

MEASURING THE ENTREPRENEUR: A COMPARATIVE ANALYSIS USING BUSINESS AND HOUSEHOLD DATA

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Abstract

Generally statistics on the profile of the entrepreneur are based on Labour Force Survey. In Italy since 2010 an exhaustive Linked Employer–Employee Database has been realized to estimate Business register employment. It gives the possibility to support entrepreneurship analysis with an integrated use of administrative data on individuals and businesses. This innovation, if on one side it is obviously very promising on the other side it also proposes new issues and questions in order to produce a further deepening of entrepreneurship analysis. In particular, can entrepreneurs be flagged directly through the self-employment figures traced in the integrated administrative data? With this respect, some insights are proposed here regarding the role of the legal forms of enterprises, with a focus on sole-proprietorships, partnerships and limited liability companies. This same issue is also tackled by widening the scope of data integration by linking LEED microdata with Labour force survey. A comparison of self-employment status as derived from these sources gives the possibility to better disentangling entrepreneurship, putting in evidence the relevance of borderline situations which deserve probabilistic approaches.

¹Although this work is the result of an open discussion among the authors and other colleagues, section 1 should be attributed to Cella while section 2 to De Gregorio. Introduction and conclusions are the result of a common effort.

Introduction

The issue of “*identifying the entrepreneurs*” is not a minor nor an easier one. Ambiguity rests on the definition itself of such figures even as far as economic theory is concerned, and *a fortiori* it is unavoidable in the field of official statistics. The ambition of counting them, analyzing jointly their individual characteristics and those of their business, is nevertheless growing. The recent achievements in the use of administrative sources and in their statistical integration with sampling surveys look very promising in guaranteeing important advancements in this field and for a more correct measure of entrepreneurship.

As a matter of fact it seems that more generally the concept of self-employment is being put under severe scrutiny for several reasons. The real reasons behind the rise in their number that took place in the last quarter of the past century (Steimatz *et al.* 1989; Linder *et al.* 1990; OECD 2000; European Commission 2010; Bjuggren *et al.* 2012) have recently brought in new categories – such as that of Dependent Self-employment – that help to focus on its fading borders with paid employment. Flexibility in the labour market has brought in some stress on official classifications of employment (ILO 2003; Hunter 2013). Administrative sources are very important in this field: they can help to identify homogeneous clusters of entrepreneurship signals, to evaluate the actual degree of autonomy and independence of the business, its hierarchical ties with other businesses.

The issue for the purposes of official statistics is that of reconciling statistical and administrative definitions with economic definitions, and to provide coherent and comparable measures concerning entrepreneurial labour input, in terms of employment, jobs and hours actually worked. The statistical integration of administrative sources with survey microdata (namely those from the Labour force survey, hereafter LFS) appear in this context a very promising tool in order to achieve important steps forward this task. The incoherencies among sources, far from being just a frustrating problem for researchers, become part of the solution since their statistical management can provide the basis for reconciliation and for the provision of new indicators not only on the actual nature of self-employment and entrepreneurship but also on the hidden part of the economy (AA.VV. 2015; De Gregorio, Filipponi *et al.* 2014; De Gregorio *et al.* 2015).

In this paper provides a description of the tools adopted in Istat to disentangle entrepreneurship based on administrative sources and a test on their efficiency based on their integration with LFS microdata. In section 1 we provide a sketch of the recent advancements derived in the last years at Istat based on the use of a LEED register, derived from the integration of administrative sources on firms and individuals. Integrated demand-side administrative data gave the possibility on one side to disentangle new sharper criteria to define entrepreneurs and on the other to identify new more sophisticated problems in entrepreneur detection. Section 2 compares administrative sources with supply-side information gathered through LFS. If on one side the approach using LEED based data appears generally coherent with LFS data, on the other side the analysis of discrepancies and incoherencies between sources seems to encourage the adoption of a probabilistic approach in order to correctly measure entrepreneurs labour input according to ILO definitions and standards. Demand side data also allow a deeper insight into hours worked, skills and social context. A final concluding section resumes the main findings and proposes feasible advancements from supply and demand side data integration.

1. The Administrative source side

1.1 Defining the Entrepreneur

A complete survey on the concept of entrepreneur goes beyond the purposes of this paper, although it is very important to remark that cultural, historical and semantic issues are at stake when dealing with this issue. The first mention of the term entrepreneur occurred in Europe around the sixteenth century, but only in the eighteenth century the entrepreneur took on the modern connotations. The entrepreneur is a bearer of uncertainty (Cantillon 1755): he buys at certain prices in the present and sell at uncertain prices in the future. Other theories on the entrepreneurial figure were formulated by the economists of the nineteenth and twentieth century: Say (1803) described the central role played by this figure in the world of capital, production, trade and consumption, indicating the entrepreneur as someone who coordinates, directs and plays a role of great importance in the business environment; according to Schumpeter (1934, 1942, 1947) the entrepreneur is the innovator who implements change within markets through the carrying out of new combinations that can take several forms as the introduction of a new good or new method of production, the opening of a new market, the conquest of a new source of supply of new materials, the carrying out of the new organization of any industry; the entrepreneur is always a speculator. He deals with the uncertain conditions of the future. His success or failure depends on the correctness of his anticipation of uncertain events (Von Mises 1949); Knight (1921), indicates the entrepreneur as someone who risks their capital, and it is here that emerges the difference between its figure and that of the manager, who instead can manage and innovate without risking anything on a personal level.

Currently, the entrepreneur can be viewed as the one who owns the factors of production (capital, means of production, labor and raw materials) in the form of a company, through which (and with the necessary investments) he develops new products, new markets or new means of production, thereby stimulating the creation of new wealth and value in the form of goods and services useful to the society.

In this paper we adopt the definition of entrepreneurs proposed by the OECD/Eurostat Entrepreneurship Indicator Program: *Entrepreneurs are those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.* (Ahmad *et al.* 2008). This definition makes a clear connection between entrepreneurship and business ownership: entrepreneurs are business owners who bear the risks and face the uncertainties associated with their activity.

1.2 Measure of entrepreneurship

There are several statistics relating to entrepreneur already produced by public or private institutions, but many of these focus only on special niches of activities or on specific subsets of the population. In Europe, Eurostat has implemented the first Factors of Business Success (FOBS) Survey in 2005, in a number of EU countries, and the European Commission's Eurobarometer has measured attitudes towards various aspects of entrepreneurship in both Europe and the USA. During 2007, 41 countries participated to the Global Entrepreneurship Monitor (GEM) Report on Women Entrepreneurship.

Generally statistics on the profile of the entrepreneur are based on Labour Force Survey (LFS) and statistics on self-employment are commonly used to measure entrepreneurial activity.

By definition, self-employed are persons who carries out its work inside an enterprise, without any formal contracts (not in the payroll), whose remuneration is included in mixed income (capital/labor). Self-employed persons include: 1) sole proprietor, freelance and own-account workers; 2) contributing family workers working in the enterprise even if not paid, with paid contributions for social security or insurance against injuries at work; 3) members of partnerships, corporations and quasi-corporation under the condition of an actual working activity carried out in the same enterprise of which they are shareholders. In the definition of self-employment adopted in Italy , the main difference with the standards lies in the inclusion of shareholders of a corporation as possible self-employed in addition to the sole owner and to owners of the unincorporated enterprises.

In Italy since 2010 an exhaustive Linked Employer–Employee Database (LEED), exclusively based on data from administrative sources, has been realized in order to revise, produce and enlarge the informative statistical database on enterprises and local units produced and disseminated every year from the BR system (ASIA in the Italian acronym). In this database different typologies of workers (to be precise jobs) employed by firms are identified: employees, self-employed and contributing family workers, outworkers and temporary workers.

In particular the informative data structure for self-employment (whose Italian acronym is SILO-I) is based on a structure of links enterprise-individuals between the administrative legal unit and the individual through a system of identification codes (tax codes). The main administrative sources available for this data structure are:

- 1) Chamber of Commerce:
 - Yearly firm declarations related to persons covering a position inside partnerships or companies (i.e. member of the board of directors, administrator, simple partner) (Register of Persons with positions - about 6,5 millions of records);
 - Yearly firm declarations related to shareholders belonging to companies and cooperatives that contribute to the enterprise’s capital because they hold a percentage of its shares (Shareholders’ Register - about 3,9 millions of records).
- 2) Tax Authority:
 - Yearly declarations made by taxpayers on income deriving from the participation in a partnerships (i.e. association of professionals) (Tax declarations’ Register - about 2,6 millions of records).
- 3) Social Security:
 - Yearly social contributions paid by the holders of craft or trade businesses. These people use mainly their own work or family workers for carrying out the business activity. The level of contribution they have to pay is calculated on the base of their

overall produced income (The craftsmen and tradesmen archive – about 4,2 millions of records).

Other information from administrative sources are used as proxies to trace any flow of remuneration from the company to its members or any evidence of working activity.

In order to identify the entrepreneur it has been considered this complex informative data structure on self-employment. Coherently with the solution adopted to estimate self-employment, the algorithm developed to flag entrepreneurs follows deterministic rules that are slightly different depending on the legal form of the businesses.

In the case of Sole Proprietors (SP), only one rule has been applied:

Rule 1: the entrepreneur corresponds to the owner. The contributing family workers are not considered as entrepreneurs.

For the other legal forms (such as Partnership (PA), Limited Liability Companies (LL) and other businesses) a set of deterministic rules is based on: a) The function or position of the individuals in the enterprises (if he is a member or a shareholder; if he holds an administrative position or not); b) the actual share owned by the shareholder. In particular the more restrictive rule to be an entrepreneur is:

Rule 1: He must be a shareholder with a share greater than the average share and simultaneously he must hold office as Chief of Executive Officer (CEO) or Managing Director.

Other rules are:

Rule 2: He is only a member of the company (without shares), but he must hold office as Chief of Executive Officer (CEO) or Managing Director.

Rule 3: He must be a shareholder with a share greater than the average share, but he doesn't hold an administrative position.

Rule 4: He must be a shareholder with a share equal to the maximum share, but he doesn't hold an administrative position (this rule is applied only if the outcome of rule 3 is null).

Rule 5: If there is only one member in the company then he is considered an entrepreneur (this rule has been applied to a small number of firms).

For the Limited Liability companies that belong to a group these rules have been applied iteratively through a bottom-up approach. If a firm (subsidiary) is controlled by another (parent) which holds the majority of shares, then entrepreneurs of the subsidiary are those of the parent. The process is iterative and ends when you arrive at the group-head, or in any case when you don't add other entrepreneurs between an iteration and the next. Therefore for some companies it can happen that an entrepreneur is not a member of the enterprise (for instance because he is an entrepreneur of the enterprise group).

The following results have been obtained applying this procedure to the administrative data structure (SILO-I) with reference year 2013 (Table 1).

Table 1. Number of Entrepreneurs by Rules and Legal form (*percentage*)

| RULES | LEGAL FORMS | | | | Total |
|--------------|--------------|--------------|--------------|--------------|--------------|
| | SP | PA | LL | Others | |
| 1 | 100.0 | 49.2 | 51.8 | 10.3 | 75.7 |
| 2 | 0.0 | 17.3 | 17.7 | 0.0 | 8.6 |
| 3 | 0.0 | 33.5 | 30.4 | 5.1 | 15.7 |
| others | 0.0 | 0.0 | 0.0 | 84.7 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: SILO-I register

More than 4.5 mln. individuals are identified, who correspond to about 5.5 mln. of entrepreneur positions. Both for the partnerships and limited liability companies a significant percentage the entrepreneurs is flagged due to rule 3. With this rule there is the risk of diluting too much the definition of entrepreneur by including shareholders who do not actually have an administrative function in the firm. For the remaining legal forms, for instance the co-operatives, the 84.7% of the entrepreneurs are identified by the other rules (namely rule 4 and rule 5).

A further issue is whether entrepreneurs are necessarily self-employed and whether these two figures coincide. According to the definition of International Classification of Status in Employment (ICSE-93) self-employment jobs are those jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced. The incumbents make the operational decisions affecting the enterprise, or delegate such decisions while retaining responsibility for the welfare of the enterprise. From this, it follows that the entrepreneur should be necessarily a self-employed.

In our case, the entrepreneurs are identified independently by the fact that they are the self-employed or not. The overlap between entrepreneurs and self-employed is thus partial (Table 2).

Table 2. Coincidence of Self-Employed and Entrepreneur by Legal form (*percentages*)

| LEGAL FORM | SELF-EMPLOYED | ENTREPRENEUR | | Total |
|--------------|---------------|--------------|-------------|--------------|
| | | No | Yes | |
| SP | No | 0.0 | 0.0 | 0.0 |
| | Yes | 10.2 | 89.8 | 100.0 |
| | Total | 10.2 | 89.8 | 100.0 |
| PA | No | 19.5 | 9.4 | 28.9 |
| | Yes | 11.0 | 60.1 | 71.1 |
| | Total | 30.5 | 69.5 | 100.0 |
| LL | No | 61.5 | 24.4 | 85.9 |
| | Yes | 4.3 | 9.8 | 14.1 |
| | Total | 65.8 | 34.2 | 100.0 |
| Other | No | 84.2 | 0.9 | 85.2 |
| | Yes | 14.8 | 0.0 | 14.8 |
| | Total | 99.0 | 1.0 | 100.0 |
| Total | No | 34.3 | 13.2 | 47.6 |
| | Yes | 7.7 | 44.7 | 52.4 |
| | Total | 42.0 | 58.0 | 100.0 |

Source: SILO_I Register

For the Sole Proprietorship the entrepreneurs are a sub-set of the self-employed. The difference is the set of contributing family workers that are considered as self-employed, but not entrepreneurs. Although self-employed and entrepreneur coincide for about the 60%, in the some partnerships there is an interchange between these two figures. Probably the rules used to identify the entrepreneur, identify a business founder who could not be a self-employed. Finally for the limited liability companies and other legal types of businesses the percentage of agreement (Yes-Yes) between self-employed and entrepreneur is low. This is due to the fact that by definition a large set of limited liability companies do not have any self-employed (about 40%), especially if the firm belongs to complex enterprise group.

2. Statistical integration of administrative sources and LFS data

2.1 Integration of LFS and SILO-I register

In this section it is analyzed the integrated LFS-ADMIN sample which has been exploited by Istat to provide the new benchmark 2011 national accounts estimates on labour input². The microdata of LFS have been linked, by using the individual tax code, to all the administrative sources (hereafter ADMIN) that trace regular jobs: they are mainly social security and tax records. These are the same sources that have been used to build up the LEED register supporting the business register (BR) for industry and services in the private sector.

In particular it has been considered here that part of administrative data used to estimate self-employment in the BR. The objective is to compare the signals of these individuals with the answers given by the same individual to LFS questionnaire. More specifically, we want to investigate the relationships between the self-assessment of the professional status by the LFS interviewee with the rules proposed in the BR in order to identify him as an entrepreneur. LFS professional status highlights in particular three response items that might identify entrepreneurship: the *Entrepreneur tout court*; the *Free lance professional* and the *Own-account worker*. Semantic aspects play a very important role. The first definition is quite straight and, as it will be shown below, is addressed towards the identification of well-structured business entities. The other two might be endowed with a certain degree of ambiguity as far as their degree of entrepreneurship is at stake, due to their particular nature: the second item is mainly tied to the kind of economic activity, generally business services (such as lawyers, accountants, consultants) ruled by professional registers; the latter is presumably linked to individuals engaged in very small and traditional family businesses (manufacture, construction, trade) which are less inclined to adopt “sophisticated” terms such as “entrepreneur”.

For this purpose, they have been selected from SILO-I only the businesses for which at least a self-employed is present in LFS sample. As a result, 36 thousands businesses were selected corresponding to 41 thousands individuals in the sample. A part of these individuals has been excluded from the analysis: in particular, those with a proxy interview or with uncertain micro-linkage with the tax code.

²The integrated LFS-ADMIN sample has been replied for the years 2010-2013. See AA.VV. (2015).

2.2. What influences LFS self-assessment

All these three categories seem to collect individual figures that, by and large, we define as running under the flag of entrepreneurship. It is straightforward to ask which features characterize these figures and at what extent administrative signals are able to highlight entrepreneurship. For this purpose they have been compared with the rules proposed in the BR to identify actual entrepreneurs. A logistic model has been used for this purpose. In particular, using as response item the LFS self-assessments it has been investigated the influence of several LFS and BR variables on their probability. The probability of the self-assessment has been modelled as a function of individual characters (such as age, gender, education, etc.), of those of the firm they are engaged in (legal form, Nace, size-class) and of the nature of the administrative traces of individuals in self-employment according to the register.

The rules proposed to flag entrepreneurs in the BR appear significantly connected with the probability of a strict self-assessment as an Entrepreneur (the *Strict definition* shown in Table 3): as a matter of fact, individuals flagged according to the “**Rule 1**” have almost the triple the odds as compared to those not flagged at all. The remaining rules also matter, although with a decreasing importance. Nevertheless other BR features appear to influence significantly the strict definition. The most important is evidently the legal status of the business: where limited businesses are concerned there is a much higher probability that the self-employed recognizes himself as an entrepreneur, while the opposite happens to sole proprietors. If the business is part of a group this probability increases. When younger or smaller businesses are concerned, the opposite happens. Manufacturing and construction are more associated with strict entrepreneurs. Finally, if the individual has a personal VAT code (signaling his engagement in professional activities) the odds are significantly lower. Even the socio-demographic characters measured by LFS have some influence. Gender appears to matter (men are significantly more inclined to use this definition), but education is not that important (except for the small odds ratio of the lower Isced levels) and even age (except for older individuals). The place of residence has some influence, probably connected with the different local business structures.

To sum up, the LFS strict definition of entrepreneur seems to catch the self-employment in structured businesses. Although BR flagging rules seem to work well and in the right direction there appear to be some spaces of improvement in dealing with the detection of these kind of self-employed individuals. If we enlarge the floor and include the larger LFS definition (summing up also Own-account workers and Professionals) the panorama of the odds is partly confirmed. The effect of the flagging rules is still quite significant, while grows the importance of business services and trade on one side and of the average education levels on the other.

In general, the self-assessment as an Own-account worker is more often associated with relatively low education individuals working in microenterprises with elementary legal forms (sole proprietorship or partnership), mainly in Construction and Manufacturing: most of them are traced in the administrative sources dedicated to artisans. Freelance and professional workers on the other side show higher education and are strongly specialized in Business Services with a dedicated legal status.

Table 3. Odds ratio of the probability of LFS self-assessment as an entrepreneur, by type of entrepreneur definition and type of source.

| Source | Variable | Benchmark | Effect | 95% limits | | | 95% limits | | |
|-----------------------------|---|-----------------|-------------------|-------------|-------|-------------|-------------|-------|-------|
| | | | | Estimate | Lower | Upper | Estimate | Lower | Upper |
| LFS | GENDER | Female | Male | 1.24 | 1.04 | 1.47 | 1.13 | 1.02 | 1.25 |
| | EDUCATION | Isced ≥ 5 | Isced ≤ 2 | 0.64 | 0.51 | 0.82 | 1.95 | 1.66 | 2.29 |
| | | | Isced = 3 | 1.10 | 0.88 | 1.38 | 2.28 | 1.95 | 2.67 |
| | | | Isced = 4 | 0.79 | 0.42 | 1.50 | 1.58 | 1.08 | 2.30 |
| | NUTS1 (place of residence of the individual) | South & Islands | North-West | 0.66 | 0.54 | 0.82 | 0.77 | 0.68 | 0.87 |
| | | | North-East | 0.97 | 0.79 | 1.19 | 0.96 | 0.85 | 1.09 |
| | | | Centre | 0.76 | 0.61 | 0.96 | 0.81 | 0.71 | 0.93 |
| | AGE (Individual) | 35-64 yrs. | 15-24 yrs. | 0.32 | 0.10 | 1.05 | 0.71 | 0.46 | 1.08 |
| | | | 25-34 yrs. | 0.87 | 0.65 | 1.17 | 1.01 | 0.85 | 1.19 |
| | | | 65-74 yrs. | 0.70 | 0.54 | 0.92 | 0.54 | 0.45 | 0.65 |
| ≥ 75 yrs. | | | 0.53 | 0.31 | 0.90 | 0.23 | 0.15 | 0.35 | |
| BUSINESS REGISTER | SELF-EMPLOYED | Yes | No | 0.81 | 0.60 | 1.09 | 0.65 | 0.52 | 0.82 |
| | FAMILY WORKER | Yes | No | 0.78 | 0.37 | 1.61 | 0.44 | 0.32 | 0.62 |
| | ENTREPRENEUR | No | Yes - Rule 1 | 2.87 | 2.27 | 3.62 | 2.50 | 2.12 | 2.94 |
| | | | Yes - Rule 2 | 1.53 | 0.99 | 2.37 | 2.04 | 1.59 | 2.61 |
| | | | Yes - Rule 3 | 1.42 | 1.06 | 1.91 | 1.30 | 1.07 | 1.59 |
| | LEGAL STATUS | Partnerships | Sole proprietor | 0.28 | 0.22 | 0.35 | 0.42 | 0.37 | 0.48 |
| | | | Limited | 2.43 | 2.00 | 2.95 | 2.17 | 1.88 | 2.50 |
| | AGE (Firm) | ≥ 11 yrs. | ≤ 2 yrs. | 0.56 | 0.39 | 0.81 | 0.76 | 0.64 | 0.92 |
| | | | 3-5 yrs. | 0.63 | 0.47 | 0.83 | 0.82 | 0.70 | 0.96 |
| | | | 6-10 yrs. | 0.87 | 0.71 | 1.08 | 0.91 | 0.80 | 1.03 |
| | BUSINESS GROUP | Yes | No | 0.65 | 0.49 | 0.88 | 0.73 | 0.58 | 0.93 |
| | NACE | Manufacturing | Business services | 0.94 | 0.76 | 1.16 | 2.75 | 2.37 | 3.20 |
| | | | Construction | 1.27 | 0.99 | 1.63 | 1.08 | 0.90 | 1.31 |
| Other services | | | 0.51 | 0.35 | 0.75 | 0.83 | 0.66 | 1.05 | |
| Trade | | | 0.85 | 0.68 | 1.06 | 1.23 | 1.05 | 1.45 | |
| FIRM SIZE (n. employees) | > 10 | No employees | 0.10 | 0.08 | 0.13 | 0.16 | 0.13 | 0.19 | |
| | | 1-3 | 0.44 | 0.35 | 0.55 | 0.50 | 0.42 | 0.60 | |
| | | 4-9 | 0.80 | 0.63 | 1.03 | 0.81 | 0.66 | 0.99 | |
| VAT NUMBER | No | Yes - Active | 0.27 | 0.18 | 0.41 | 0.46 | 0.35 | 0.61 | |
| | | Yes - Inactive | 0.50 | 0.37 | 0.67 | 0.63 | 0.52 | 0.77 | |

Source: LFS-ADMIN integrated sample and SILO-I register, year 2013

Notes: Strict definition: Entrepreneur tout court; Larger definition: Entrepreneur plus Own-account worker plus Professional freelance. Figures in bold have a significant 95% confidence level.

2.3. What do the flagging rules assess

Reversing the approach, the BR flagging rules have been used as response items in order to investigate what kind of phenomena they bring into light. The purpose is to investigate which factors might be considered in order to improve the explanatory power of these rules. If compared, they appear to be working quite differently and with varying efficiency levels. The “**Rule 1**”, the one which is more restrictive, brings on very reasonable results (Table 4). In particular it is very significantly connected with LFS employment status: the odds of the three LFS self-assessment levels are in fact very high, with the highest coinciding with the strict definition of entrepreneur.

Nevertheless, it tends to exclude younger individuals and to include those residents in the southern regions. The probability of being flagged by this rule is higher for individuals engaged with smaller and younger firms, in the Construction and Other services, and not endowed with a VAT personal code. The remaining rules operate quite differently. They tend to favor women and people not in employment, given that they are inversely related to LFS strict or larger entrepreneur assessments. Extreme age classes and center-north residents are also associated with these rules. Higher probability of being flagged characterize individuals engaged in smaller and older firm in the business services and endowed with VAT numbers especially if with an appreciable turnover. The characteristics of the flagging rules considered as a whole substantially reflect the effects of the first one which is neatly the most used.

Table 4: Odds ratio of the probability of being flagged as an entrepreneur in the Business register, by type of rule and type of source

| Source | Variable | Benchmark | Effect | 95% limits | | | 95% limits | | | 95% limits | | |
|-------------------|---|-------------------|-------------------------|---------------|-------|-------------|----------------------|-------|-------------|----------------------|-------|-------|
| | | | | Estimate | Lower | Upper | Estimate | Lower | Upper | Estimate | Lower | Upper |
| LFS | GENDER | Female | Male | <i>Rule 1</i> | | | <i>Further rules</i> | | | <i>All the rules</i> | | |
| | | | | 1.34 | 1.23 | 1.47 | 0.84 | 0.76 | 0.92 | 1.30 | 1.16 | 1.46 |
| | EDUCATION | Isced ≥ 5 | Isced ≤ 2 | 0.84 | 0.73 | 0.97 | 0.98 | 0.85 | 1.15 | 0.79 | 0.65 | 0.95 |
| | | | Isced = 3 | 0.87 | 0.75 | 0.99 | 0.95 | 0.82 | 1.10 | 0.75 | 0.63 | 0.90 |
| | | | Isced = 4 | 0.95 | 0.69 | 1.29 | 0.95 | 0.67 | 1.34 | 0.95 | 0.63 | 1.43 |
| | EMPLOYMENT STATUS | Not in employment | Employee | 0.89 | 0.73 | 1.08 | 0.83 | 0.67 | 1.03 | 0.73 | 0.58 | 0.92 |
| | | | Entrepreneur | 3.57 | 2.88 | 4.44 | 0.56 | 0.44 | 0.71 | 3.09 | 2.35 | 4.07 |
| | | | Professional free lance | 3.33 | 2.80 | 3.97 | 0.43 | 0.36 | 0.52 | 2.67 | 2.12 | 3.36 |
| | | | Own-account worker | 2.49 | 2.17 | 2.84 | 0.62 | 0.54 | 0.72 | 2.51 | 2.11 | 2.98 |
| | | | Other self-employed | 0.39 | 0.30 | 0.50 | 0.57 | 0.43 | 0.75 | 0.29 | 0.22 | 0.38 |
| | NUTS1 (place of residence of the individual) | South & Islands | North-West | 0.59 | 0.53 | 0.66 | 1.59 | 1.40 | 1.81 | 0.75 | 0.65 | 0.87 |
| | | | North-East | 0.49 | 0.44 | 0.55 | 1.74 | 1.53 | 1.98 | 0.61 | 0.52 | 0.71 |
| Centre | | | 0.51 | 0.45 | 0.57 | 1.84 | 1.61 | 2.11 | 0.69 | 0.59 | 0.81 | |
| AGE (individual) | 35-64 yrs. | 15-24 yrs. | 0.48 | 0.35 | 0.67 | 1.36 | 0.95 | 1.94 | 0.52 | 0.35 | 0.76 | |
| | | 25-34 yrs. | 0.64 | 0.56 | 0.75 | 1.22 | 1.03 | 1.43 | 0.63 | 0.52 | 0.76 | |
| | | 65-74 yrs. | 1.01 | 0.88 | 1.17 | 1.34 | 1.16 | 1.55 | 1.65 | 1.36 | 2.01 | |
| | | ≥ 75 yrs. | 1.55 | 1.19 | 2.01 | 1.08 | 0.83 | 1.39 | 2.54 | 1.79 | 3.61 | |
| BUSINESS REGISTER | SELF-EMPLOYED | Yes | No | 0.04 | 0.03 | 0.04 | 0.36 | 0.31 | 0.42 | 0.02 | 0.02 | 0.02 |
| | AGE (Firm) | ≥ 11 yrs. | ≤ 2 yrs. | 2.22 | 1.90 | 2.60 | 0.59 | 0.50 | 0.70 | 1.78 | 1.45 | 2.19 |
| | | | 3-5 yrs. | 1.92 | 1.67 | 2.21 | 0.70 | 0.60 | 0.82 | 1.98 | 1.62 | 2.41 |
| | | | 6-10 yrs. | 1.65 | 1.47 | 1.85 | 0.65 | 0.57 | 0.74 | 1.30 | 1.11 | 1.52 |
| | BUSINESS GROUP | Yes | No | 1.34 | 1.02 | 1.78 | 1.39 | 1.06 | 1.83 | 1.59 | 1.24 | 2.04 |
| | NACE | Manufacturing | Business services | 1.01 | 0.88 | 1.15 | 1.10 | 0.95 | 1.27 | 1.17 | 0.98 | 1.39 |
| | | | Construction | 1.48 | 1.26 | 1.73 | 0.76 | 0.63 | 0.91 | 1.31 | 1.06 | 1.61 |
| | | | Other services | 1.71 | 1.44 | 2.03 | 0.60 | 0.49 | 0.73 | 1.33 | 1.06 | 1.67 |
| | | | Trade | 1.20 | 1.05 | 1.37 | 0.85 | 0.74 | 0.98 | 1.12 | 0.94 | 1.34 |
| | FIRM SIZE (n. employees) | > 10 | No employees | 3.80 | 3.14 | 4.61 | 0.91 | 0.73 | 1.13 | 5.62 | 4.57 | 6.91 |
| 1-3 | | | 1.71 | 1.41 | 2.07 | 1.59 | 1.29 | 1.97 | 2.72 | 2.21 | 3.35 | |
| 4-9 | | | 1.22 | 0.97 | 1.53 | 1.71 | 1.34 | 2.18 | 1.86 | 1.45 | 2.39 | |
| VAT NUMBER | No | Yes - Active | 0.71 | 0.55 | 0.92 | 4.65 | 3.74 | 5.79 | 1.75 | 1.39 | 2.21 | |
| | | Yes - Inactive | 0.30 | 0.26 | 0.35 | 3.67 | 3.16 | 4.27 | 1.01 | 0.83 | 1.24 | |

Source: LFS-ADMIN integrated sample and SILO-I register, year 2013
Note: Figures in bold have a significant 95% confidence level

3. Concluding remarks

Several caveats must be kept in mind while using survey microdata combined with ADMIN sources. First of all, they have to do with non-sampling survey errors: in order to reduce their effect proxy interviews and mismatches in the micro linkage by tax code have been excluded. Although we are confident that the biases induced by such choice can be disregarded in this experimental approach, any further use in the production process needs their measurement and correction. Furthermore, Istat experience in LFS integration with ADMIN data revealed that there is a minor but not negligible area of incoherence between the two sources. Modelling this incoherence means to detect and measure survey employment underreporting and ADMIN over-coverage of regular employment. The latter is mainly due to misalignment of ADMIN rules with the regulations and definitions of official statistics. In particular, they have to do with the difference between LFS signals, which are referred to the reference week of the interview, and ADMIN signals, which for self-employment are usually simply annual signals with no infra-annual detail on the actual weekly employment status. It should also be noticed that the results of the logistic regression discussed in this paper were obtained from un-weighted models. The use of normalized weights should anyway also be tested in order to see if they are confirmed.

This taken into account, it seems that source combination confirms that defining entrepreneurship is first of all a semantic issue, since this concept might be declined in several ways and contexts, even not necessarily in the world of self-employment. It is, consequently, a cultural and an historical issue. Even when constrained in the domain of self-employment, entrepreneurship remains an economic concept, in the sense that it depends on the degree of market autonomy and self-determination of the entrepreneur and on the kind of economic activity. LFS-ADMIN data seem to confirm this. Alternative definitions of entrepreneur are used according to the intrinsic characteristics of the business and of the individual: as a result, various degrees of entrepreneurship seem to exist, with very specific characters.

More specifically, our results highlight that strict definitions are clearly associated with somehow sophisticated businesses and signals, such as the presence of employees or, more importantly, of more complex legal statuses. On the other side, larger definitions change and blur somehow the picture, introducing elements which characterize particular businesses.

If we consider the BR side, it must be remarked that the integrated administrative data do not cover the whole population of businesses with the same accuracy. The information on the owners and members from various administrative sources doesn't cover in fact the whole universe of active enterprises. This mere fact necessarily implies the development of estimation methods. This said, the adoption of deterministic rules based only on administrative signals looks anyway of great help in extracting a convincing evidence of what could be envisaged as entrepreneurship. Nevertheless, the results show also that they need further refinements, in particular the secondary rules which unavoidably face the solution of more ambiguous cases.

The use of statistical integration of survey and administrative data, on the other side, paves the way for more appropriate probabilistic approaches, which can be configured as bases for the production of satellite information on businesses and self-employment. Such approaches look promising in general for labour input estimation, since they are based on the principle that the power of sample

surveys can be dramatically enhanced with the provision of exhaustive individual auxiliary information.

References

- AA.VV. 2015. *Methodological solutions for the integrated use of statistical sources to estimate employment* (in Italian). Final report of Istat Working group on the development of new methods for employment estimates for National accounts benchmark. Istat working paper (to be published). Roma: Istat
- Ahmad N., Hoffman A. 2008. *A Framework for Addressing and Measuring Entrepreneurship* OECD Statistics Directorate Working Paper, STD/DOC(2008)2
- Bjuggren C.M., Johansson D., Stenkula M. 2012. *Using self-employment as proxy for entrepreneurship: some empirical caveats*. International Journal of Entrepreneurship and Small Business, 17(3): 290-303
- Block J., Sandner P. 2006. *Necessity and Opportunity Entrepreneurs and their Duration in Self-employment: Evidence from German Micro Data*. SOEP papers on Multidisciplinary Panel Data Research n 191. DIW Berlin (May)
- Cantillon R. 1755. *Essai sur la Nature du Commerce en Général*. London, MacMillan (1931): UK
- Davis T. 2006. *Understanding Entrepreneurship: developing indicators for international comparisons and assessments*. OECD: Paris
- De Gregorio C., Giordano A. 2015. The heterogeneity of irregular employment in Italy: some evidence from the Labour force survey integrated with administrative data. *Istat working paper*, n.1
- De Gregorio C., Filipponi D., Martini A., Rocchetti I. 2014. *A comparison of sample and register based survey: the case of labour market data*. Paper presented at Q2014 Conference. Vienna: Statistik Austria
- European Commission. 2010. *Self-Employment in Europe*. European employment observatory review. Luxembourg.
- Hunter D. 2013. *Status of work on the International Classification of Status in Employment*. Expert Group Meeting on International Statistical Classifications. New York, 13-15 May
- ILO. 2003. *Refocusing the employment relationship: recent developments*. In: ILO. The scope of the employment relationship (ch. 5). International Labour Conference 91st Session
- Knight F. 1921. *Risk, Uncertainty and Profit*. University of Chicago, Chicago.
- Garofalo G., Rocchetti I., Viviano C. 2012. *A revision of the Italian Business Register: a new methodological and conceptual "backbone" for a new informative system on employment*. Paper presented at the 23rd Meeting of the Wiesbaden Group on Business Registers.
- Linder M., Houghton J. 1990. *Self-employment and the petty Bourgeoisie: comment on Steinmetz and Wright*. American Journal of Sociology, vol. 96 n. 3 (Nov.), pp. 727-735
- OECD. 2000. *The partial renaissance of self-employment*. In: OECD employment outlook, ch.5. OECD: Paris, pp. 155-199.
- OECD. 2013. *Entrepreneurship at a Glance 2013*, OECD: Paris
- Piacentini M. 2013. *Entrepreneurship statistics by gender: a review of existing sources and options for data development*. OECD: Paris
- Say J.B. 1803. *Traité d'économie politique*. Transaction Publishers
- Schumpeter J.A. 1934. *The theory of economic development*. Harvard University Press: Cambridge, MA:.
- Schumpeter J.A. 1942. *Capitalism, Socialism and Democracy*. New York: Harper and Roe Publishers

- Schumpeter J. A. 1947. The Creative Response in Economic History. *Journal of Economic History*, Vol. 7 149-159
- Seymour R. 2006. *Measuring Entrepreneurial Activity*. ISTAT-Eurostat-OECD Seminar on Entrepreneurship Indicators. Rome, December 6 and 7
- Steinmetz G., Wright E.O. 1989. *The fall and rise of the petty bourgeoisie: changing patterns of self-employment in the postwar United States*. *American Journal of Sociology*, vol. 94 n. 5 (Mar.), pp. 973-1018
- Viviano C. 2015. *Integrated Longitudinal Employer-Employee Data: a New Informative System on Employment in Italy* Workshop on Developing Entrepreneurship Statistics by Gender in the Republic of Moldova
- Von Mises L. 1949. *Human Action: A Treatise on Economics*. Fourth Revised Edition 1996. Fox & Wilkes: San Francisco