The integration of administrative data to analyse the business economic performance: methodological aspects and results of a study

Fulvia Cerroni[a], Viviana De Giorgi[b], Marianna Mantuano[c]

Abstract This paper describes the integration of micro data from two administrative sources, the Balance Sheets and the Fiscal Authority Survey, in order to study the economic performance of Italian enterprises active during the period 2007-2009 for which the performance indicators, such as the gross profitability, the labour productivity, and the wage-adjusted labour productivity can be calculated. Enterprises are grouped into homogeneous clusters of the gross profitability indicator. The analysis gives information about the group structure, dynamism and composition.

1. The integration of economic administrative data

The integration of different administrative data in order to compare the same characteristics on the units of a reference population is based on the availability of compatible and comparable information.

For this work, information from the available economic/accounting sources, such as the *satellite archives*[1] on enterprises, have been integrated in order to analyse the economic performance of Italian enterprises in a three-year period for two specific economic sectors. One of the main disadvantages in using administrative data is that their availability might not be exhaustive of the whole reference population. The administrative economic/fiscal sources currently available, the Balance Sheets for corporate companies and the Fiscal Authority survey (called Sector Studies) for the other enterprises, do not include all Italian firms: excluded are the enterprises that do not fill in a balance sheet nor the sector study survey[2]. Anyway, the combined use of

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[a] Istat, e-mail: cerroni@istat.it

[b] Istat, e-mail: degiorgi@istat.it

[c] Istat, e-mail: mantuano@istat.it

[1] They integrate information from the Italian Business Register (Asia) and the administrative/economic sources

[2] They are the minimum taxpayers, the enterprises with proceeds greater than 7.5 million Euros, and firms not liable to the sector studies survey. The causes for exclusion, including the limit of sale proceeds, are in general valid for any type of study and involve the non application of the studies. Excluded is the enterprise that: 1) has a tax period other than 12 months; 2) has started or ceased its activity during the taxation year, 3) has changed its activity during the year; 4) determines the income criteria on a lump-sum basis; 5) is responsible for house-to-house service, 6) is not in an ordinary activity; 7) is classified in a proceeds category different from that relevant

such data is an innovation in the economic analysis of enterprises because, even excluding the above-mentioned enterprises[3], the set used is representative for the economic performance analysis in terms of the total number of firms and persons employed. It should be noted that the integration of the two sources on the one hand allows the comparative analysis of a wider set of enterprises, on the other hand reduces the availability of accounting information for the calculation of economic indicators[4]. Moreover, in order to ensure the comparability of indicators over time, the source must be always the same for the same enterprise for all years analysed ([2]). The comparison of indicators in fact could be altered by the differences (in definition, data collection methods) among sources ([1]). Furthermore, in order to maintain the comparability over time, some firms have been left out, due to special economic situations they face: takeovers, closing downs, suspensions, breakups, etc.

2. The analysis of economic performance: methodological aspects

This paper analyses the closed panel of enterprises active during the period 2007-2009 in order to see how they have changed their economic performance. The descriptive analysis of information available for all enterprises (turnover, costs, value added, gross operating surplus) and the analysis of the changes in economic performance occurred from the first to the last year explains how the enterprises experience the transition from 2007 to 2009. A complementary analysis of the enterprises that have closed down in the period has been added: they are firms that do not survive after either the first year or the second year, selected with the same criteria of the panel (data availability, regular activity).

The analysis of economic performance is a study on subpopulations of enterprises grouped by similar characteristics of economic performance. It implies, in fact, an initial phase where firms are split into groups dynamically homogeneous with respect to the gross profitability indicator (defined as the ratio between gross operating surplus and turnover) and a second phase in which: 1) the (apparent) labour productivity indicator (the ratio between value added and the number of persons employed) for all firms, and 2) the personnel cost and the wage-adjusted labour productivity ratio (the ratio between labour productivity and average personnel cost) only for firms with employees, are analysed within each homogeneous group. In detail, starting from the calculation of the quartiles of the profitability indicator, each enterprise is assigned to a group according to its relative position (first, second, third, last quartile) in 2007 and in 2009. Then a transition matrix is processed. It will determine how firms stay in or move from their position over the period, either remaining within the same quartile of profitability or improving/worsening it by moving into higher/lower quartiles of profitability. This methodology identifies three different categories: a) stationary

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to the application of the Sector Studies survey. Changing the activity during the year is not a cause of exclusion when the two activities (the one started and the one ended) are included in the same study.

[3] Their characteristics are to be considered non-homogeneous with those of other enterprises.

[4] As a matter of fact, sector studies register economic items, but with a detail different than the ones filled in a balance sheet. So calculating the standard budget analysis indicators (ROI, ROE, ROS) is not possible. However, other indicators, which are to be used for all enterprises in order to ensure comparability among them, can be derived.

enterprises, i.e. firms that remain in the same quartile of profitability (the main diagonal of the matrix), b) upward enterprises, which move into higher profitability quartiles (upper right quadrant, above the main diagonal); c) downward enterprises, that move to the lowest profitability quartile (lower left quadrant, below the main diagonal). Stationary firms can be further divided into: a.1) lower profitability enterprises, whose profitability is always in the bottom quartile; a.2) higher profitability enterprises, i.e. firms whose profitability is always in the top quartile; a.3) intermediate profitability enterprises, whose profitability still maintains the same central position (second or third quartiles).

3. Main results of the study in two sectors

This paper focuses on a set of enterprises[5] consisting of the manufacture sector of textiles, wearing apparel, leather and related products (TWL) and the sector of Information Technology (IT) in the years 2007-2009[6]. We have analysed 52,190 enterprises in the TWL sector (5,826 of which do not survive after 2007, and 3,702 do not survive after 2008) and 57,395 firms in the IT sector (of these, 5,776 are not more active in 2008 and 3,554 have closes down in 2009). The 2007-2009 closed panel is therefore made up of 42,662 TWL enterprises and 48,075 IT firms. They account for 74.3 percent out of the enterprises of the TWL sector and 72.7 percent out of the IT sector, and 83.6 percent and 85.4 percent, respectively, in terms of the number of persons employed.

The analysis of the main performance indicators in the TWL sector highlights that the enterprises face with a strong activity contraction from 2007 to 2009, whereas the effects of the crisis on employment can be seen only in 2009. Turnover and value added decrease by about 20 percent over the three years with an acceleration of the decline from 2008 to 2009, while the gross operating surplus decreases by 45 percent. The employment shows a positive trend in 2008, whereas decreases in 2009 when the number of persons employed is 5 percent less than the 2007 level. The IT sector, apparently, does not suffer immediately the effects of the crisis: turnover increases in 2008 and fall slightly in 2009, whereas value added shows always a positive trend. Moreover, enterprises continue to employ, although in 2009 the gross operating surplus shrinks, reaching an average level lower than in 2007. To conclude, during the economic and financial crisis the TWL sector seems to suffer more than the IT sector[7].

The enterprises that leave the market over the three years very low volumes of turnover. In the TWL sector such enterpises have three persons employed on average, and in the IT sector they are sole proprietorships or firms with one employee, and. For both sectors, the percentage of firms leaving the market in 2008 and 2009 is in inverse

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[5] To read the results on other sectors, see [4], Section 2.3.2.

[6] The TWL sector consists of the divisions 13 (Manufacture of textiles), 14 (Manufacture of wearing apparel and leather and fur) and 15 (Manufacture of leather and related products) of the Nace Rev.2. The IT sector is composed by the divisions 62 (Computer programming, consultancy and related activities) and 63 (Information service activities) of the same classification.

[7] This is likely due to the fact that the traditional manufacture sector of Made in Italy is characterized by a strong foreign demand, which has slowed sharply over the period. Surveys confirmed the relevance of the enterprises operating in traditional sectors, including the manufacture of leather and related products, in the export propension during 2009 ([5])

proportion to the number of years of activity; this suggests that a professional background helps stay on the market.

Figure 1 shows, for each sector, the percentage distribution of firms out of the total number of firms, according to their shifting among quartiles.

Figure 1. Number of enterprises by quartile of gross profitability. Sectors: TWL and IT. Years 2007-2009 *(percentage composition)*

TWL sector					It sector				
2009					2009				
2007	1	2	3	4	2007	1	2	3	4
1	13,2	8,2	2,5	1,0	1	16,3	6,0	1,9	0,7
2	6,1	10,7	6,6	1,8	2	5,7	12,0	5,4	1,8
3	3,7	4,8	11,0	5,6	3	2,1	5,5	12,2	5,3
4	1,9	1,6	5,1	16,2	4	0,9	1,8	5,6	16,6

As far as for the TWL sector is concerned, 25.7 percent of enterprises improve their position in terms of the gross profitability indicator by moving to upper quartiles. On the contrary, 23.2 percent of firms follow the opposite direction, moving in 2009 to a levels of gross profitability lower than 2007. So, 51.1 percent remain stable in the same quartile. The IT sector seems to be less dynamic: stationary enterprises represent 57.1 percent out of the total, 21.2 percent improve their relative position, while 21.6 percent worsen it. The greater the number of positions changed, the less intense the number of changes.

Analysing separately the groups of gross profitability identified by the transition matrix indicator helps understand the economic performance. The TWL higher profitability enterprises are characterized by the highest performance, though they worsen their profitability and labour productivity. Also stationary intermediate profitability firms lose in profitability and labour productivity. The same happens to the values of the IT enterprises. The IT higher and intermediate profitability enterprises have a fall in profitability, in spite of a productivity improvement.

Further analyses are about the enterprises with employees, whose average personnel costs and wage-adjusted labour productivity ratio can be calculated. In both the TWL and IT sectors, businesses with employees in general have on average lower profitability and lower dispersion of values. For upward firms, improvements of profitability are not much clear, and the profitability of higher profitability enterprises is about half that the one calculated on the whole set of enterprises.

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