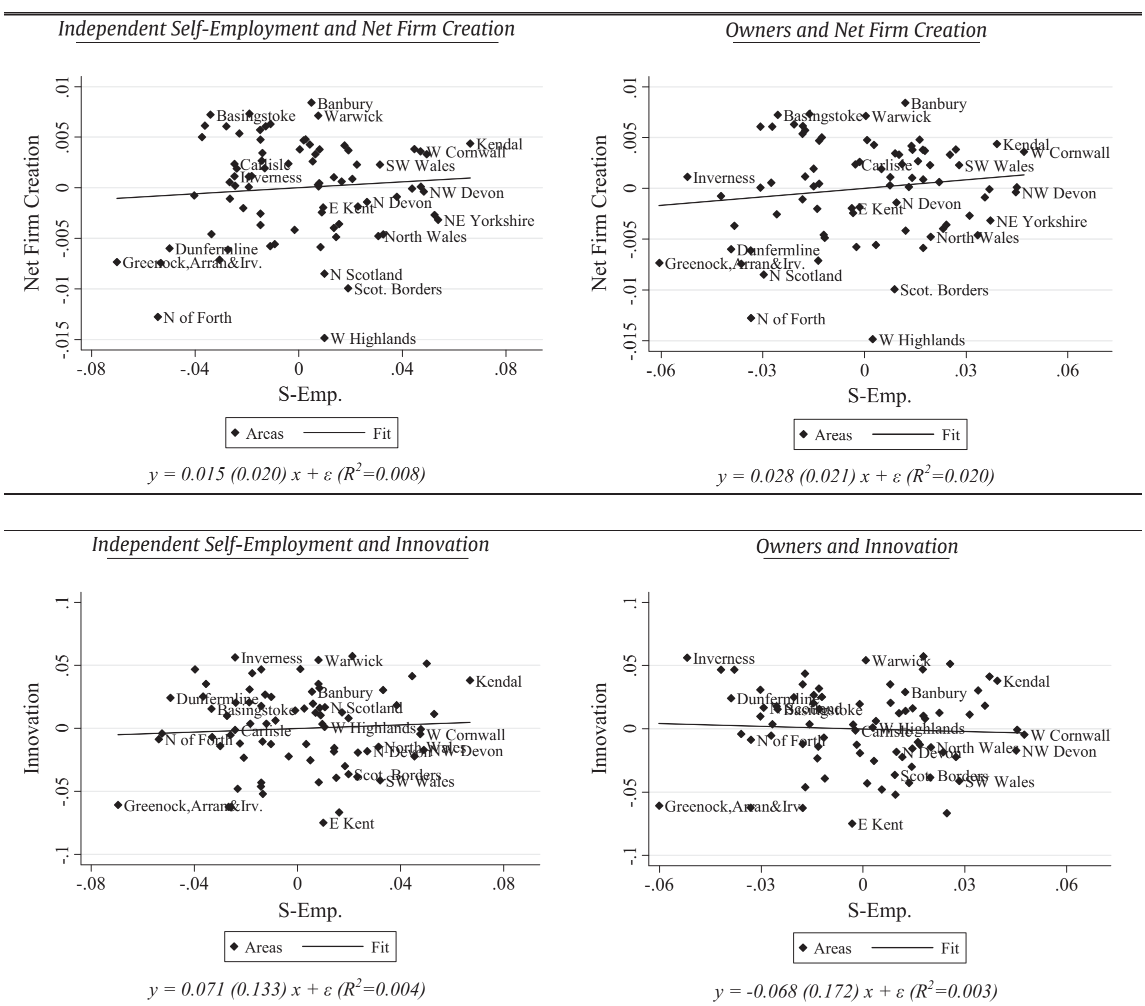

Fig. 3. Self-employment and entrepreneurship in rural areas. *Note:* Analysis includes 79 rural TTWAs only. All variables displayed in the panels have been demeaned. Equations report coefficients and standard errors of a regression of the variable on the vertical axis (*y*, e.g. share of innovative firms) on variable on the horizontal axis (*x*, i.e. a given measure of self-employment) plus a constant. Robust standard errors used.

coefficient of the regression of the net share of firm creation on 'Independent Self-Employed' is 0.015 (s.e. 0.020), and the corresponding figure for 'Owners' is 0.028 (s.e. 0.020). The bottom panels of Fig. 3 show that the share of self-employment in a TTWA is similarly not positively or significantly associated with innovative activities. While for 'Independent Self-Employed' workers the relation remains positive (at 0.071) but insignificant (s.e. 0.133), the link between 'Owners' and innovation is negative (though insignificant) with a coefficient of −0.068 (s.e. 0.172). Fig. A1 further shows that gross firm creation is negatively linked to self-employment in rural TTWAs, although this relation is not statistically significant.

Note that at the bottom of each panel we also report the R-squared from our simple TTWA-level regressions in urban and rural areas. Across all specifications, R-squared are substantially higher for the urban sample than for the rural one. For instance, the incidence of self-employment explains between 11% and 16% of the overall variation in net firm creation in urban areas. The corresponding values for rural areas are 0.8–2%. Similarly, urban self-employment rates explain approximately 9% of the spatial variation in innovation activities, but the corresponding figures for the rural sample are much lower, at 0.3–0.4%.

All in all, these findings suggest that measures of self-employment derived from individual-level data act as good proxies for entrepreneurship as measured by start-up and innovation rates in urban areas. Conversely, the same self-employment measures applied to rural areas would give a distorted picture of the spatial distribution of entrepreneurial activities. Clearly, at this stage, we cannot rule out the possibility that even in urban areas self-employment captures a different – and less entrepreneurial – phenomenon than firm creation and innovation. For example, truly entrepreneurial ventures might drive up local population and generate demand for 'replicative' self-employment in urban areas. We will return to these issues in Section 5, where we explore some explanations for our findings.

4.2. Sectoral heterogeneity: manufacturing versus services

As already noted, the share of firms in manufacturing sectors has been declining steadily in the UK during the period 1997–2008, but this decline was more marked in urban areas than in rural areas, leaving more room in cities for services to flourish. It might also be argued that self-employment is a better proxy for entrepreneurship in service sectors, where individuals leading consultancies or setting up retail chains might still view themselves as self-employed – and yet be highly entrepreneurial. On the other hand, entrepreneurs who founded a large manufacturing plant might not identify themselves as self-employed. If this was the case, the lack of alignment between the share of self-employed workers and both firm creation and innovation in rural areas might be related to sectoral considerations.

In order to explore this issue, we repeat the analysis carried out in Section 4.1, but considering service and manufacturing industries separately. Our results are presented in Figs. 4 and 5, where we only consider 'Owners'.[8] Note that when calculating the shares of self-employed workers in urban and rural areas, and separately for services and manufacturing, our individual-level data becomes thin. This is particularly true for manufacturing in rural areas (the number of individuals working in rural manufacturing is about 30,000, climbing to 90,000 for urban manufacturing). Therefore, we expect the results in this section to be more 'noisy' than the findings discussed in Section 4.1.

Fig. 4 concentrates on individuals and firms operating in service industries. The left panels of the figure refer to individuals and firms located in urban areas, whereas the right panels concentrate on rural areas. The two rows present evidence on the link between self-employment and: (i) net firm creation (top row); (ii) innovation (bottom row). Since we are focussing on services, we concentrate on *process* innovation.

Starting with the urban graphs, the share of 'Owners' is positively aligned with both proxies for entrepreneurship: the regression of net firm creation on self-employment yields a significant coefficient of 0.100 (s.e. 0.034), increasing to 0.401 (s.e. 0.135) when we consider innovation. On the other hand, the relation between self-employment and entrepreneurship in rural areas is slightly negative when considering net rates of business start-ups (coeff. −0.008; s.e. 0.025), and positive but insignificant when focussing on the share of innovative firms (coeff. 0.167; s.e. 0.103).

In Fig. 5, we replicate this analysis for manufacturing. In this case, our proxy for innovation considers only firms that engage in *product* innovation. Starting with the urban panels, we find that a larger share of 'Owners' is positively associated with both net firm creation (coeff. 0.067; s.e. 0.037) and innovation (coeff. 0.626; s.e. 0.380). However, this is not the case for rural areas. The link between self-employment rates and net firm creation remains positive, but becomes much flatter and turns insignificant (coeff. 0.023; s.e. 0.034). Similarly, the association between 'Owners' and the share of innovative firms is positive but substantially smaller and less precisely estimated than for urban areas (coeff. 0.088; s.e. 0.284).

By and large, the evidence gathered in this section suggests that the stark urban/rural heterogeneity documented so far cannot be explained by differences in the incidence of manufacturing and services in urban and rural TTWAs.

4.3. Robustness checks and additional findings

In this section, we discuss a number of extensions that assess the robustness of our findings. To begin with, we investigate whether our results are robust to the use of other self-employment definitions adopted in the literature. To do so, we use either all self-employed workers, or self-employed individuals in professional and managerial occupations (i.e. identified as "Managers and senior officials"; "Professionals"; or in "Associate professionals and technical occupations" by the LFS 1990 Socio-Economic Classification at the 1-digit level). When we adopt these measures, we find patterns that are fully consistent with those discussed above. For example, the link between net firm creation and 'all self-employment' carries a positive regression coefficient of 0.085 (s.e. 0.023) significant at the 1% level in urban areas. However, this relationship turns flatter and insignificant (coeff. 0.020; s.e. 0.016) when considering rural TTWAs.[9]

Next, we check whether the patterns documented so far are affected by the exclusion of multi-plant enterprises from the BSD and the CIS. For the latter dataset, in particular, we were forced to assign the same level of innovative activity to all plants belonging to the same multi-plant enterprise since we could not pin down the business unit in which the innovation was developed (see Section 2.3). By dropping multi-plant enterprises, we bypass this problem. When we do so, we confirm our previous results. The link between self-employment ('Owners') and innovation remains positive and significant for urban areas (coeff.: 0.574; s.e. 0.283), but negative, not significant for rural TTWA (coeff.: −0.396; s.e. 0.362). Similarly, when dropping multi-plant firms from the BSD, the rela-

[8] Results obtained using 'Independent Self-Employed' are similar and are available on request.

[9] The results discussed in this section are not tabulated for space reasons, but are available in the working paper version of this article (Faggio and Silva, 2012) or on request from the authors.

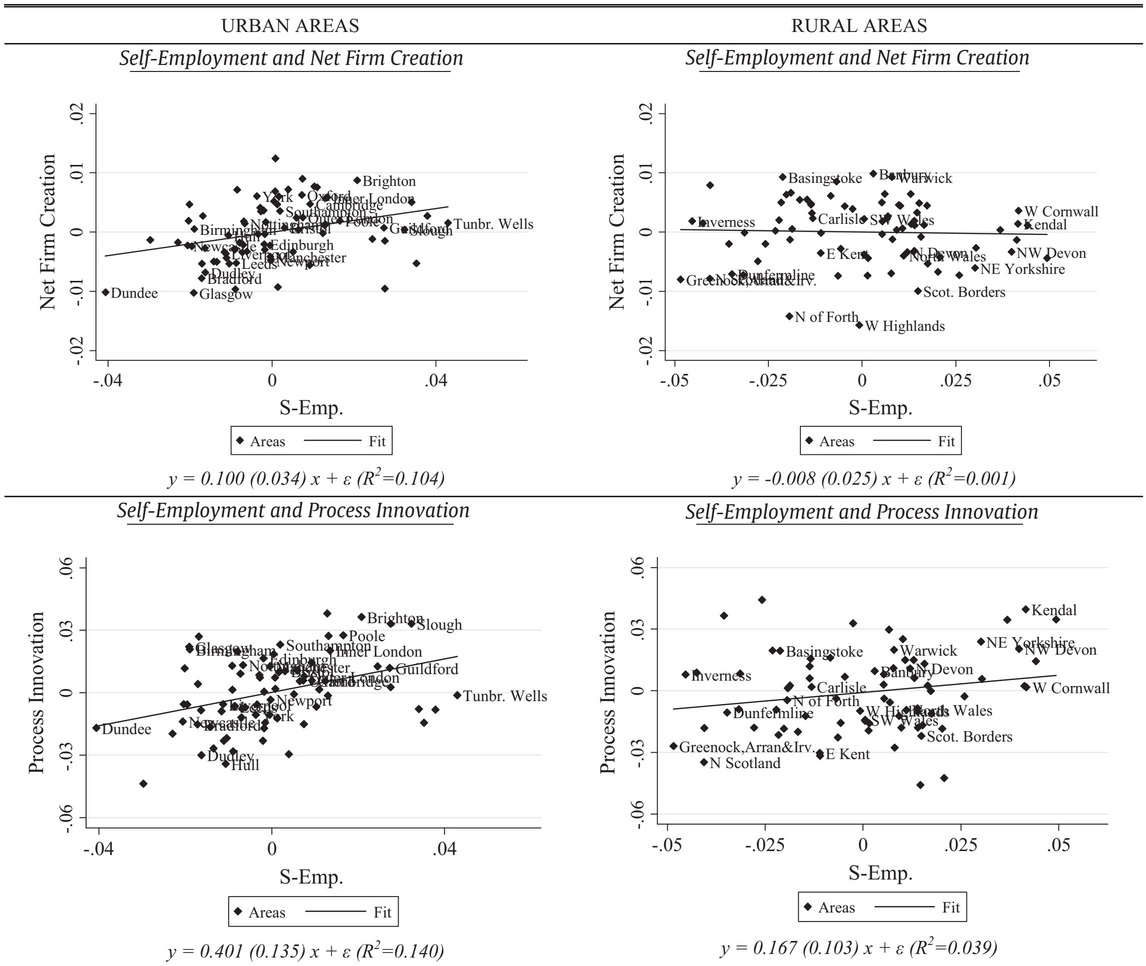

Fig. 4. Self-employed owners working in *Services* in urban and rural areas. *Note:* See notes to Figs. 2 and 3 (various panels). Descriptive statistics for process innovation as follows. Urban areas: mean = 0.163; std. dev. = 0.025. Rural areas: mean = 0.151; std. dev. = 0.074.

tion between net firm creation and 'Owners' remains positive in urban areas with a regression coefficient of 0.054 (s.e. 0.030), but turns completely flat in rural areas at 0.002 (s.e. 0.026).

As discussed in Section 2.3, another concern relates to the structure of the CIS, which was designed to be representative of broad geographical areas – namely, regions – larger than the ones we consider here (TTWA). In order to assess whether this affects our findings, we re-run our analysis at the regional level using the 18 macro-areas provided by the LFS, further partitioned into their urban and rural parts. Although the results from this investigation are less conclusive given the very limited number of observations, we find patterns which are broadly consistent with our previous findings. For example, the link between 'Owners' and innovation is substantially larger in urban areas (0.425, s.e. 0.275) than in rural areas (0.037, s.e. 0.189).

A final concern is that our results are driven by outliers based on very small numbers of individual-level observations used to calculate area-level self-employment rates. As noted above, this issue is particularly relevant for rural areas and for self-employment in manufacturing. Although the graphical evidence in Figs. 2–5 already suggests that outliers do not drive our findings, we asses this issue more formally by re-running our analysis weighting regressions by the number of workers used to measure the incidence of self-employment. This change does not affect our results.

5. What explains the urban/rural heterogeneity?

5.1. Local employment opportunities and the urban/rural heterogeneity

In this section, we explore whether local labour market conditions can explain the misalignment between self-employment and entrepreneurship that we observe in rural areas.

In order to shed some light on this issue, we exploit additional information contained in the LFS and compute three proxies that capture the pervasiveness of lack of employment opportunities at the TTWA level. These variables are: (i) the incidence of individuals who work part-time because of lack of full-time employment opportunities; (ii) the unemployment rate in the working-age population; and (iii) the inactivity rate among working-age individuals. Note that these measures are aggregated using all individuals in their working age (16–64 year old males and 16–59 year old females) – not just for the self-employed – over 12 years, and therefore measure lack of employment opportunities across the whole of the labour market. Descriptive statistics for these variables are presented in Table A2. These show that more people work part-time because of lack of full-time employment opportunities in rural areas (11.7%) than in urban areas (10%). The rates of unemployment and inactivity are instead

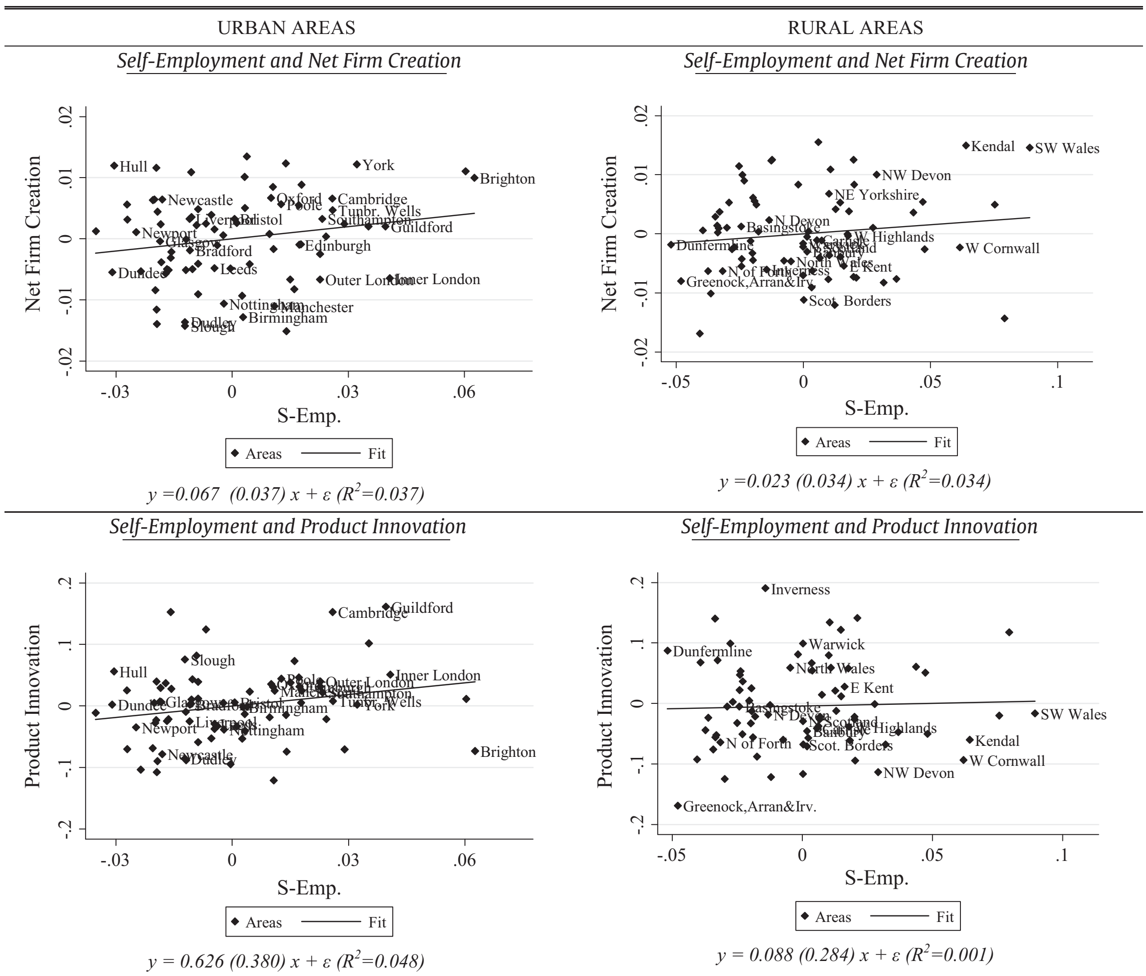

Fig. 5. Self-employed owners working in *Manufacturing* in urban and rural areas. *Note:* See notes to Figs. 2 and 3 (various panels). Descriptive statistics for product innovation as follows. Urban areas: mean = 0.404; std. dev. = 0.057. Rural areas: mean = 0.385; std. dev. = 0.074.

higher in urban areas than rural TTWAs, though these differences are small.[10]

We begin our investigation by studying the association between self-employment and entrepreneurship, and the three proxies for lack of employment opportunities. In particular, we analyse: (a) whether individuals are deterred from/drawn to *self-employment* in areas with poor employment opportunities, and whether this association is heterogeneous across rural and urban areas; and (b) whether the association between *entrepreneurship* – specifically, net firm creation – and poor labour market opportunities is positive/negative, and heterogeneous along the urban/rural dimension.

We present our results in Table 3, where we pool data for both urban and rural areas, and estimate the following regression using 158 TTWA-level observations:

$$Outcome_i = \alpha + \beta LackEmpl_i + \gamma Rural_i + \delta LackEmpl_i \times Rural_i + \varepsilon_i \quad (1)$$

where the subscript i refers to TTWAs; $Outcome_i$ is either the incidence of self-employed 'Owners' in the TTWA or the rate of net firm creation; $LackEmpl_i$ is one of the proxies for the lack of employment opportunities just discussed; $Rural_i$ is a dummy denoting whether a TTWA is rural; and $LackEmpl_i \times Rural_i$ is an interaction between the former two variables. Finally, ε_i is a random error term, which we allow to be heteroskedastic and correct the standard errors accordingly.[11]

Across all columns, we find that the coefficients on our proxies for poor labour market opportunities are negatively and significantly associated with both self-employment and net firm creation. However, an interesting pattern emerges when considering the interaction between the variables capturing lack of employment opportunities and the dummy indicating whether the TTWA is rural. When focussing on self-employment, this term carries a positive and clearly significant coefficient for 'lack of full-time employment' and the local inactivity rate, and a positive and sizeable coefficient (though not significant at conventional levels) when considering local unemployment. Conversely, net firm creation is *not* positively associated with lack of employment opportunities in rural areas. The coefficient on the interaction term is negative (insignificant) when focussing on 'lack of full-time employment' and unemployment, and positive (but small and insignificant) when considering local inactivity rates. Finally, the coefficient on the dummy $Rural_i$ is imprecisely estimated across all columns.

[10] Although small, these differences are significant. A test for the equality of means in urban and rural areas for 'lack of full time employment' rejects the null with a p-value of 0.0006. The p-values for the unemployment and inactivity rates are 0.045 and 0.048, respectively. See related standard errors of means in Table A2.

[11] We check that our findings do not differ when we use the incidence of 'Independent Self-Employed' or the share of innovative firms. See Table A3 (Columns 1 and 2), where we tabulate results using 'lack of full time employment' as a proxy for local labour market opportunities. More results are available on request.

Table 3
Labour market opportunities, self-employment and firm creation.

Dependent variable is: owners/net firm creation	(1)	(2)	(3)	(4)	(5)	(6)
	Proxy for poor labour market opportunities					
	Lack of full time employment		Unemployment		Inactivity rate	
	Owners	Net firm creation	Owners	Net firm creation	Owners	Net firm creation
Labour Market Proxy × Rural Area	0.301 (0.121)**	−0.012 (0.026)	0.105 (0.198)	−0.020 (0.044)	0.195 (0.090)**	0.028 (0.017)
Labour Market Proxy	−0.371 (0.088)***	−0.074 (0.201)***	−0.677 (0.120)***	−0.120 (0.032)***	−0.284 (0.037)***	−0.062 (0.011)***
Rural Area	−0.018 (0.013)	0.002 (0.003)	0.002 (0.011)	0.000 (0.002)	−0.032 (0.019)	−0.005 (0.004)

Note: Regressions at the Travel to Work Area (TTWA) level. Number of observations: 158 of which 79 in urban areas and 79 in rural areas. Table reports coefficients from regressions of the dependent variable on the explanatory factors and robust standard errors in round parenthesis. Descriptive statistics for the labour market opportunity proxies are provided in Table A2. 'Lack of Full Time Employment Opportunities', 'Unemployment Rate' and 'Inactivity Rate' are calculated using LFS data for adult working-age population (16–64 year-old males; 16–59 year-old females).
* 10% significant.
** 5% significant.
*** 1% significant.

We interpret this pattern as follows. Although poor labour market opportunities reduce the chances of self-employment across the board, this negative relationship is considerably flatter in rural TTWAs – suggesting that more urban than rural workers 'take their chances' and become self-employed as we move from areas with poor labour market outcomes to those characterised by more dynamic economic environments. We see this group of urban workers as risk-taking, innovative individuals – in the sense of Knight (1921) and Schumpeter (1921) – who spur local entrepreneurship. This positive dynamics does not, however, hold for rural workers. Our results are also consistent with a more negative story: as labour market conditions deteriorate, urban workers are discouraged from becoming self-employed more than their rural counterparts – who still transit into self-employment because they lack of better alternatives. This explanation is consistent with the literature on 'self-employment of last resort' (e.g. Earle and Sakova, 2000; Santarelli and Vivarelli, 2007). Either way, it is evident that self-employment and start-up rates are better lined-up in urban areas since both variables are negatively associated with lack of employment opportunities and thus likely to capture the same economic phenomenon – i.e., genuine entrepreneurship. This is not the case in rural areas.

In order to test more formally whether the misalignment between self-employment and net firm creation can be accounted for by local labour market conditions, we estimate the following regression:

$$Entr_i = \alpha + \beta SelfEmp_i + \gamma Rural_i + \delta SelfEmp_i \times Rural_i + \lambda LackEmpl_i + X_i'\Sigma + \varepsilon_i \quad (2)$$

where the subscript i still refers to TTWAs; $Entrep_i$ is the rate of net firm creation; $SelfEmp_i$ is the share self-employed 'Owners'; $Rural_i$ is once again a dummy denoting whether a TTWA is rural; $LackEmpl_i$ is one of the proxies for the lack of employment opportunities described above. We also add a vector X_i' of additional TTWA controls computed among working-age individuals, including: average age, household size and number of children; percentage of males; percentage of white British; and percentage of homeowners. Finally, ε_i is a random error term which we allow to be heteroskedastic (so we use 'robust' standard errors).

We use this regression to study whether local employment opportunities explain the urban/rural heterogeneity discussed above. In particular, we estimate this equation guided by the following intuition. The positive association between urban self-employment and entrepreneurship is genuine. Conversely, the flatter or negative link between these two variables in rural areas (see Fig. 3 and Table 3) is spurious and driven by an omitted factor – i.e. the lack of employment opportunities. This omitted factor is negatively associated with net firm creation across all areas, but its relationship with self-employment is less negative in rural TTWAs than urban ones. Stated differently, the omitted factor is positively correlated with the interaction term $SelfEmp_i \times Rural_i$, but negatively with both $Entr_i$ and $SelfEmp_i$.

If this line of reasoning is correct, we should have that: (a) omitting this factor from Eq. (2) gives rise to a negative association between self-employment and entrepreneurship in rural areas; and (b) the proxies for poor labour market opportunities enter our regressions with negative and significant coefficients, and their inclusion explains away the negative link between self-employment and entrepreneurship in rural areas (relative to urban areas). This is exactly what we find.

We present our evidence in Table 4. In Column (1), we start by estimating Eq. (2) without controlling for $LackEmpl_i$, but including the vector X_i' of controls. If the diagrammatic results in Figs. 2 and 3 depict urban/rural differences that are robust to the inclusion of simple demographic controls, then the regression should show: (i) a positive and significant coefficient β on $SelfEmp_i$; and (ii) and negative and significant coefficient δ on the interaction term $SelfEmp_i \times Rural_i$. The term $Rural_i$ should instead enter with a small coefficient given that Table 1 shows that the mean differences in net firm creation and innovation are negligible between urban and rural areas. We find that this is the case. The coefficient on self-employed 'Owners' is positive and significant at 0.125 (s.e.: 0.027), but its interaction with $Rural_i$ carries a negative and significant estimate at −0.061 (s.e.: 0.031). Finally, the dummy for rural areas has a small significant coefficient (0.006; s.e. 0.003) – suggesting that rural areas with no self-employment have more net firm creation than zero self-employment urban areas.

Next, we augment our specification by adding the three proxies for poor labour market opportunities. In Column (2), we include 'lack of full-time employment'. This variable enters the regression with a negative and significant coefficient at −0.063 (s.e. 0.013). More importantly, we find that the overall relationship between self-employment and entrepreneurship becomes smaller (at 0.062), but remains significant at the 1% level. We also find that the negative association between self-employment and net firm creation for rural areas shrinks by a factor of three to −0.020, and becomes statistically insignificant.[12]

[12] Using 'Independent Self-Employed' or innovation as a proxy for entrepreneurship yields similar patterns to the ones presented in Table 4. See Table A3 (Columns 3–8), where we tabulate results using 'lack of full time employment' as a proxy for poor labour market opportunities. Note that our findings are less precise when focussing on the share of innovative firms. This is expected since this variable was aggregated using fewer observations than those used to construct net firm creation, and so is likely to be 'noisier' (see Section 2.3). More results are available on request.

Table 4
Explaining the difference in the relationship between self-employment and net firm creation in urban and rural areas.

Dependent variable is: net firm creation	Proxy for poor labour market opportunities is				
	(1)	(2)	(3)	(4)	(5)
	No additional control	Lack of FT empl. opportunities	Unemployment rate	Inactivity rate	Joint controls
Owner	0.125 (0.027)***	0.062 (0.031)***	0.064 (0.033)**	0.079 (0.030)***	0.055 (0.033)*
Owner × Rural Area	−0.061 (0.031)**	−0.020 (0.032)	−0.024 (0.032)	−0.018 (0.032)	−0.014 (0.033)
Rural Area	0.006 (0.003)**	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Lack of full-time (FT) Employment Opportunities		−0.063 (0.013)***			−0.047 (0.018)**
Unemployment Rate			−0.099 (0.025)***		−0.023 (0.050)
Inactivity Rate				−0.044 (0.010)***	−0.008 (0.020)

Note: Regressions at the Travel to Work Area (TTWA) level. Number of observations: 158 of which 79 in urban areas and 79 in rural areas. Table reports coefficients from regressions of the dependent variable on the explanatory factors and robust standard errors in round parenthesis. All regressions further control for the following additional variables averaged in the TTWA: male; age; white ethnicity; home-ownership; household size; and number of children. Information derived from LFS data and referring to adult working-age population (16–64 year-old males; 16–59 year-old females). Each column corresponds to a different regression. Descriptive statistics for the additional controls are provided in Table A2. 'Lack of Full Time Employment Opportunities', 'Unemployment Rate' and 'Inactivity Rate' are calculated using LFS data for adult working-age population (16–64 year-old males; 16–59 year-old females).
* 10% significant.
** 5% significant.
*** 1% significant.

In Column (3), we replace 'lack of full-time employment' with local unemployment. We find broadly consistent patterns. While the overall association between self-employment and entrepreneurship remains positive and significant (at 0.064; s.e. 0.033), the negative link for rural areas shrinks substantially and becomes insignificant (at −0.024; s.e. 0.032). Finally, the local rate of unemployment displays a sizeable and negative coefficient at −0.099, significant at the 1% level.

We find very similar results in Column (4), where we concentrate on the inactivity rate among working-age adults as a proxy for poor labour market opportunities. The coefficient on $SelfEmp_i$ stays sizeable and significant at 0.079 (s.e. 0.030), whereas the coefficient on the interaction term $SelfEmp_i \times Rural_i$ shrinks by a factor of nearly 3.5 and becomes statistically insignificant. Lastly, the local inactivity rate enters the specification with a negative effect at −0.044 (s.e. 0.010).

These results suggest that local employment opportunities can account for the lack of a positive relationship between self-employment and entrepreneurship in rural areas. The three measures for poor labour market conditions we have used in our analysis were chosen because they can be easily calculated from the data we have at hand. *A priori*, however, it is hard to know which of the three proxies is 'the right one', and whether these variables are the only proxies that could be used to measure flagging labour markets.

In Column (5), we partly address this issue by including the three measures at the same time. We still find that the association between self-employment and entrepreneurship is positive and (borderline) significant, and that the interaction term $SelfEmp_i \times Rural_i$ carries a small and insignificant coefficient (−0.014; s.e. 0.033) once we control for labour market opportunities. Among the three proxies, we find that only 'lack of full-time employment' carries a negative and significant coefficient – approximately three-quarters of the size displayed in Column (2). The other two variables instead shrink more substantially. This is consistent with the findings presented in Table 3: of the three proxies, 'lack of full-time employment' was the one with the largest positive association with self-employment in rural areas – the interaction term $LackEmpl_i \times Rural_i$ carried a coefficient of 0.301 – relative to the overall negative link between the two variables – estimated at −0.371.

It is worth noting that local unemployment and inactivity rates are highly correlated (0.86) and collinearity between these two variables could account for their lack of significance in Column (5) of Table 4.[13] To address this issue, we check whether our findings change if we only include 'lack of full-time employment' and unemployment, or 'lack of full-time employment' and inactivity. We find this is not the case. When only considering the first two variables, we find that lack of full-time job opportunities carries a sizeable and negative coefficient at −0.051 (s.e. 0.019), whereas unemployment has a smaller effect at −0.036 (s.e. 0.035). Focussing instead on 'lack of full-time employment' and inactivity returns estimates of −0.049 (s.e. 0.018; significant at the 1% level) and −0.015 (s.e. 0.014; insignificant).

In some further robustness checks, we consider another proxy – namely the incidence of individuals who claim they would like to work longer hours in their current job, but are not offered the possibility to do so. When using this measure for the incidence of underemployment, we find similar patterns to those displayed in Table 4. In particular, while the coefficient on the relationship between net firm creation and self-employment remains positive and significant at 0.091 (s.e. 0.028), the interaction term $SelfEmp_i \times Rural_i$ is negative, but clearly insignificant at −0.050 (s.e. 0.031).

To summarise, the evidence gathered in this section suggests that the misalignment between self-employment and entrepreneurship in rural areas can be accounted for by local labour market conditions. In a nutshell, favourable environments push more *urban* workers to become entrepreneurial self-employed – but this is not true for their *rural* counterparts. The latter group instead is less sensitive to local economic conditions and less discouraged from transiting into self-employment as these deteriorate. This suggests that more rural than urban workers choose self-employment as last resort option because they lack of better alternatives.

5.2. Checks against alternative explanations

The heterogeneity presented above could also be rationalised by the distinction between 'replicative' and 'innovative' entrepreneurs (Baumol, 2005), and their differential incidence in urban and rural areas.

In order to test whether replicative entrepreneurship can explain some of the urban/rural disparities presented so far, we

13 Lack of full-time employment has a 0.65 and a 0.64 correlation with unemployment and inactivity, respectively.

carry out a set of regressions similar to those formalised in Eq. (2) and presented in Section 5.1, but replacing our proxies for local employment opportunities with measures capturing the incidence of replicative and innovative entrepreneurship. In particular, we identify individuals who choose self-employment because they want to 'Generate More Income' or because they 'Saw the Demand/Market' for a specific good or service to gather proxies for innovative entrepreneurship. We also consider self-employed individuals who choose this occupation because they 'Joined the family business' or 'Had family commitments/wanted to work from home' to construct proxies for replicative entrepreneurship. Using this data, we calculate the corresponding shares among self-employed workers in the TTWAs.[14]

We find that adding either of these controls to our specification does not substantially move the estimates presented in Column (1) of Table 4. The link between self-employment and net firm creation increases slightly when including the two proxies for innovative entrepreneurship, and decreases slightly when using the two measures of replicative businesses. Similarly, the association between net start-up rates and the term $SelfEmp_i \times Rural_i$ either stays the same or becomes slightly less negative, but retains its statistical significance.

These patterns clearly suggest that the distinction between routine and innovative entrepreneurship – with the former more concentrated in rural areas, and the latter predominantly active in urban TTWAs – does not explain the urban/rural heterogeneity. However, these results do not rule out the possibility that even in urban areas, where self-employment lines-up with entrepreneurship, the former captures replicative entrepreneurship, rather than innovative business activities. Indeed, according to Baumol (2011), highly productive and entrepreneurial environments – with a high rate of firm creation – attract a larger population base. In turn, a larger population base raises the demand for locally-produced goods and services, including those provided by routine entrepreneurs. If this were the case, self-employment and net firm creation would still be well aligned in urban areas, even though they would capture different phenomena.

To investigate this possibility, we estimate a specification similar to the one presented in Eq. (2), but replacing the proxy for local labour market conditions with population density. This is measured by the number of people per squared kilometre living in a TTWA as recorded in the GB Census 2001. When we do this, we still find a positive association between net firm creation and self-employed 'Owners' at 0.125 (s.e. 0.027). Similarly, the interaction term $SelfEmp_i \times Rural_i$ still carries a negative and significant coefficient of −0.061 (s.e. 0.031). Conversely, population density does not enter our regression significantly. Using total population count – as opposed to density – or focussing only on individuals aged 16–64 does not affect this pattern.[15]

In conclusion, the robustness checks discussed in this section suggest that the distinction between routine and innovative entrepreneurship does not explain the urban/rural heterogeneity. Replicative entrepreneurship also cannot explain the positive alignment between self-employment and net firm creation in urban areas. On the contrary, this positive association points to a genuine link suggesting that urban self-employment is an expression of innovative business ventures as much as business start-up rates and innovative firm behaviour are.

[14] This information was collected for self-employed individuals in 1999, 2000 and 2001 only, so the number of observations used to calculate these proxies is small (around 9000 in the urban areas and 3000 in rural TTWAs).

[15] Note that the relationship between the population-based proxies and either self-employment or net firm creation is positive, and not heterogeneous across urban and rural areas. This explains why including this control in our regressions does not affect the main pattern documented in Column (1) of Table 4.

6. Conclusions

Economists consider entrepreneurs a crucial 'ingredient' in determining a country's or a region's economic prosperity. Entrepreneurs are thought to be conveyors of innovation, engines for job creation and sparks for economic growth. Unsurprisingly, a large empirical and theoretical literature on the characteristics and functions of the entrepreneur, as well as on the effects of dense entrepreneurial environments, has emerged over the recent decades.

Similarly, policy makers' interest in studying small business creation and designing interventions that stimulate entrepreneurial start-ups is always very high, and more so in the aftermath of the Great Recession. With the possibility of fiscal stimuli progressively eroded by the need for a sustainable long-term path in public finances, the dynamics of private sector entrepreneurs are even more tightly associated with the prospects of different countries' swift recoveries or long lasting periods of sluggish growth. Besides cyclical considerations, policies aimed at stimulating entrepreneurship are often devised to close the economic gap between dynamic urban labour markets and persistently lagging ones in remote and rural areas.

Despite the self-evident interest and importance of the role of the entrepreneur in policy making and economics thinking, relatively little conclusive evidence has been gathered on the subject. This is because research in the field is hampered by the fundamental issue of defining and identifying who the entrepreneurs are. While the vast majority of the empirical investigations in this area rely on self-employment data to study entrepreneurship, the link between these two variables is far from proven.

In this paper, we have shed some light on this issue by looking at the correlation between the incidence of self-employment in urban and rural labour markets, and some of the most noticeable aspects of entrepreneurship, namely business creation and firms' innovative behaviour. To the best of our knowledge, our study is the first to systematically investigate whether the validity of using self-employment rates as a proxy for entrepreneurship varies across consistently defined and economically relevant areas (i.e. TTWAs) – and in particular along the urban and rural dimension.

Our results show that there is a positive and significant correlation between the incidence of self-employment and business creation as measured by gross and net firm creation rates in urban TTWAs. Similarly, we find a positive and significant correlation between self-employment and innovation in urban areas. However, none of these results holds for rural TTWAs, where we find that self-employment does not 'line up' with firm creation or innovation. These patterns are not driven by the sectoral composition of business activities across urban and rural areas, and are robust to a number of checks in relation to alternative ways of measuring self-employment rates and aggregating the data.

In order to explain these urban/rural differences, we have exploited additional information contained in the LFS and constructed proxies for the lack of employment opportunities. We have shown that these proxies are negatively and significantly associated with entrepreneurship in both urban and rural areas. We have also found that this negative link is evident for self-employment in urban areas – but this association turns flat in rural areas. Finally, we have shown that the urban/rural heterogeneity disappears once we study the relationship between self-employment and entrepreneurship controlling for local labour market conditions. This pattern is consistent with the idea that urban workers 'try their luck' as self-employed in areas with good labour market opportunities – i.e. they become risk-taking, innovative entrepreneurs in the sense of Knight (1921) and Schumpeter (1921). This is, however, not true for rural workers.

Our results are also consistent with a story in which urban workers are discouraged from becoming self-employed by poor labour market conditions more than their rural counterparts – who still transit into self-employment of last resort because they lack of better alternatives. Either way, our evidence clearly highlights that urban and rural self-employment captures different economic forces.

We have also shown that proxies that help us to differentiate between routine and innovative entrepreneurship do not help accounting for the urban/rural heterogeneity, nor do they explain the positive relationship between self-employment and entrepreneurship in urban areas – which instead seems to be genuine and suggests that urban self-employment is an expression of innovative and entrepreneurial business activities.

Our results carry important implications for the academic debate in the field which has widely used information on individuals' self-employment status to identify entrepreneurs. As long as the analysis focuses on urban labour markets – roughly speaking equivalent to the US Metropolitan Statistical Areas (MSAs) – our results show that self-employment could provide a relatively good proxy for entrepreneurship. On the other hand, our findings reveal that this is not true for rural TTWAs, and that self-employment rates could provide a distorted picture of the spatial distribution of entrepreneurship in more remote regions.

Our findings also carry implications for public policies that promote self-employment with the aim of stimulating business creation and innovation, and narrowing gaps in economic performance between dynamic and lagging regions. Indeed, this paper has documented an important urban/rural distinction in individuals' motivation behind the decision to become self-employed. Our results therefore challenge the current policy stance that tends to consider the incidence of self-employment in both urban and rural TTWAs as an expression of the same positive economic phenomenon.

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Appendix A

See Fig. A1 and Tables A1–A3.

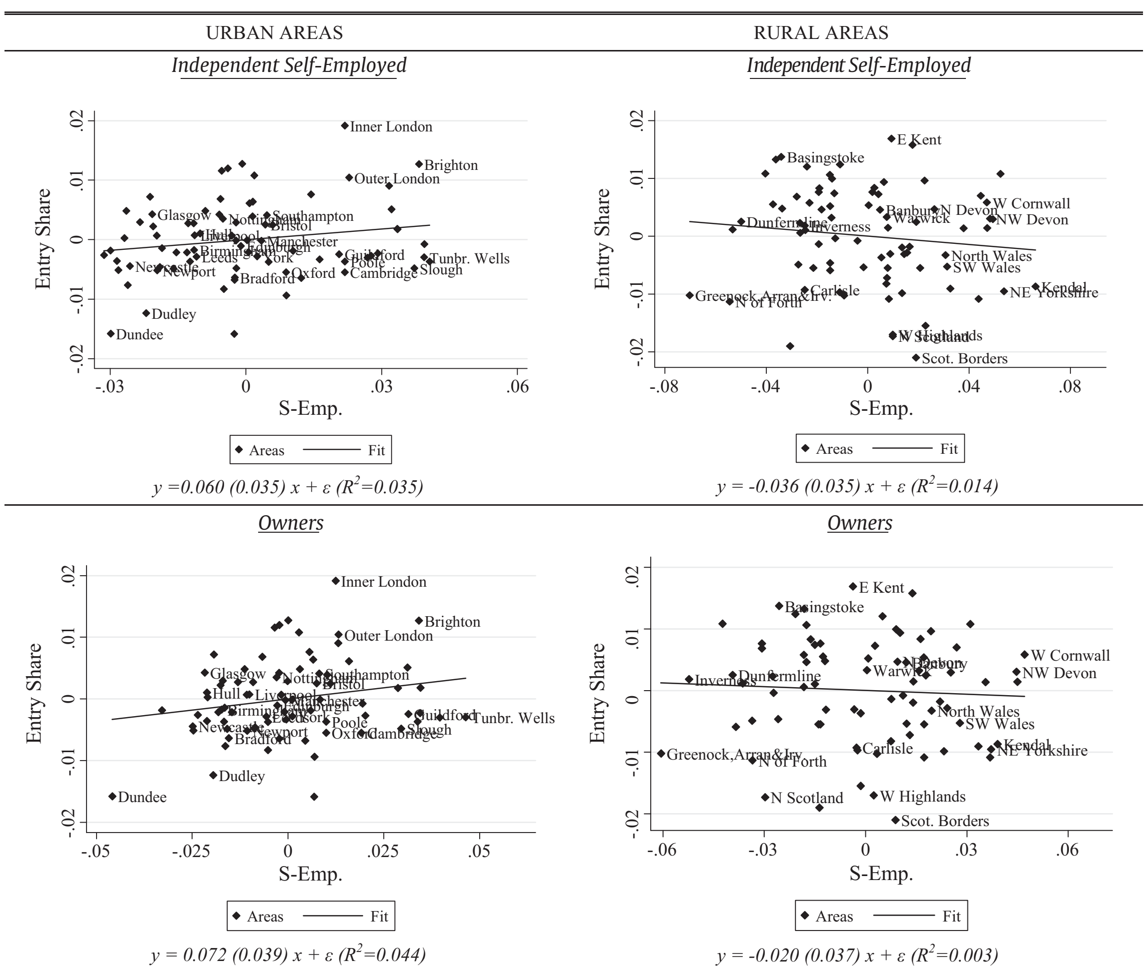

Fig. A1. Self-employment and firm entry. *Note:* Analysis includes 79 urban TTWAs and 79 rural TTWAs. All variables displayed in the panels have been demeaned. Equations report coefficients and standard errors of a regression of the variable on the vertical axis (y, i.e. gross firm creation rates) on variable on the horizontal axis (x, i.e. a given measure of self-employment) plus a constant. Robust standard errors used.

Table A1
Self-employed and work location – urban and rural samples.

	Urban areas				Rural areas			
	(1)	(2)	(3)	(4)	(5)	(6)	(9)	(8)
	Same LAD	Same LAD	Work/use home	Work/use home	Same LAD	Same LAD	Work/use home	Work/use home
Panel A: Independent self-employed								
Self-Employed (dummy 0/1)	0.238 (0.013)	0.275 (0.013)	0.508 (0.006)	0.467 (0.005)	0.181 (0.008)	0.209 (0.008)	0.544 (0.006)	0.497 (0.005)
Panel B: Owners								
Self-Employed (dummy 0/1)	0.189 (0.013)	0.240 (0.013)	0.443 (0.005)	0.392 (0.005)	0.146 (0.007)	0.181 (0.007)	0.479 (0.006)	0.419 (0.006)
Year/Month Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demo + Job Controls	No	Yes	No	Yes	No	Yes	No	Yes
SIC 92 (2 digits) Effects	No	Yes	No	Yes	No	Yes	No	Yes
TTWA Effects	No	Yes	No	Yes	No	Yes	No	Yes

Note: See Table A2 for list of controls. Sample includes employees and self-employed workers. Total number of observations as follows. Urban sample: approximately 397,000 for Independent Self-Employed and 313,000 for Owners. Rural sample: approximately 118,000 for Independent Self-Employed and 93,000 for Owners. Differences are due to variables not being available for all years. Standard errors clustered at the Travel to Work Area (79 TTWAs for both urban and rural areas). All coefficients significant at 5% level or better. Shares of people working and living in the same Local Authority/District as follows. Urban areas (mean = 0.582; std. dev. = 0.493); rural areas (mean = 0.726; std. dev. = 0.446). Shares of people working from home/using it as headquarter as follows. Urban areas (mean = 0.105; std. dev. = 0.307); rural areas (mean = 0.121; std. dev. = 0.326).

Table A2
Descriptive statistics of control variables – urban and rural samples.

Variable	Urban areas		Rural areas	
	Mean	Standard deviation	Mean	Standard deviation
Demographic controls				
Female	0.477	0.012	0.490	0.018
Head of Household	0.525	0.013	0.513	0.015
Age	39.69	0.649	40.53	0.753
White	0.954	0.044	0.987	0.009
Status: single/cohabiting	0.305	0.032	0.273	0.019
Status: married	0.576	0.030	0.603	0.022
Status: separated	0.026	0.005	0.027	0.007
Status: divorced	0.080	0.010	0.084	0.013
Status: widowed	0.013	0.002	0.013	0.003
Skills: No Qual.	0.119	0.024	0.122	0.021
Skills: Other	0.237	0.027	0.242	0.029
Skills: O-Levels and Equiv.	0.274	0.033	0.277	0.030
Skills: A-Levels and Equiv.	0.183	0.026	0.194	0.036
Skills: Higher Education	0.187	0.056	0.165	0.038
N. of Children: 0	0.553	0.026	0.555	0.023
N. of Children: 1	0.192	0.017	0.190	0.018
N. of Children: 2	0.187	0.014	0.188	0.017
N. of Children: 3+	0.068	0.009	0.067	0.011
Household size: 1	0.136	0.023	0.126	0.017
Household size: 2	0.558	0.020	0.574	0.025
Household size: 3	0.195	0.017	0.199	0.018
Household size: 4+	0.111	0.014	0.100	0.015
Job and home ownership controls				
Full Time	0.733	0.024	0.715	0.028
Second Job	0.043	0.008	0.052	0.013
Home Owners	0.821	0.045	0.812	0.033
Public Renter	0.095	0.033	0.098	0.036
Private Renter	0.083	0.032	0.090	0.030
Labour market controls				
Lack of Full Time Employment Opportunities	0.100	0.028 [0.003]	0.117	0.028 [0.004]
Unemployment Rate	0.060	0.017 [0.002]	0.055	0.015 [0.002]
Inactivity Rate	0.217	0.039 [0.004]	0.205	0.034 [0.004]

Note: There are 79 urban TTWAs and 79 rural TTWAs. Number of underlying individual-level observations: approximately 536,000 (urban) and 159,000 (rural). Individual controls averaged at the TTWA level from individual data. Age controlled in regression analysis using shares of categorical variables constructed as follows: group 1 (16–25); group 2 (26–30); group 3 (31–35); group 4 (36–40); group 5 (41–45); group 6 (46–50); group 7 (51–55); group 8 (56+). Figures in square brackets are standard errors of means of the labour market controls.

Table A3
Explaining the urban/rural heterogeneity – alternative self-employment (S-E) and entrepreneurship measures.

Dependent variable is: relevant S-E or entrepreneurship proxy	Proxy for poor labour market opportunities is lack of FT employment opportunities							
	Independent S-E	Innovative firms	Independent S-E and net firm creation		Owners and innovative firms		Independent S-E and innovative firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lack of FT Employment Opportunities × Rural Area	0.340 (0.135)**	0.073 (0.142)						
Self-Employment (S-E)			0.107 (0.029)***	0.057 (0.030)*	0.478 (0.184)***	0.225 (0.188)	0.516 (0.191)***	0.335 (0.188)*
Self-Employment × Rural Area			−0.046 (0.028)*	−0.008 (0.030)	−0.444 (0.243)*	−0.273 (0.236)	−0.230 (0.207)	−0.095 (0.198)
Lack of full-time (FT) Employment Opportunities	−0.326 (0.097)***	−0.295 (0.103)***	–	−0.067 (0.013)***	–	−0.254 (0.086)***	–	−0.241 (0.083)***
Rural Area	−0.019 (0.014)	−0.014 (0.016)	0.006 (0.003)*	0.003 (0.003)	0.034 (0.023)	0.021 (0.022)	0.020 (0.023)	0.008 (0.022)

Note: Regressions at the Travel to Work Area (TTWA) level. Number of observations: 158 of which 79 in urban areas and 79 in rural areas. Table reports coefficients from regressions of the dependent variable on the explanatory factors and robust standard errors in round parenthesis. Regressions in Columns (3) to (8) further control for the following additional variables averaged in the TTWA: male; age; white ethnicity; home-ownership; household size; and number of children. Information derived from LFS data and referring to adult working-age population (16–64 year-old males; 16–59 year-old females). Each column corresponds to a different regression. Descriptive statistics for the additional controls are provided in Table A2. 'Lack of Full Time Employment Opportunities' is calculated using LFS data for adult working-age population (16–64 year-old males; 16–59 year-old females).
* 10% significant.
** 5% significant.
*** 1% significant.

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