# A mosaic type of development: the Agri-Food Districts experience in Italy

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# 1. Introduction: Industrial Districts Approach

In the second post world-war period the rapid and successful economic development of Italy attracted the attention of many researchers. The Italian socio-economic development was studied utilising different approaches. Traditional dualistic analyses were used during the 1950s and 1960s (North-South, large-small firms, traditional-modern sectors, export-led moldel) to explain the profound differences existing inside the Italian industrialisation process (Valli, 1998). In the 1970s the industrialization process spred from Nord-West regions to North-Est and Central part of the country. The presence of different regional patterns of development was emphasised in the analyses of the 1980s. The relevance of geographical agglomeration and specialisation of independent SMEs was underlined by the pioneering work carried out by Becattini (1979, 1987, 1989) starting from Marshall's (1919) definition of aggregation and concentration of many SMEs, with the advantages of the division of labour and external economies of scale. These economies and development factors are often external to the enterprise but internal to the region or the district area[1].

The Industrial Districts (IDs) became an important tool to analyse the roles of SMEs on the remarkable economic performance of Italy over the last decades Numerous studies stressed the different pattern of development of SMEs belonging to certain districts with respect to big enterprises, on one hand, and isolated SMEs, on the other, (Piore and Sabel 1984, Brusco, 1986, 1989; Nuti, 1989; Garofoli 1989, Sabel 1989). The analytical efforts for defining and describing IDs have been growing over time. Empirical analyses point to considerable differences existing between the

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[1] In order to better understand the recent Italian developments, Becattini described "Industrial District" as a localised thickening of inter-industrial relations between SMEs, with "a complex and inextricable network of external economies and diseconomies".

different geographical realities, in terms of not only the type of product specialization, but also of firms' structure, socio-economic context, relationships between national and international markets, productivity and efficiency of production.

The effort to define different typologies and models of local development were done first by Garofoli (1991), then Markusen (1996) and Castellano (1999), who proposed a broader definition of IDs. In particular, they describe four types of ID (Marshallian ID, Hub and Spoke districts, Satellite industrial platform, State anchored ID) according to the main characteristics of the firm such as size, inter-firm relationships and internal versus external orientation (Guerrieri, Pietrobelli, Iammarino, 2001, pages17-19).2 In the last decade, quantitative analyses were developed to identify and evaluating the theoretical hypotheses of IDs and their performance (Signorini 1994, 2000; Bagella and Becchetti 2001). In recent years the regional and local development analyses have received growing attention in connection with the apparent contradiction on the effect of globalisation (Banca d'Italia 2005, Università di Modena 2003). 3 The Italian Industrial Districts (IDs) are now considered in the national and international literature as one of the main factors of the successful and rapid industrial development of Italy after the Second World War.

## 2. The Agri-Food Districts in Italy

The copious Italian research works carried out on IDs and local systems hardly refer to the agri-food sector. Only during the Nineties several empirical studies showed the presence of agri-food districts and their relevance to the fast changes of Italian

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[2] Recent advances of this research has analysed the role of foreign investment on multinationals and their complementary and positive linkages with the development of local industry (Markusen and Venables 1999, Gorg and Strobel, 2002)

[3] The "industrial districts" analysis was accompanied at international level by other approaches to regional and local development such as "innovative milieux" (Aydolat 1986; Maillat 1995), "new industrial spaces" (Scott and Storper, 1992), "learning regions" (Morgan 1997; Maskell et al.1998), and "intelligent regions" (Cooke and Morgan, 1990). Regional (national) development was also analysed by resorting to the "industrial cluster" concept (Swann 1998), which emphasises geographical proximity, although not necessarily specialisation and intra-firm relationships. Industrial clusters were utilised to measure competitiveness of regions,

agriculture and the food industry after the Second World War (Iacoponi, 1990; Fanfani, Montresor, 1991; Fanfani 1994).

The impressive change in the geography of Italian agriculture was first described by Rossi-Doria (1969), who initiated research on the "zonizzazione" of agriculture. Further analyses of geographical transformations of Italian agriculture took into account many other variables, such demographic changes, and also general socio-economic variables and, in particular, the role of the food industry (Cannata G., Forleo M. B. 1998; Boccafogli F., Brasili C., 1998).

The analyses of agri-food districts are also closely connected to the growing importance of food processing industries. In Italy, the food industry's added value is now reaching and exceeding that of agriculture. As a result analyses of the food industry are receiving increased attention from numerous researchers (Brasili C., Fanfani R. 2000; Fanfani R., Henke R. 2001). In recent years, there has been a strong concentration of food industries, which has led to the creation of some big national groups and to the penetration of multinational firms. Nevertheless, SMEs still predominate and characterise the Italian food industry.

Various scholars attempt to extend the interpretation tools of the ID approach by identifying agricultural and agri-food districts. Iacoponi's (1990) study was among the first studies which attempted to introduce the ID concept in the economic analysis of agriculture. Another important study was that conducted by Fanfani & Montresor (1991), where the concept of "filière" is extended to the local analysis of the Italian agri-food system. There are many studies dealing with specific agri-food districts. Most of them are focused on northern Italy, but some significant analyses also concern

following the suggestion of Porter (1990). For a comparison of Porter's approach and the ID approach, see Fanfani, Lagnevik (1995), with particular reference to the agri-food systems.

southern Italy. Among the most interesting ones are studies on the Parmigiano Reggiano system (Bertolini 1988; Giovannetti 1991), the production and processing of pork in the province of Modena (Fanfani 1993, Mora, Mori, 1995), and the analysis of the poultry production system in the provinces of Verona and Forlì (Montresor, 1991)[4].

Long-established (and extensively studied) agri-food districts have a different origin and a different evolution. In fact, the origin of agri-food districts is closely related to the enhancement of the value of local resources and traditions. In many cases, the presence of typical and traditional products represents the groundwork for the development of arts and crafts processing and preservation activities, which help to overcome the problems of seasonality and widen the market. The strong local demand for the typical products of the district plays a critical role in their development, making it possible to achieve economies of scale at the initial stage and then to progressively diversify the products[5].

Moreover, the evolution of agri-food districts has been favoured by the more general processes of development of Italian agriculture, with gradual concentration and specialisation of production in increasingly narrow areas. Thanks to these trends, the main Italian agricultural products are now concentrated in no more than four or five provinces[6]. Furthermore, the link between agriculture and industry in agro-industrial districts tends to become weaker and the local processing industry often relies on supplies from outside the district.

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[4] These analyses have been conducted on long-standing and, to some extent, "mature" agri-food systems. Many other agri-food districts have also been analysed from the "red fruits" of Vignola, to the nurseries of Pistoia and neighbouring municipalities (Scaramuzzi, 1998) and to the vine cuttings of Friuli. An important point of reference for the analysis of local agri-food systems in relation to typical and quality products is represented by the papers presented at the conferences held in Parma in 1997: "Typical and traditional products: rural effect and agro-industrial problems". A comprehensive review of the literature on the definition and study of agro-industrial districts is given by De Rosa (1996).

[5] A case in point is represented by the districts which process pork meat for the production of ham and salami (Parma and Reggio Emilia, Modena, S. Daniele). Here, a wide range of products are associated with a high manufacturing flexibility.

[6] The most notable examples are livestock reared for milk or meat production, and the growing of fruits and vegetables (tomato districts of Piacenza and Parma, on one hand and of Salerno and Naples, on the other).

Additionally, local institutions and authorities often play a crucial role in the agri-food districts. However, this role is often overlooked or regarded as negligible not only for the creation and management of general services, but also for the supply of specific services to local enterprises. Their action is instrumental in designing and implementing economic policy programmes and projects targeted at individual districts[7]. In recent years, investigations on food districts have become more and more frequent. Despite the availability of empirical analyses and the rising number of statistical data, there are still difficulties in singling out the features of, and criteria for, the definition of food districts. Our efforts are aimed at developing an accurate and reliable methodology for identifying the main districts of the Italian agri-food system. For this purpose, we define and used six indicators of location, concentration and specialisation (each for local units and employees)[8]. The "mosaic" or "patchwork" distribution of food industry labour and firms resulting from previous studies - as well as from analyses based on food industry location, concentration and specialisation indicators – infer that the existence of local production systems.

For more than two decades, the importance of local-level analysis has not been paralleled by a policy aimed to acknowledging the positive and distinctive features of the local districts and systems of SMEs. For various reasons, this lack of political involvement has penalised the development of Italian food industry.[9]

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7 An increasingly significant role is played by EU policies (regional rural development plans or actions made by local governments in Objective 1 and 2 areas) with Regional Plan for Rural Development.

8 For details on these parameters and their use, the reader is referred to Brasili, Pecci, Giustino (1997), Brasili, Fanfani, Montresor, Pecci (1998), Brasili (1999) and to the methodological appendix to this paper. The recent publication of Industrial Census of 2001 will allow for a new analysis as reported in paragraph 4.

9 The districts were formally recognised only in 1991, under art. 36 of law no. 317. And the implementing decree of law no. 317, establishing the parameters for identifying the districts, was enacted only on 21 Apr. 1993. For the purposes of our analysis, it is worth noting that both law no. 317 and the Ministerial Decree adopted the district identification approach proposed by Sforzi (1987). This author drew up a map of 61 Marshallian industrial districts by using 1981 data. His studies officially recognise the value of using highly disaggregated municipal and individual data for economic analyses.

## 3. The Quantitative Evaluation of Agri-food District Effects

### 3.1 The difficulties in identifying the districts

The main difficulties in identifying the agri-food district arises as this involves clusters of firms and a specific territory. To overcome these difficulties in the process of clustering firms on the territory we proceeded in two steps. The first step uses the data of the Census of Industry and Services to define the areas where the main concentration of specific food sectors are (meat, dairy, fruit and vegetables….). In this step we utilised structural data on the number of establishments and employees for each municipality for the meat sector. We computed six concentration and specialisation indices at a municipality level in order to identify the main local system of production and the agri-food districts. In this paper we utilise the data of the 2001 Census of Industry, recently published, to update our the previous analysis done using the Census of 1991[10]. The second step, after identifying the meat districts, was to analyse the balance sheets of firms to verifying the existence of a "district effect" in the meat sector. We cluster the firms of the meat sector into different groups according to whether or not they belong to the firms of a specific district. The analysis of the firms' balance sheets focuses on the main economic and financial results of the different groups using the most common indicators. A more specific analysis on the firms' results was done by estimating the technical efficiency of the meat firms utilising a stochastic frontier production function to assess the "district effect" in the meat districts. In the past few years, a considerable number of studies, based on balance sheet data, suggested a clear "district effect" on the return ratios of firms for the main manufacturing sectors, including the food sector (Fabiani S., Pellegrini G. 1998; Fabiani S., Pellegrini G., Romagnano E., Signorini L.F.

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[10] The Census data are available in Italy every ten years. This is an handicap for the analysis on structural changes of location of economic activities and in particular for district analyses. In this paper we utilised

1998; Signorini L.F. 1994). It was found that the return ratios (ROI and ROE) of district firms were sharply higher than those of the non-district firms (Fabiani S. et al. 1998).

In the next section we present a detailed economic and efficiency analysis of the firms belonging to the main meat districts and the other districts in order to establish whether there is a "district effect". We use the balance sheets of a panel of 448 firms from the Italian meat processing industry for the years from 1998 to 2002.

### 3.2 An economic and efficiency analysis of the meat sector

#### 3.2.1 The utilised data (panel of firms)

The data utilised consists of a panel of firms derived from the general data bank of manufacturing industries with a minimum turnover of 1 million Euro. From the balance sheets of firms of the food industry, we selected the firms belonging to the meat sector for the years from 1998 to 2002. Our panel data was 448 meat processing firms which were active in Italy between 1998 and 2002. We organised the panel data in four main groups of firms: the two well known ham districts (Parma and S. Daniele), the firms belonging to the other meat districts, and, finally, the firms not belonging to any districts. The result of this clustering process was as follows: non-district firms (302); firms in the Parma district (60); firms in the San Daniele district (11); firms in other Italian districts (71) (Table 3.1). The Parma and San Daniele ham-producing districts are economically important within Italy's agri-food industry as they epitomise the *made-in-Italy* brand, which is increasingly popular both in Italy and abroad. These two districts - although both are (mainly) ham production areas - showed strikingly different structural and economic features. The Parma district can be considered the main system specialised in meat processing (Brasili, 1999, Brasili Ricci Maccarini 2001). Our

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establishments' data which have better capabilities to describe the territorial location of economic activities with respect to the firms data.

previous studies indicate that it included, in 1991, as many as 15 municipalities; the district encompassed 443 establishments and 3,769 employees. Almost one third of the employees were concentrated in the municipality of Langhirano, playing a central role in the local system. The data from the recent 2001 Census shows us that in the new Century this district continues to play an important role[11]. The Parma ham district is specialised in pork meat processing and the *Prosciutto of Parma* is undoubtedly the most valuable local product. The total production in 2001 has been about 10 million of ham pieces. *Prosciutto of Parma* is one of the most typical products of Italy's food industry. Its salient feature is that it derives from processing a so-called "heavy pig" ( pig of 180 kilograms or more). The pigs are raised mainly in the area and - after processing - the ham is seasoned for 12 months or more in the Langhirano firms.

The "San Daniele" local system, in contrast, covers just one of the eponymous municipalities; where, in 1991, a whooping 35 local units and 430 workers were located. In 2001 there was one more establishment and 464 employees. This district is exclusively specialised in the seasoning, stocking and marketing of the typical "San Daniele" ham; all the raw material came from outside the municipality, mainly from other Italian regions. In order to determine whether there is a "district" effect for the main groups of firms, an analysis of the main economic and financial results of the meat firms belonging to each of these groups was conducted[12].

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[11] However, in 2001, the area has one municipality less than in 1991, with 431 establishments and 3,964 employees. The number of establishments reduced from 1991 to 2001 but the number of the employees increased. Almost one third of the employees were concentrated in the municipality of Langhirano. Again, 65% of all manufacturing employees and as many as 95% of employees in the food industry work in the meat sector of the municipality of Langhirano. The average size of the firms are small in terms of employees due to the great proportion of firms exclusively devoted to ham seasoning.

[12] We resorted to the most common economic and financial ratios such as:i) ROI, return on investment which is calculated as the ratio of the operating income on the invested capital ii) ROE, which is calculated as the ratio of the net profit to the company's capital or equity (per 100); iii) ROS return on sales; iv) productivity of labour (thousands of euros per employee) v) labour cost per employee, calculated as the ratio of the cost of labour to the employees (thousands of euros per employee) vi) acid ratio vii) current ratio; viii) leverage and viii) vertical integration. In the analysis we utilised the median value because the average is influenced by outliers, which are common in the case of balance sheet data.

The main results that emerge from the economic and financial analysis, as shown in table 4.2, are an almost general and clear convergence of the results of the firms belonging to a district versus the same level for the non district firms. These results are a concern when comparing them with the results from our several previous works on the same meat districts using data from 1996 to 1998 in the first paper (Brasili C., Ricci Maccarini E., 2001) and from 1996 to 1999 in the second paper (Brasili C. and Ricci Maccarini E., 2003)[13]. Within the meat sector differences between firms in the district and outside the district are disappearing, therefore there is a tendency for the economic and financial results to be similar. The detailed results of the new analysis from 1998 to 2002 are the following. The Parma and San Daniele meat processing districts generally show higher return ratios until 2000 or 2001. In fact, the San Daniele district has a ROI higher than 6% until 2001 but in 2002 this decreases to 4.34% which is more or less equal to the Parma district, all the other meat districts and other meat firms (Table 3.2). Generally, the ROE value was higher in the two districts until 2001 but after it falls under the value of other firms both within and outside of the district, becoming a very low value of roughly about 1 or 2 percent. Based on other studies conducted on Italian districts (Signorini 1994; Fabiani S., Pellegrini G. 1998), we confirm the higher return ratios for the firms located in the districts but there is little evidence of this over the last few years. The changes to these results over the last years require confirmation over a longer time series. Labour productivity was, in all the years, considered to be higher in the Parma and San Daniele district firms than in the firms located in other districts or those outside the district. But while this result is evident in the years from 1998 to 2000 (the value was about 15-20 000 greater), after 2000 the values become more similar to

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[13] The results of this paper are not completely comparable with the previous two, in fact some firms are changed in the years and the panel we have analysed is not exactly the same.

those for the other firms. In fact, the range of values for all the meat firms are between 49 and 56 thousands euros which greatly reduces this difference. On the other hand, the labour cost of the Parma and San Daniele Districts which were previously higher, reach similar values in the 2002, slightly lower than firms in other districts (26 000 euros from 27 000 euros).  Again, for the years prior to 2000 we show results in line with Signorini (1994), suggesting labour costs higher for district firms, other than Parma and San Daniele, because of higher salaries.

**Table 3.1 Meat Processing Panel**

| Geographical areas | firms | employes | | | | |
|---|---|---|---|---|---|---|
| | 1998-2002 | 1998 | 1999 | 2000 | 2001 | 2002 |
| **Parma district District** | 64 | 1449 | 1353 | 2119 | 1887 | 2045 |
| **San Daniele district** | 11 | 199 | 184 | 177 | 235 | 251 |
| **Other meat districts** | 71 | 10879 | 12970 | 12280 | 11940 | 12591 |
| **Other meat firms** | 302 | 11501 | 11640 | 11754 | 11800 | 12427 |
| **Total** | **448** | 24035 | 26154 | 26336 | 25867 | 27314 |

*Source: our processing of Cerved data (Balance sheet data Bank)*

The three following financial ratios, acid ratio, current ratio and leverage, show a more stable trend in the sample and are generally better for Parma and San Daniele District, perhaps suggesting a phase of restructuring (but these are less informative than the district ratios). The vertical integration ration within the district is finally considered and again is shown to be closer between (15%) and within the district (20% in San Daniele in 2002).  Perhaps this is due to higher specialisation in only one kind of production (in San Daniele all the firms produce only ham).

To identify the existence of a "district effect" we conduct an efficiency analysis of the meat processing firms. In particular, we estimate a stochastic frontier production function relative to the meat processing firms which either belonging or not to the district. A positive "district effect" is equivalent to a reduction of the technical inefficiency of a given firm.

**Table 3.2 Meat Sector Districts : Firms Balance Sheet Ratios (median)**

| R O I (%) | 2002 | 2001 | 2000 | 1999 | 1998 |
|---|---|---|---|---|---|
| Parma district | 4.08 | 5.10 | 4.69 | 4.78 | 6.95 |
| S. Daniele | 4.34 | 6.65 | 6.20 | 6.22 | 6.40 |
| Other meat districts | 4.48 | 4.54 | 3.69 | 3.87 | 5.22 |
| Other meat firms | 4.62 | 4.71 | 3.66 | 4.26 | 5.41 |
| Total | 4.42 | 4.78 | 3.85 | 4.30 | 5.56 |
| R O E (%) | 2002 | 2001 | 2000 | 1999 | 1998 |
| Parma district | 2.26 | 5.47 | 3.70 | 4.94 | 7.45 |
| S. Daniele | 1.49 | 5.01 | 6.93 | 6.22 | 3.79 |
| Other meat districts | 4.19 | 3.33 | 2.72 | 2.22 | 2.83 |
| Other meat firms | 3.79 | 3.02 | 1.62 | 2.09 | 3.14 |
| Total | 3.50 | 3.58 | 1.93 | 2.63 | 3.73 |
| R O S (%) | 2002 | 2001 | 2000 | 1999 | 1998 |
| Parma district | 5.13 | 6.49 | 5.17 | 5.43 | 8.10 |
| S. Daniele | 6.56 | 9.38 | 9.47 | 10.11 | 12.22 |
| Other meat districts | 2.88 | 2.49 | 1.95 | 2.49 | 2.82 |
| Other meat firms | 2.98 | 2.81 | 2.23 | 2.40 | 3.01 |
| Total | 3.38 | 3.12 | 2.58 | 2.86 | 3.51 |

| Leverage | 2002 | 2001 | 2000 | 1999 | 1998 |
|---|---|---|---|---|---|
| Parma district | 3.65 | 3.51 | 3.33 | 3.29 | 3.41 |
| S. Daniele | 2.23 | 2.36 | 2.30 | 2.12 | 2.14 |
| Other meat districts | 5.80 | 6.91 | 7.18 | 6.47 | 5.33 |
| Other meat firms | 5.67 | 6.27 | 5.82 | 5.68 | 5.64 |
| Total | 5.36 | 5.64 | 5.51 | 5.08 | 5.12 |
| Vertical Integration (%) | 2002 | 2001 | 2000 | 1999 | 1998 |
| Parma district | 15.24 | 17.31 | 17.35 | 18.27 | 20.32 |
| S. Daniele | 20.71 | 21.52 | 24.26 | 27.12 | 24.89 |
| Other meat districts | 14.32 | 13.94 | 13.81 | 14.89 | 14.78 |
| Other meat firms | 14.95 | 13.22 | 13.47 | 14.71 | 14.51 |
| Total | 15.11 | 14.06 | 14.13 | 15.36 | 15.33 |
| Labour productivity (.000 euros per employee) | 2002 | 2001 | 2000 | 1999 | 1998 |
| Parma district | 53 | 58 | 68 | 83 | 74 |
| S. Daniele | 56 | 65 | 76 | 73 | 69 |
| Other meat districts | 50 | 50 | 47 | 51 | 51 |
| Other meat firms | 49 | 49 | 52 | 59 | 49 |
| Total | 48 | 48 | 46 | 51 | 49 |

*Source: our processing on AIDA-Bureau Van Dijk data*

To achieve this goal, we employed a parametric methodology used in previous research on other sectors of the processing industry (Brasili C., Ricci Maccarini E. (2001, 2004) Fabiani S. et al. 1998; Fabiani S. and Pellegrini G. 1998; Signorini L.F. 1994)[14]. The above-mentioned stochastic frontier production function was estimated for the 448 firms as follows: (**1**) $\ln(Y_{it}) = \beta_0 + \beta_1 trend + \beta_2 \ln(L_{it}) + \beta_3 \ln(K_{it}) + (v_{it} - u_{it})$

where $Y_{it}$ is the value added of the *i*-th firm at time *t;* $L_{it}$ the *i*-th firm's number of employees at time *t;* $\kappa_{it}$ is the value of the net tangible assets of the i-th firm at time t; $v_{it}$ is a random variable independently and identically distributed according to a normal with null medium and $\sigma_v^2$ variance; $v_{it}$ is assumed to be non-correlated with regressors and technical coefficients. The effect due to technical inefficiency $u_{it}$ is specified as follows(**2**):

$$u_{it} = \delta_0 + \delta_1 (\text{Parma distr.}_i) + \delta_2 (\text{San Daniele distr.}_i) + \delta_3 (\text{Other Meat distrs}_i) + \delta_4 (<20 empl._i) + \delta_5 (20-100 empl.) + \delta_6 (NE_i) + \delta_7 (NW_i) + \delta_8 (Centre_i) + \delta_9 (TecInnInd_i) + \omega_{it}$$

where $\omega_{it}$ are non-negative random variables measuring technical inefficiency and assumed to be independently distributed along a truncated normal $N(m_{it}, \sigma_u^2)$, where $m_{it} = z_{it}\delta$ and where $z_{it}$ is the vector of 9 explanatory variables which - in our opinion - may affect the technical efficiency of the firm in equation (2) and the coefficients $\delta$ are parameters to be estimated[15]; where $\delta_1, \delta_2$ and $\delta_3$ are the coefficients of the dummies that refer to district location, while $\delta_4$ and $\delta_5$ are the coefficients relative to the size of the firms. The three dummies $\delta_6$, $\delta_7$ and $\delta_8$ represent the geographical location of the firms in Italy. Finally, $\delta_9$ is the coefficient of the index that we chose as a proxy of technical innovation (in particular it is an investment in tangible assets on the total revenue). The coefficient of the district variable was significant but not of the expected sign for firms in the Parma district ($\delta_1$=1,47) and in San Daniele district ($\delta_2$=1,33), with respect to those not included in the meat districts. These results mean that there is no more technical efficiency in the firms included in the two districts while there is a very low district effect ($\delta_3$=-0.24) for the firms included in the others meat districts (Table 3.3). These results are in complete contrast with our previous findings (Brasili C., Ricci Maccarini E., 2001, 2004) where the district effect was positive and evident in the years from 1996 to 1999. The analysis of the efficiency of meat industry firms shows that the dimension of the firm (size classes) and their geographical locations are still important and distinctive factors of efficiency. In particular, these results indicate that the technical inefficiency is higher in small firms, roughly 2 times higher than for larger firms, but it is the medium size enterprises who have the highest efficiency.

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[14]For the utilisation of the parametric-type functions, the reader is referred to Fabiani S., Pellegrini G., Romagnano E., Signorini L.F. (1998), whose conclusions we share.

[15] Simultaneous maximum likelihood estimates for the parameters in equations (1) and (2) were made with Version 4.1 of the FRONTIER program by Tim Coelli of New England University.

Moreover, the firms that belong to the geographical area of the North-East, North-West and Centre have a progressively decreasing inefficiency when compared the firms from the South of Italy. The firms located in the North East regions are the most efficient $\delta_6$,=-0.86. Lastly, the variable of technological innovation although showing the expected sign (-0.00) was not significant.

**Table 3.3 Stochastic Frontier Production Function and Technical Efficiency Parameters for Meat Processing Firms (1998-2002)**

| | Coefficient | Standard error | t-statistic | |
|---|---|---|---|---|
| $\beta_0$ | **9.43** | 0.11 | 82,79 | ** |
| $\beta_1$ | **-0.01** | 0.01 | -1,97 | ** |
| $\beta_2$ | **0.63** | 0.01 | 44..68 | ** |
| $\beta_3$ | **0.21** | 0.01 | 23.42 | ** |
| | Coefficient | Standard error | t-statistic | |
| $\delta_0$ | **-0.77** | 0.24 | -3,22 | ** |
| $\delta_1$ | **1.47** | 0.24 | 6.12 | ** |
| $\delta_2$ | **1.33** | 0.23 | 5.63 | ** |
| $\delta_3$ | **-0.24** | 0.06 | -4.17 | ** |
| $\delta_4$ | **2.04** | 0.40 | 5.08 | ** |

| | Coefficient | Standard error | t-statistic | |
|---|---|---|---|---|
| $\delta_5$ | **-0.25** | 0.07 | -3.44 | ** |
| $\delta_6$ | **-0.86** | 0.12 | -6.98 | ** |
| $\delta_7$ | **-0.50** | 0.20 | -2.44 | ** |
| $\delta_8$ | **-0.18** | 0.07 | -2.41 | ** |
| $\delta_9$ | **-0.00** | -0.000.45 | -0.85 | |
| $\gamma$ | **0.22** | 0.05 | 4.22 | ** |

$$\ln(Y_{it}) = \beta_0 + \beta_1 trend + \beta_2 \ln(L_{it}) + \beta_3 \ln(K_{it}) + (v_{it} - u_{it})$$
$$u_{it} = \delta_0 + \delta_1(PR\,distr._i) + \delta_2(San\,Daniele\,distr._i) + \delta_3(Other\,Meat\,distrs_i) + \delta_4(<20empl._i) +$$
$$\delta_5(20-100empl.) + \delta_6(NE_i) + \delta_7(NW_i) + \delta_8(Centre_i) + \delta_9(TecInnInd_i) + \omega_{it}$$

$$\gamma = \sigma^2_u \Big/ (\sigma^2_u + \sigma^2_v)$$

**\* significant for t$_{0.05}$=1.645**

**\*\* significant for t$_{0.025}$=1.960**

*Source: our processing on AIDA-Bureau Van Dijk data*

The results obtained from the efficiency analysis partially confirm our previous findings, with a decreasing district effect in the meat industry, especially in the first years of New Millennium. In fact the firms belonging to the two more relevant meat districts (Parma and San Daniele) are loosing their economic and efficiency results with respect to the non district firms, however, they remain in the most valuable geographical location, with a higher presence of efficient medium size enterprises. This analysis has shown a substantial change over time of the main economic and efficiency results of firms in the Italian meat districts. The further availability of panel data over a longer period of time will stimulate further researchers to understand if these changes are part

of a permanent structural change, or if they are the result of economic cycles which impact the dynamic evolution of the Italian meat districts.

## 4. Concluding Remarks

A controversial debate has taken place for many years about the survival and future evolution of IDs, and how the processes of globalisation may undermine the factors that characterise and contribute to the competitiveness and success of local and regional development. The numerous works and approaches utilised in the last decade clearly show the relevance of local and regional development. The differences existing in the models of local development and the numerous factors that influence the changes of local economies might ensure the capability of firms to adapt to changes in the international scenario. In the analysis of the characteristics and dynamic changes of local and regional economies, agri-food districts hold a particular and specific position. Wide geographical coverage of the food industry is associated with strong sectoral and geographical agglomeration and specialisation. In general, we have seen that agri-food districts have the same main characteristics and the same factors of competitiveness as other districts and local economies. Thus, we could apply many of the different approaches and concepts used for regional and local development. However, it is important to note that the agri-food districts have several distinctive features. Clustering the firms of the panel (1998-2002) into different groups, belonging or not to specific food districts, was carried out in the economic and financial analysis. The analysis shows better results for firms inside the local systems, especially for the meat industry. Among the firms belonging to the meat districts, the best results are obtained by the firms in the district of Parma, followed by that of San Daniele and by other meat districts. Also the efficiency of the meat processing firms in the panel, estimated with a stochastic frontier production function, validates the reduction of the "district effect".

With respect to the previous analysis we conducted we found that in the meat industry the district effect has been progressively reducing from 1998 to 2002. This is particularly true after 2000 when the economic and financial results of the firms belonging to the district are similar to those of other meat processing firms. The size of the firms is another factor of efficiency in the meat sector, with the medium size firms proving to be more efficient. The efficiency analysis also shows that the geographical location (in Nort-Eastern part) remains an important factor for the efficiency of the firms. This promising quantitative analysis of agri-food districts needs to be developed further, in order to consider the relevance of the district effect not only on the efficiency of enterprises, but also to better understand the role of innovation, the competitiveness on markets, the quality of human capital and the local institutions within the districts.

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