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Marco Capasso, Lucia Cusmano, Andrea Morrison

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The determinants of outsourcing and offshoring strategies in industrial districts: evidence from Italy

Marco Capasso,

Maastricht University, School of Business and Economics and UNU-MERIT

P.O. Box 616, 6200 MD Maastricht, The Netherlands

marco.capasso@gmail.com

Lucia Cusmano

Insubria University, Department of Economics

via Monte Generoso 71, 21100 Varese, Italy

lucia.cusmano@uninsubria.it

and

KITeS - Bocconi University

via Roentgen 1, 20136 Milano, Italy

CORRESPONDING AUTHOR: Andrea Morrison,

Utrecht University, Faculty of Geosciences, Urban and Regional research centre Utrecht (URU),

Heidelberglaan 2, 3508 TC, Utrecht, The Netherlands

and

KITeS - Bocconi University

via Roentgen 1, 20136 Milano - Italy

a.morrison@geo.uu.nl

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## Abstract

Outsourcing has become more and more a distinguished feature of the recent evolution of industrial districts and constitutes the object of this study. We focus on the industrial district of Castel Goffredo, which is the largest European manufacturing area specialised in tights. We analyse the determinants of outsourcing as function of firms' specific characteristics and how they affect the geographical reach of outsourcing relations. Our firm level analysis allows to grasp the impact of firm heterogeneity on outsourcing decision.

Jel codes: R12, R1, R

Keywords : offshoring, outsourcing, industrial districts, ceramic sector,

## 1. Introduction

Industrial districts have long been representing the backbone of the Italian manufacturing industry. Since the second half of the 1970s, following post-fordist restructuring of the Italian manufacturing system, they have emerged as a model of decentralised production and flexible specialisation. Typically, the division of labour among local players is deep, also supported by specific local institutions. The specialised functions and competences recombine continuously at the territorial level, generating variety and a distinct capacity of the system to respond rapidly to changing markets. Knowledge externalities and benefits from labour market pooling work as an important centripetal force, further attracting localization of specialized suppliers and broadening the scope for further division of labour and specialisation (BECATTINI, 1990; BRUSCO, 1982; GAROFOLI, 2002; PYKE, BECATTINI and SENGENBERGER, 1990; SCOTT, 1988). In this regard, local outsourcing has been always represented a mechanism through which territorial chains have articulated, giving rise to a dense local web of subcontracting relationships.

In the last decade or so, however, this model of flexible specialisation has been put under significant strain by the increased competition in international markets, the emergence of new global players

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and the restructuring in the international division of labour they have brought about. Industrial districts have broadly transformed, as established business models have changed in terms of both organisational structure and competitive drivers. The late process of industrial restructuring has significantly modified the conventional ‘marshallian’ paradigm, on which districts prospered in the 1980s, in particular in relation with the degree of vertical integration and the spatial dimension of the dense web of production relationships. In the new competitive environment, district firms have been forced to achieve greater efficiency by growing in size, through strategies of merger and acquisition and the creation of business groups, and cutting costs, mainly via the externalisation of labour intensive phases of production to local or distant subcontractors, or to upgrade their core activities (CORÓ, VOLPE and BONALDO, 2005; CAINELLI, IACOBUCCI and MORGANTI, 2006). As a consequence, nowadays, industrial districts, once characterised by geographically bounded networks of SMEs, are more often populated by large and medium size firms, and, in several cases, the local leaders have turned into “small multinationals” or business groups that govern global value chains (RABELLOTTI, CARABELLI and HIRSCH, 2009). In particular, outsourcing strategies, the object of the present study, have been reshaping the structure of territorial relationships and the spatial boundaries of the district-related value chains. As such they have become an issue of debate among scholars and concerns by policy makers, in particular in the case of international outsourcing (offshoring),. On the one hand, offshoring can turn into an important channel of internationalisation, beyond the traditional export-based model of district firms. The search for distant suppliers and the delocalisation of production stages can allow input sourcing at more favourable cost conditions, but also access to markets, especially emerging ones, and integration into global networks. However, as the competitive advantages of industrial districts are strongly localised, based on integrated systems of customers, subcontractors, services and knowledge (RABELLOTTI, CARABELLI and HIRSCH, 2009), distant outsourcing is likely to reduce this density and weaken the local capacity to continuously generate idiosyncratic knowledge and recombine functions among local actors.

The present work focuses on the industrial district of Castel Goffredo, which is the largest European manufacturing area specialised in tights production, accounting for approximately 75% of the Italian production, 60% of the European one and 30% of the world production (Banca Intesa, 2004; [www.adici.it](http://www.adici.it)).

The case of Castel Goffredo is exemplary of the transformations occurring in Italian industrial districts. In fact, this district went through a process of vertical disintegration in the nineties, which was followed, more recently, by a process of concentration and partly of internationalisation (Banca Intesa, 2004). Our attention goes to the processes of organisational and geographical restructuring of the production value chain. In particular, we aim at analysing the firm-level determinants of outsourcing. In this way we aim at shedding light on the micro dynamics that result into the broader transformation captured by the studies based on aggregate data. Indeed, our firm level analysis allows to grasp the impact of firm heterogeneity on the outsourcing decision. More in details, we examine how firms' characteristics (e.g. size, degree of vertical integration, product quality, innovation, export behaviour) affect the geographical extension of outsourcing relations. In particular, we contribute to an emerging stream of empirical studies that analyse outsourcing and offshoring through micro data (CUSMANO et al., 2010; GIRMA and GÖRG, 2004; TAYMAZ and KILIÇASLAN, 2005; TOMIURA, 2005). The outcome of this analysis has obviously implication for the internal dynamics of industrial districts. We relate the findings to the specific territorial context investigated and contribute with new evidence to the understanding of the evolutionary paths of industrial districts.

## 2. Outsourcing and offshoring strategies in industrial districts

Outsourcing and its variants and specifications (e.g. subcontracting, networking) identify firms' strategies to cope with a continuously changing and increasingly diversifying pattern of demand, while preserving or strengthening efficiency (AJAYI, 2005). These organisational forms constitute the peculiar character of industrial districts. Indeed, a high degree of specialisation and the co-

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ordination of local supply chains are at the base of the post-fordist flexible specialisation model, in which the potential weaknesses at the firm level (e.g. small size) are turned into key competitive factors (COOKE and MORGAN, 1994; PIORE and SABLE, 1984; SCOTT, 1988; STORPER and SCOTT, 1989). It is at the level of the territorial system that economies of scale and scope emerge, that is, localised networks of SMEs enjoy external economies, which replace the internal economies of scale that generally characterise large corporations (BECATTINI, 1990; BRUSCO, 1982; MASKELL and MALBERG, 1999).

Local outsourcing is the mechanism by which specialisation and flexible recombination of specialised functions are achieved. Its local character relates, first of all, to cost advantages, driven by self-reinforcing marshallian externalities. Physical proximity favours the emergence of pecuniary externalities, as firms can easily access, at lower costs, resources, specialised markets of inputs and providers. This entails that outsourcing of production activities, in particular for production smoothing, often takes place at the local level. Furthermore, as the transaction cost approach suggests, outsourcing to local suppliers is more beneficial because firms can more rapidly monitor the quality of the input and services provided by subcontractors. Long distance outsourcing, on the other hand, can generate longer lead times, larger inventories, communication and co-ordination problems, difficulties in contractual specification and monitoring (WILLIAMSON, 1985). This is even more relevant when non-standardised tasks or specific assets are concerned, as in advanced services, which entail significant customisation, frequent contacts between users and providers, or even simultaneous production and consumption (HOWELLS, 2000).

Secondarily, a network based organisation, like the one prevailing in districts, can turn into a *locus* of innovation and knowledge production, fuelled by knowledge externalities (CAMAGNI, 1991). Firms learn through user-producer relationships along the value chain (LUNDVALL, 1992) as well as along horizontal linkages, via informal know-how trading with competitors (VON HIPPEL,

2001). Also, local learning is enhanced by labour market pooling, and the high degree of labour mobility.

In districts, the decentralized production system combines proximity and diversity. Firms, which are close in both geographical and social terms, create knowledge through the deepening in the division of labour, and the variation and recombination of functions or products at the system level (MASKELL, 2001). Moreover, opportunistic behaviour, which is regarded by the transaction cost approach as the key reason for internalising activities, is significantly reduced. Physical, cultural and social proximity facilitate transparency and control, so that formal and informal contracts are more likely to be complied because deviant behaviours can be more easily identified and sanctioned.

Nevertheless, the current economic scenario seems to put under pressure the mechanisms described above.

As to start with, pecuniary externalities seem to be less relevant than in the past, in particular in terms of costs advantages. In fact, as improvements in transport and communication technology have reduced the costs of arm's length interactions, physical proximity becomes less important for managing relationships along a fragmented (or de-verticalised) value chain. "Organized proximity", that is, common behavioral rules and routines (TORRE and RALLET, 2005) and the means for sharing information and knowledge, offers powerful mechanisms for long-distance coordination. This implies that firms located in a cluster are not excluded from externalities generated somewhere else (PHELPS, 2004; PHELPS and OZAWA, 2003); what matters is the "accessibility" rather than "proximity" to the sources of externality. In other words, location in one area does not preclude access to externalities generated in another area if the two are strongly connected, by means of exchange of inputs and intangibles and in terms of business culture or practices (CUSMANO et al., 2010). Paradoxically, the wider availability of pecuniary externalities pushes individual firms to search for partners outside the boundary of the cluster, and in so doing puts under threats the internal dynamics of traditional industrial agglomeration.



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Second, the extreme specialisation implied by vertical disintegration might imply that the space for interactive learning is indeed reduced, as cognitive distance between clusters' members widens. On the other hand, as BOSCHMA (2005) points out, intense horizontal cooperation and knowledge sharing might also undermine the benefits of interacting with firms in the cluster, as they get too similar in their knowledge bases. All in all, these forces might generate *lock in* that firms escape by establishing relations with partners (e.g. subcontractors, providers) external to the cluster (ARTHUR, 1983; BATHELT et al. 2004; GRABHER, 1993). External linkages might in fact help firms in clusters to access complementary assets and new market relationships, so reducing static and dynamic uncertainty (CAMAGNI, 1991). This seems to be increasingly the case for firms that search for specialised knowledge in non-manufacturing activities, such as advanced services, which is indeed the kind of outsourcing that characterises the recent wave of industrial restructuring. Some business service functions are extremely sophisticated to be developed within firms, especially SMEs, which are inherently bounded in their financial and competence resources and have too little scope and scale economies to carry out these activities (BEYERS and LINDAHL, 1996; COE, 2000). Traditional manufacturing districts tend to be short of advanced service providers and firms often refer to specialists outside of the district, especially in the large markets of possibly close metropolitan areas.

As third point, we have to mention the upsurge of international subcontracting towards low-cost areas, which stems from the increasing competition in international markets (FEENSTRA, 1998). Cost factors have been always present in districts firms' strategies; however they feature even more prominently today as competition has become harsher for districts specialised in traditional industries (AMIGHINI and RABELLOTTI, 2006; CORÓ, VOLPE and BONALDO, 2005; RABELLOTTI, 2004). In a globalised world economy, this implies that firms seek for factor price differentials across countries and regions, particularly, though not exclusively, in labour-intensive and routinised unskilled production activities. It is in traditional sectors that cost-cutting strategies have often resulted in total outsourcing, so giving rise to global buyers, which co-ordinate global

production networks of subcontractors in many different countries (GEREFFI, 1999). A side effect at the level of the district of these business strategies can be the dismantling of the above mentioned local user-producer relationships, which are at best replaced by similar patterns of subcontracting relationships in peripheral areas of advanced countries or developing regions.

Finally, we acknowledge that the organisational structure of districts has evolved significantly towards a greater internal heterogeneity. Few districts can nowadays be represented as an undifferentiated and homogeneous population of SMEs linked by subcontracting relationships (LAZERSON and LORENZONI, 1999; TAYLOR and THRIFT, 1982). Industrial districts differ to a large extent, some are characterized by highly competing networks of small firms, others are conversely populated by a small core of large firms with several subcontractors or see the emergence of a limited number of business groups of medium size firms (BELUSSI et al. 2002; CAINELLI, IACOBUCCI and MORGANTI, 2006; PANICCIA, 2002). As far as outsourcing is concerned, district firms are undertaking different strategies in which their individual or sectoral characteristics might shape the nature and extent of this process. In order to unfold the heterogeneity of these strategies, the next section presents the recent evidence brought by the literature on firm level determinants of outsourcing.

## 2.1 The determinants of firm level outsourcing: brief overview of the empirical literature

A number of recent empirical studies have investigated the determinants of outsourcing strategies using firm level data (CUSMANO et al., 2010; GIRMA and GÖRG 2004; MAZZANTI et al., 2007; MOL, 2005; TOMIURA, 2005). These contributions analyse the firm characteristics that impact on outsourcing strategies and, when built on evidence from specific local production systems (e.g. MAZZANTI et al., 2007; 2009) draw implications about the industrial restructuring at the territorial level induced by firm level strategies. These latter studies also comment on whether outsourcing drivers have different explanatory power in cluster or district settings, related to the peculiar organization and dynamics of the industrial agglomeration.

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Among firm characteristics, size is regarded as an important explanatory factor by the empirical literature. Subcontracting relationships are for example often modelled as an asymmetric relation between large firms and small subcontractors (TAYLOR and THRIFT, 1982). Thus large firms might be expected to be more engaged in externalisation, in particular in relation with activities that can be carried out also by small firms, presumably labour intensive tasks. A positive sign between size and outsourcing is expected if subcontracting is intended as a strategy of "production smoothing", which allows large firms to reduce costs and enhance flexibility (IMRIE, 1986; KIMURA, 2002; TAYAZ and KILIÇASLAN, 2005). Conversely, the literature inspired by the Resource Based View of the firm suggests that small firms are more likely to outsource, due to the limited resources available, which are largely focused on core activities (ABRAHAM and TAYLOR, 1996; CORÓ and GRANDINETTI, 1999). However, we might also argue that small firms outsource less, given that they have a smaller scope to start with, and, especially as far as service activities are concerned, fewer and simpler needs than large firms (MARTINEZ and RUBIERA, 2004). The effect of size has been tested by some recent empirical works (CUSMANO et al., 2010; GIRMA and GÖRG, 2004; MAZZANTI et al. 2007; 2009), which however do not provide clear cut evidence. According to Mazzanti et al. (2009), in the case of local production systems ambiguous results are not unexpected, as outsourcing does not occur within a "dual" relationship, in which the largest firms subordinate the smaller firms. Large firms have certainly more scope for outsourcing and may have greater capacity to manage and coordinate fragmented value chains, but SMEs can resort to outsourcing as a means of implementing a heterarchic division of labour within the system. This dynamics of SME-led social division of labour is indeed what the literature identifies as a defining character of the Italian district productive organisation, which is highly different from the division of labour connected to technical and organizational needs that are defined by the leading firm (GAROFOLI, 2002).

Productivity is widely tested by the literature, following the hypothesis that outsourcers enjoy higher productivity than vertically integrated firms (OLSEN, 2006). The rationale is that firms

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3 outsource activities in which they are less efficient, in so doing they focus on core competencies or  
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6 reallocate resources towards activities with greater value added, thus gaining in productivity. Only  
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9 very few studies have analysed the reverse direction of causality, providing however no clear cut  
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11 evidence (KIMURA, 2002; TOMIURA, 2005).

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13 Propensity to innovate and R&D intensity are also considered factors that might impact on  
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15 outsourcing (MAHNKE, 2001; MOL, 2005). The conventional view suggests that firms operating  
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17 in R&D intensive industries tend to be vertically integrated because they have to recover the sunk  
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19 costs generated by innovation investment. As suggested by the transaction cost approach, firms  
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21 dealing with complex products face appropriability problems, therefore they internalise these  
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23 activities to avoid knowledge leakages (WILLIAMSON, 1985). On the other hand, the 'open  
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25 innovation' literature, which conceives firms as open platforms (CHESBROUGH, 2003), argues  
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27 that companies need to develop extensive external networks, in particular international ones, to  
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29 access relevant capabilities (BARNEY, 1999). In a similar vein, modular technologies and products  
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31 show that outsourcing is desirable for firms operating in highly changing markets (BRUSONI et al.,  
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33 2001). In the case of local production systems, outsourcing at the local level may allow to tap into  
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35 the resources and competences of skilled suppliers, which can feed the innovation process  
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41 (MAZZANTI et al., 2009).

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43 As far as human capital is concerned, it can be argued that firms pursuing cost cutting strategies  
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45 externalise those activities that employ mainly low skill workers or blue collars. On the other hand,  
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47 firms with high skill workers are less willing to outsource activities that entail the risk of losing  
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49 relevant capabilities. Both rationales should emerge in the data in terms of a negative relation  
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51 between percentage of skilled workers and probability of being an outsourcee. Finally, some  
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53 authors suggest that skilled workers are deemed essential for accessing international markets and  
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55 negotiating with foreign partners (TOMIURA, 2005). Hence qualified human resources might be  
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60 associated with foreign outsourcing.

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The outward orientation of the firm seems to be an important control for international outsourcing. Most studies show a positive relationship between export and international outsourcing (CUSMANO et al., 2010; TOMIURA, 2005), which is consistent with the idea that firms having already business experience abroad can reduce the fixed costs of foreign contracting.

As for the effect of the position of firms in the value chain, it is straightforward that firms operating in many different stages of production have higher scope for outsourcing. In particular, it is suggested that firms operating along the final stages of the value chain would show higher propensity to outsource. Outsourcing in this case represents an effective strategy for smoothing production over different subcontractors, thus coping with seasonal or demand peaks (IMRIE, 1986). This argument is consistent with the evidence on cost saving strategies, as found in recent works on subcontracting relationships (TAYMAZ and KILIÇASLAN, 2005).

3. The Castel Goffredo hosiery district: research questions and methodology

Our empirical investigation examines the case of the hosiery district of Castel Goffredo, which is among the world leaders in women tights, accounting for approximately 80%, 70% and 30% respectively of the Italian, European and worldwide production (WWW.ADICI.IT). The district is located in the Northern Italian region of Lombardy, Italy’s wealthiest and most industrialized area, and it counts 280 firms, employing more than 7000 workers (WWW.ADICI.IT).

3.1 Why Castel Goffredo: research questions

Over the last decade, Castel Goffredo has attracted the attention of scholars as a paradigmatic example of the evolutionary transformations of Italian industrial districts (COOKE and MORGAN, 1994; BELUSSI and SEDITA, 2009). As in many other districts, in fact,, its origin dates back to the end of the Second World War, and it revolves around the fortunes and misfortunes of a large firm. Decentralised production and flexible specialisation followed the rise and fall of “Noemi”, the large vertically-integrated firm that, from 1924 to the 1950s, was the only hosiery producer in the area.

When the firm went bankrupt in the mid-50s, new firms spun off and specialised in the different phases of production (LAZERSON and LORENZONI, 1999). As for most industrial districts, during the sixties and seventies the rapid growth of the local network of firms and the attractiveness to foreign operators were favoured by the low costs of production and the increasing demand of fashions that favoured. However, as in other traditional labour intensive businesses (e.g. clothing, leather, shoes), the 1980s and early 1990s brought about major changes in market demand, which became increasingly sensitive to temporary fashion trends (BANCA INTESA, 2004; AASTER, 2006). This turning point meant for many industrial districts either the beginning of a sharp decline, or the shift towards a new business model based on trading rather than manufacturing (BOSCHMA and LAMBOOY, 2002; GRABHER, 1993). Castel Goffredo belongs to the group of successful districts that have been able to keep their manufacturing core and reposition themselves on the international markets by upgrading their activities at functional, process and production level. Under the stimuli of an increased international competition, firms within the district have achieved higher efficiency by growing in size and at the same time focusing on core activities while sourcing out (also internationally) labour intensive ones.

The question that arises is then how this new organisational structure might affect the internal coherence of the district. In particular, does the emergence of small multinationals, along with the survival of local manufacturing activities, trigger a process of multiple embeddedness or re-embeddedness, in which local ties help to preserve the district's culture while external linkages feed the district with novel ideas and competences (ZUCHELLA, 2006). On the contrary, does it rather lead to a process of dis-embeddedness, with disruption of local learning and productive relations?

In order to understand the extent of this process of re-embeddedness, and the role that the different types of district firms might play in it, we carry out a quantitative analysis at firm level, testing the impact of firm characteristics on outsourcing (both domestic and international). The empirical and theoretical literature on outsourcing discussed in section 2.1 provides a useful background to formulate testable propositions. As to start with, size is a key determinant to understand the role of

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emerging “small multinationals” and in particular the extent of their internationalisation. Although empirical research does not provide clear cut evidence on this point (see section 2.1), based on the qualitative evidence on Castel Goffredo shortly discussed above (BANCA INTESA, 2004; AASTER, 2006), we expect large firms to play a major role in international outsourcing, as small firms are relatively more inclined to outsource locally. Similarly, export orientation is, as unanimously suggested by the literature, positively linked to international outsourcing. We expect this to be the case also for Castel Goffredo. Qualitative evidence based on secondary sources and direct interviews also support this hypothesis (BANCA INTESA, 2004; AASTER, 2006) that innovation and productivity are positively related to international outsourcing, as other studies focusing on the Italian case suggest (CASTELLANI, 2007). However, the presence of specialised subcontractors and, in particular, of specialised providers of capital goods in the district, might suggest that local learning is still a major source of change and we might therefore expect a positive relation between innovation and domestic outsourcing. As for human capital, we need to account for the fact that blue collars in district based SMEs are often repositories of idiosyncratic and tacit knowledge, which is sticky and hardly (or costly) replaceable. As Becattini et al. (2003) suggest, the district’s capacity for innovation depends on the ability to integrate codified knowledge with the wealth of tacit knowledge that is mainly embedded in local entrepreneurs and workers.. Hence, despite most literature would suggest a positive relation, the peculiarity of the innovation process in industrial districts makes it a case for a less straightforward outcome. . Finally, a key question in this context is to understand what kind of functions and products (high vs low value added) are relocated either locally or abroad. Evidence of this kind would provide robust evidence on the processes of re-embeddedness and dis-embeddedness. To illustrate this point we first check what type of production phases are sourced out and where (a typology of production phases is presented in Table 1). In the econometric analysis (section 4) we analyse also the range of goods (high vs low quality) outsourced by firms. We expect to find that firms outsource locally the production of high quality goods.



-----TABLE 1 HERE-----

### 3.2. Data and methodology

Our empirical analysis exploits micro firm-level data based on a survey which the “Centro Servizi Calza” (“Tights Service Centre”, a local business centre) conducted in 2005. The survey includes all the 205 firms that, according to the local Chamber of Commerce, were operating in the district of Castel Goffredo and were identified as belonging to the following *Atecofin 4* activity codes:

*17.71.0 Manufacturing of hosiery items;*

*18.23.A Packaging of underwear items;*

*18.24.3 Other manufacturing related to the clothing industry.*

For 85% of these firms, turnover is lower than 5 million euros; 25% of the units are microfirms recording a turnover lower than 150.000 euros (Table 2).

The survey is composed of 98 questions, grouped into ten sections, pertaining: turnover, employment, production structure, technology, commercialization and strategy. While some general questions were answered by all the surveyed firms, there are specific questions to which only some of the firms replied. For this reason, large part of the analysis is conducted on a smaller sample of 100 firms, which provided all the information needed for the purposes of this study. It is worth noting that this sample of 100 firms is representative of the whole population. The larger sample (205 firms) will be used for some of the variables under study.

In the survey, outsourcing is explicitly detected by way of three questions:

- “Does the firm make use of external labs or firms in order to complete its own processing cycle?”;



- “If so, specify for which activities (as listed) tasks are outsourced to firms or labs that do not belong to the firm’s group. Please specify also if the external firms are located in Italy or abroad”;
- “If you rely on external labs or firms, then specify, for each production phase, the share of the total output that is produced internally and the share that is sourced from external firms”.

-----TABLE 2 HERE-----

All the 100 firms included in the sample have consistently answered these questions. Moreover, given that firms were also asked to define the phases in which they operate, we decided to exclude from the sample all the firms that declared to outsource activity in a production phase in which the firm does not report to operate. In other words, we consider as outsourcees only firms which, after having reported to operate in some given phases, also declare to outsource at least one of these same phases, even when the percentage of outsourced activity is 100%. We investigate the determinants of outsourcing and offshoring by means of econometric analysis. Section 6 presents the methodological details of the econometric analysis. Before that, we illustrate the descriptive statistics concerning the outsourcing behaviours of firms in Castel Goffredo.

4. Outsourcing and offshoring in Castel Goffredo: descriptive evidence

At a first glance, outsourcing emerges as a pervasive phenomenon in the tights district of Castel Goffredo. Indeed, on average almost 60% of firms resort to outsourcing in at least one of the production phases in which they declare to operate. However, outsourcing is not uniformly

distributed across firms: largest firms appear to be by far the most engaged in contracting out. As shown in Table 3, more than 72% of firms with a turnover equal or higher than Euro 0.5 million have contracted out some activity. This share falls abruptly in the case of small and medium firms, where figures range from 33.3% (firms with a turnover between 0.15 and 0.3 million) to 46.1% (firms with a turnover between 0.15 and 0.3 million). In the case of very small firms (firms with a turnover less than 0.15), outsourcing concerns a minority of business units (10.5%). This outcome is in line with the literature arguing that large firms externalise more than very small firms (firms with a turnover less than 0.15), first of all because they have more scope for it, in particular as far as production functions are concerned (MARTINEZ and RUBIERA, 2004). On the other hand, the evidence does not support the assumption that, in districts, also smaller units resort significantly to outsourcing practices, as a means of implementing a heterarchic division of labour (MAZZANTI et al., 2009).

Large and small firms behave differently also with regards to the geographical dimension of outsourcing (Table 3). International outsourcing is very common for larger firms in the district, while absent for small and micro ones. On average a 44% share of large firms outsources some activity abroad, as compared to 6% of small firms and 0% of micro ones. On the contrary, domestic outsourcing represents the rule for SMEs. This outcome is consistent with the peculiar structure of Italian industrial districts, which still largely consist of SMEs embedded in dense local production and social relations.

-----TABLE 3 HERE-----

Nevertheless, it also supports those studies pointing to the increased heterogeneity within industrial districts, in this case with respect to the spatial outreach of the firms' outsourcing strategies and the rationales underlying them. In fact, the evidence suggests that outsourcing strategies of SMEs are most likely driven by the search for complementary assets, which can be found in close proximity

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among the numerous specialised suppliers within the district. On the contrary, larger firms’ decision to outsource is apparently more cost-driven, as they establish foreign linkages to source out labour intensive stages of production.

In order to explore this hypothesis, we consider the content of the activities performed by firms. The focus is on the main stages of the tight production, and we expect that the degree of outsourcing varies according to the type of function considered. It has to be pointed out that not all the firms in the district undertake the full range of production functions<sup>i</sup>, although manufacturing is present in most of them. Indeed a very tiny percentage of firms fully externalise the production functions. If we look into the functions that are partly outsourced, the labour intensive ones (i.e. sewing; finishing and packaging) rank first and second, standing well above the more capital intensive phases. This result suggests that cost motivations are as present in industrial districts as in the manufacturing sectors of advanced regions at large (see CUSMANO et al., 2010). It also supports the view that, even in a district-like context, outsourcing is more likely to concern routine-based activities with low value added, rather than intangible, higher value added activities, which are better kept internal (ANTONIOLI, 2009)

-----TABLE 4 HERE-----

The evidence illustrated in Table 4 also points to the peculiarity of firms’ district strategies: full disinvestment is almost never a viable option for the district’s firms, while the opposite, full internalisation, is not common.

This evidence is further investigated by looking at the organisational and geographical dimensions of outsourcing strategies. Table 5 reports the number of production stages carried out by firms (rows) and the percentage of firms that outsource in one or more stages of production (columns). What stands out is that firms engaged in more sections tend to externalise in almost all the stages in which they operate, often retaining only the production in one stage as fully internal. The only firm

that performs the five stages of production externalises in each one of them, and the other firms undertaking more than three stages of production outsource at least two or more of them. Table 5 also points at a core of highly specialised (mono-function) small firms, half of which do not experience outsourcing. These are indeed likely to be the local subcontractors to the largest district firms.

-----TABLE 5 HERE-----

As far as the geographical breadth of outsourcing is concerned, Table 6 shows that both labour and capital intensive phases of production are mostly outsourced locally. However, if we look at the absolute number of firms that offshore (outsource at the international level), labour intensive stages are more fragmented across boundaries.

-----TABLE 6 HERE-----

## 5. The econometric analysis

### 5.1 Models and variables

We model outsourcing as a function of a number of variables reflecting firm-specific characteristics. The dependent variables are built by checking the consistency of the three mentioned questions of the survey that explicitly deal with the outsourcing choice and are devoted to understand respectively: whether the firm outsources part of its activity; which stages of production are concerned by the outsourcing decision; which is the proportion of activity outsourced for each production stage. Only firms that have outsourced in the stages pertaining to the five “pure” manufacturing processes (i.e. texturization, weaving, sewing, dyeing, confection; thus

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excluding commercialization and other services) and that have consistently answered to all the three questions on outsourcing have been included in the analysis. We use a *generalized ordered logit* (Gologit) model for explaining the relation between the independent variables and the probability of outsourcing (at least) part of the firm activity, and a *Tobit* model for explaining not only the choice of outsourcing, but also the percentage of activity outsourced.

The choice of an *ordered* model for explaining the probability of outsourcing is dictated by the observation that all the firms in the sample that outsource abroad part of their activity deal also with Italian outsourcers, suggesting an ordered classification of firms as: not dealing with any outsourcer (category 1); dealing only with Italian outsourcers (category 2); dealing both with Italian outsourcers and with foreign outsourcers (category 3). In particular, we choose a *generalized ordered* model, in its totally unconstrained version, in order to allow the effects of the explanatory variables to vary with the point at which the categories of the dependent variable are dichotomized (MADDALA, 1983, p.46). In other words, we obtain different intercepts and different coefficients for each category threshold  $j$ , according to the Gologit model

$$p(c_i \geq j+1) = \frac{\exp \beta'_j x_i}{1 + \exp \beta'_j x_i}$$

where  $j$  can have value equal to 1 or 2 (we have two threshold points  $j$  as we have three firm categories), and  $c_i$  is the category to which firm  $i$  belongs. The two series of parameters obtained at each estimation of the model correspond respectively to the influence of the independent variables first on the choice of outsourcing in Italy (domestic outsourcing, when  $c_i$  exceeds the first threshold), and then on the choice of outsourcing also abroad (international outsourcing, when  $c_i$  exceeds the second threshold). The model is estimated by using the STATA routine *gologit2* written by WILLIAMS (2006).

For the Tobit model, we compute the relative amount of outsourced activity (*outact*) by each firm  $i$  as

$$outact_i = 100 \left( \sum_{h=1}^5 act_{ih} out_{ih} \right)$$

where  $act_{ih}$  is the activity in the production phase  $h$  as share of the overall activity of firm  $i$ , while  $out_{ih}$  is the amount of outsourced activity in the production phase  $h$  as share of the overall activity of firm  $i$  in the same production phase.  $h$  can refer to any of the five “pure” manufacturing phases. The variable  $outact_i$  thus measures the percentage of activity outsourced by firm  $i$  in any of the five production phases with respect to the overall activity of firm  $i$ . As in the usual Tobit model, we assume that a latent variable  $y_i$  is, for each firm, linearly related to the independent variables, and is linked to the percentage of outsourced activity as in the following:

$$y_i = \beta' x_i + u_i$$

$$outact_i = \begin{cases} y_i & \text{if } y_i > 0 \\ 0 & \text{if } y_i \leq 0 \end{cases}$$

The independent variables  $x_i$  initially used in both the Gologit and the Tobit models are:

PRODUCTIVITY (*prod*): turnover class, represented by a number between 1 (less than 150,000 euros in 2004) and 12 (more than 250 millions in 2004), over the logarithm of one plus the number of the firm’s employees (including extra-district employees), see Table 2 for the correspondence between turnover class and actual turnover;

LOG NUMBER OF EMPLOYEES (*empl*): logarithm of the total number of employees (including extra-district employees);

DEGREE OF VERTICAL INTEGRATION (*integr*): we consider the number of production phases in which the firm operates (including the ones in which outsourcing is 100%); apart from the five “pure” manufacturing phases we consider here also “commercialization”, although firms operating only in this phase have been excluded from the sample;

PROPORTION OF BLUE COLLARS (*blue*): number of blue-collar workers and apprentices in the firms (including extra-district employees) over total employment of the firm (including extra-district employees);

PRODUCT RANGE (*range*): product range across the following categories of goods produced: Man, Woman, Child, Underwear. The firm is asked the distribution of its activity over these categories. These shares are used to compute a Herfindahl index of concentration. The index is then inverted and logarithmed to provide a measure of product range which corresponds to a measure of dispersion across the four categories of goods;

PRODUCT QUALITY (*quality*): quality of the goods produced, defined in increasing quality order as: first class, medium refined, fashion, special (*quality* respectively equal to 1, 2, 3, 4). The variable is based upon an explicit question of the survey asking the firm which is the percentage of the overall production that falls into each of the four quality classes. We then consider only the class for which such percentage is higher.

PROCESS INNOVATION (*inno*): the firm is asked which is the percentage of old (up to 1998), semi-recent (between 1999 and 2002) or recent (2003 or 2004) machineries for each manufacturing phase in which it operates. The tools are thus classified into three “novelty” classes; we then consider the section in which the firm has declared to operate most and check the “novelty class” in which the highest percentage of tools lies (in case of equal percentages, we consider as dominant the older instrument class). The variable can thus have three values, 1 or 2 or 3, respectively corresponding to a majority of old or semi-recent or recent tools for the production phase in which the firm mainly operates.

Of the 205 firms that answered the questions of the 2005 survey, only 100 have consistently answered all the questions relating to outsourcing as well as to all the seven independent variables, i.e. the same 100 firms that have been considered in the previous sections. The characteristics of this “extended” sample can be compared to the ones of the main sample of 100 firms by means of descriptive statistics (Table 7), and a robustness check confirm that our results are not driven by the sample selection<sup>ii</sup>. Finally, we will consider only the firms for which the first three independent variables are available plus an additional variable which refers to the firm’s exports. Indeed, after building the variable *export* according to the percentage of the final product which is aimed at the foreign market, the sample is downsized to 57 firms, as only few firms have provided such information. Table 8 shows the correlations among the explanatory variables for the two subsamples.

-----TABLE 7 HERE-----

-----TABLE 8 HERE-----

Within the main sample of 100 firms, 57 firms outsource at least part of their activity: 45 outsource only to Italian firms, 12 outsource both to Italian and to foreign firms, and no one outsources only to foreign firms. Table 9 presents the means of variables for different subsamples of outsourcing firms, distinguishing between domestic and foreign outsourcing. We observe that all the seven independent variables are on average higher for firms that outsource than for the whole sample, and generally higher for firms that outsource abroad. A relevant exception to this is detected for the *quality* variable: firms outsourcing only to Italian contractors are (on average) focussed on higher quality segments than firms outsourcing also abroad. The *innovation* variable is, on the other hand, in line with the general trend: the capital equipment of offshorers is (on average) more recent than it is the case for firms that subcontract only at the national (or local) level.



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5.2 Results

Before illustrating our findings it is worth mentioning that they should be interpreted with some caution, since the cross-sectional design of our data does not allow us to fully control for potential reverse causation effects, which might be relevant for some of the explanatory variables. For example, more productive firms can be expected to outsource more, but the reverse might be also true, firms that outsource ancillary activities might achieve higher productivity. Similar considerations can be applied, though to a lesser extent to most of our explanatory variables. Our data do not allow us to build convincing instruments, thus we cannot control for endogeneity. Therefore, our interpretation is limited to comment the direction of the effect of the explanatory variables, and we interpret results in terms of correlation. While reminding the reader of the important distinction between correlation and causality, we exploit the particular nature of our data (firm-level from a census conducted in a specific industrial district) to retrieve variable relations that should not be neglected when investigating the causal structures behind the phenomenon under study. That constitutes novel facts which are helpful in assessing the extent of applicability of the alternative theories on outsourcing.

Table 10 reports the estimates of the Gologit and Tobit models. In most of the specifications tested, as expected size (*empl*) appears to be a good predictor of outsourcing. Size is particularly significant in the case of international outsourcing, pointing to the fact that in order to engage in foreign subcontracting firms need to have a large pool of resources. This is in line with our expectations and

the recent evidence in the literature (TOMIURA, 2005). This latter finding suggests that, in order to extend beyond domestic borders the reach of their value chain, district's firms need to grow in size. This result provides support to the literature that see in the 'dwarfism' of Italian districts' firms their major obstacle to get international, beyond the traditional export channel (ONIDA, 2004; NARDOZZI, 2004).

Productivity (*prod*) appears to be a good predictor of outsourcing, also when we distinguish between the direction (Gologit) and check for the amount of outsourcing (Tobit). This would suggest that firms which are more efficient also tend to outsource more. The rationale can be that they focus only on those activities for which they have superior skills while getting rid of inefficient ones. However, the problem of reverse causality calls for caution. Indeed, the evidence on this issue is scattered and generally test the reverse direction of causality (OLSEN, 2006). Some studies, for example TOMIURA (2005), find a positive link between international outsourcing and productivity, given that going abroad imply high fixed costs, so only the most efficient firms can bear them.

The degree of vertical integration (*integr*) shows a clear positive association with domestic outsourcing, for any specification of the model, and a positive relation can also be detected with the relative amount of activity outsourced. This outcome is not unexpected, indicating that highly vertically integrated firms have clearly more scope for outsourcing than firms active in one or few phases of production. However, the same variable does not seem to have a significant effect on the choice of offshoring. This suggests that the district dynamics described by early literature is still at work. In spite of the strong (mainly cost) incentives to go offshoring in traditional manufacturing sectors, the fragmentation takes place through – and strengthen - the dense input–output system at the local level (GAROFOLI, 2002).

The significant negative coefficient for the share of blue collar employees (*blue*) indicates that firms having a smaller proportion of blue collars are those that outsourced the most. This might be the result of past outsourcing practices that have focussed on labour intensive phases, significantly

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reducing the actual share of blue collars. However, it might also be read differently: that firms having more blue collars, hence that rely on a large pool of in-house manufacturing expertise, tend to outsource less. In this view, those workers are qualitatively different from unskilled blue collars, as they might have the tacit knowledge that can be hardly found in firms outside the district. A definitive interpretation is however not possible in this study, as the data do not allow to disentangle between the two effects.

The quality segment in which the firm operates (*quality*) is an important determinant of outsourcing. As expected, firms that are active in the high quality market segment are more likely to source out to an Italian supplier rather than to an international one. This suggests, on the one side, that foreign outsourcing is still largely confined to low value added activities, and on the other side that local (i.e. Italian) suppliers are present and specialised into the high value added functions. Innovation (*inno*) plays a role in explaining how much firms outsource; firms that are closer to the technological frontier tend to outsource more, as indicated by the Tobit model.<sup>iii</sup> This is consistent with the literature that describes the search for knowledge complementarities as a key driver of linkage creation and task recombination in the district.

Turning to the export behaviour of the firm, our results confirm what recent empirical studies have found (CUSMANO et al., 2010; TOMIURA, 2005): export is always positively associated with international outsourcing. Therefore, having some experience in doing business abroad seems to considerably lower the cost and uncertainty linked to the search of new subcontractors<sup>iv</sup>.

-----TABLE 10 HERE-----

## 6. Conclusions

The globalisation of markets has widely affected the organization of production in highly dense manufacturing areas. Industrial districts, which have expanded through penetration of international markets, in the last decade or so struggled to cope with the new competitive scenario. In Italy, the evolutionary paths of traditional district areas have diversified, as district firms have adopted different strategic behaviors. In particular, outsourcing strategies, a typical driver of flexible specialization and a defining character of the post-fordist mode of production, have been reshaping the structure of territorial relationships and the spatial boundaries of the district-related value chains. In this paper, we investigated the determinants of outsourcing in a traditional Italian industrial district, i.e. the hosiery district of Castel Goffredo.

The empirical evidence shows that outsourcing is a widely diffused strategy in Castel Goffredo. However, this process has not implied the desertification of the local production structure. Most of the externalization takes place at domestic level (i.e. Italy). Moreover, it clearly appears that outsourcing is a strategy to smooth the production and cope with peaks of demand. Full externalization of functions is indeed a rare event, which, if it occurs, characterizes very specific activities. Most firms contract out labour intensive functions, suggesting that cost motivations are relevant outsourcing strategies across firm typologies. Nevertheless international outsourcing is a limited phenomenon, almost exclusively pertaining to the largest firms in the district. Moreover, we find that the strategy of building international value chains goes hand by hand with other internationalization strategies, such as exporting. Through the delocalization strategies of these large players, which reap the benefit of cheap labour advantage, the district has been evolving along a cost-efficiency path. Though delocalisation seems to be only incipient, in the long run it might imply the dismantlement of local ties with subcontractors and in turn the loss of jobs and competences, as some evidence on the Italian case already indicate (COSTA and FERRI 2007 as

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cited in CASTELLANI, 2007; CORO' and VOLPE 2006). Nevertheless, our findings also suggest that cost-efficiency is not the only (main) driver of district evolution. In fact, it is evident that the local subcontracting dynamics is still at work, especially in the case of firms specialized in the high-end segment of the market.

. When these firms outsource, they generally search for domestic suppliers. This suggests that the local production system still exhibits a competitive edge over foreign suppliers, at least for niches comprising high value added activities. The preference for local suppliers, rather than distant ones, when competition is based on quality, seems also to suggest that monitoring and lead times can still represent important determinants of localization in traditional manufacturing. This evidence confronted with the current debate on the evolution of industrial districts (RABELLOTTI et al. 2009) suggest that *re-embeddedness* rather than *dis-embeddedness* is still an option for industrial districts.

Recent literature argues that the industrial district model is evolving towards a network-based typology, depending only in part on local agglomerative forces (GORDON and MCCANN, 2000). This would be a system in which productive linkages and information flow would not be established exclusively with local partners, but rather with a mix of local and foreign sources (BATHELT et al., 2004; ZUCHELLA, 2006). In this context “small multinationals” might play an important role: acting as district activators (SAMMARRA and BELUSSI, 2004) or knowledge gatekeepers (MORRISON, 2008) they can nurture and revitalise local culture by in-sourcing external novel ideas. The evidence presented in this study suggests that, in high quality traditional manufacturing segments, this path of value chains restructuring still maintains a strong territorial anchorage, where outsourcing is a driver of localized thickening of inter-industrial relationships.

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Table 1 Women tights production process

Production Phases	Factor intensity	Brief description of the production process of women tights in Castel Goffredo
Texturization	High capital intensity	The production of women’s tights takes place along five phases: stretching and texturization, weaving, sewing, dyeing and confection. After stretching the raw nylon yarn, texturization consists in further processing the nylon yarns in order to provide it with elasticity and softness. Such a process is performed by means of specialized machinery such as the twisting machine. During weaving the initial yarn is transformed using a circular rotating machine which allows to combine different types of yarns. The tubes so produced are then put together by means of seams. This is the sewing phase, which can be run by an automated system, or done manually; the latter being more comfortable as layers do not overlap. Larger vertically integrated firms tend to automate this phase. The semi-finished tights are then dyed and treated with conditioners, this is a capital intensive phase involving an intensive use of machineries and containers where stocks can be dipped into. Finally, tights are dried, ironed and packaged (I.e “confection” phase). While packaging may or may not be done by hand, the other sub-phases always involve an intensive use of labour. Apart from these five “pure manufacturing” phases, the firms in the district deal also with commercialization and other services.
Weaving	High labour intensity	
Sewing	High labour intensity	
Dyeing	High capital intensity	
Finishing and Packaging	High labour intensity	
Confection	High labour intensity	

Table 2: Firms by turnover class (% in the sample): 2005 population versus sample of 100 firms

answering all questions.

Turnover class	Turnover (mln. euros)	Population ( 205 firms)	Sample of 100 firms
1	<0.15	24.88	19
2	0.15 – 0.3	14.15	18
3	0.3 – 0.5	13.17	13
4	0.5 – 2.5	21.95	25
5	2.5 – 5	8.78	11
6	5 – 15	8.78	11
7	15 – 25	1.95	1
8	25 – 50	1.95	1
9	50 – 75	0.00	0
10	75 – 100	0.49	0
11	100 – 250	0.98	1
12	>250	0.49	0

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Table 3: Direction of outsourcing, by firm size

Turnover class	Number of firms	Percentage of outsourcers	of which (share)	
			only in Italy	also abroad
1	19	10.53	100%	0%
2	18	33.33	100%	0%
3	13	46.15	100%	0%
4	25	72	94%	6%
>4	25	100	56%	44%
Total	100	57	88%	12%

Table 4: Depth of outsourcing (n=100)

Production Phase	Depth of outsourcing - Number of firms for which the function is:			
	Never performed	Totally outsourced	Partly outsourced (%) of outsourcing)	In-house only
Texturization	98	0	1 (10.00)	1
Weaving	60	0	15 (23.60)	25
Sewing	22	1	47(44.87)	30
Dyeing	92	1	2 (9.50)	5
Finishing and Packaging	60	1	21 (51.14)	18



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Table 5: Organisational dimension of outsourcing (n=100)

Number of functions performed	Number of firms	Number of firms which outsource in:					
		no functions	1 section	2 functions	3 functions	4 functions	5 functions
1	56	38	18	-	-	-	-
2	26	5	16	5	-	-	-
3	13	0	2	8	3	-	-
4	4	0	0	0	3	1	-
5	1	0	0	0	0	0	1

Table 6: Geographical orientation of outsourcing (n=100)

Production Phase	Number of firms	Percentage of outsourcers	of which (share)	
			only in Italy	also abroad
Texturization	2	50	0%	100%
Weaving	40	95	71%	29%
Sewing	78	62.82	78%	22%
Dyeing	8	75	50%	50%
Finishing and Packaging	40	65	77%	23%

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Table 7: Explanatory variables: descriptive statistics

	Sample of 100 firms				Sample of 155 firms				Sample of 57 firms			
	Min	Max	Mean	Std Dev	Min	Max	Mean	Std Dev	Min	Max	Mean	Std Dev
<i>prod</i>	0.34	2.23	1.22	0.45	0.34	2.49	1.23	0.47	0.56	2.23	1.40	0.41
<i>empl</i>	0.00	6.55	2.59	0.96	0.00	6.55	2.22	1.18	0.00	6.55	2.80	1.22
<i>integr</i>	1.00	6.00	1.89	1.29	1.00	6.00	1.75	1.21	1.00	6.00	2.56	1.51
<i>blue</i>	0.20	1.00	0.67	0.16								
<i>range</i>	0.00	0.93	0.23	0.26								
<i>quality</i>	1.00	4.00	2.51	0.83								
<i>inno</i>	1.00	3.00	1.37	0.58								
<i>export</i>									0.00	0.95	0.40	0.33

Table 8: Explanatory variables: correlations

Sample of 100 firms	<i>prod</i>	<i>empl</i>	<i>integr</i>	<i>Blue</i>	<i>range</i>	<i>quality</i>	<i>inno</i>
<i>prod</i>	1.000						
<i>empl</i>	0.342	1.000					
<i>integr</i>	0.452	0.577	1.000				
<i>blue</i>	-0.004	0.273	0.063	1.000			
<i>range</i>	0.116	0.231	0.272	0.102	1.000		
<i>quality</i>	0.095	-0.062	0.006	0.161	0.045	1.000	
<i>inno</i>	0.301	0.124	0.122	0.014	0.179	0.065	1.000

  

Sample of 155 firms	<i>prod</i>	<i>empl</i>	<i>integr</i>
<i>prod</i>	1.000		
<i>empl</i>	0.159	1.000	
<i>integr</i>	0.382	0.555	1.000

  

Sample of 57 firms	<i>prod</i>	<i>empl</i>	<i>integr</i>	<i>Export</i>
<i>prod</i>	1.000			
<i>empl</i>	0.138	1.000		
<i>integr</i>	0.311	0.622	1.000	
<i>export</i>	0.286	0.408	0.410	1.000

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Table 9: Averages of the explanatory variables for firms subsampled according to their outsourcing choice

	Whole sample	Outsourcing	Outsourcing only to Italy	Outsourcing also abroad
<i>prod</i>	1.22	1.43	1.37	1.65
<i>empl</i>	2.59	2.98	2.80	3.67
<i>integr</i>	1.89	2.47	2.24	3.33
<i>blue</i>	0.67	0.66	0.65	0.69
<i>range</i>	0.23	0.26	0.26	0.28
<i>quality</i>	2.51	2.67	2.73	2.42
<i>inno</i>	1.37	1.47	1.40	1.75

Table 10: Regression results

	Sample of 100 firms			Sample of 155 firms			Sample of 57 firms		
	GOLOGIT		TOBIT	GOLOGIT		TOBIT	GOLOGIT		TOBIT
	(domestic)	(international)	(%of out.)	(domestic)	(international)	(%of out.)	(domestic)	(international)	(%of out.)
<i>prod</i>	1.79*	4.90**	10.02*	2.08***	3.85***	27.46***	2.30*	4.52**	38.86***
	(0.97)	(1.93)	(5.54)	(0.59)	(1.23)	(5.89)	(1.18)	(1.95)	(9.56)
<i>empl</i>	2.15***	2.03**	11.11***	0.97***	1.37***	7.30***	1.40*	1.01*	5.88
	(0.68)	(0.85)	(2.89)	(0.30)	(0.50)	(2.48)	(0.75)	(0.59)	(3.67)
<i>integr</i>	2.97***	0.05	1.79	2.69***	0.06	4.44*	1.97**	-0.14	-0.95
	(0.84)	(0.31)	(1.90)	(0.57)	(0.26)	(2.29)	(0.83)	(0.35)	(2.94)
<i>blue</i>	-5.63**	-0.68	-55.44***						
	(2.63)	(3.19)	(14.26)						
<i>range</i>	-1.14	-2.15	-2.52						
	(1.58)	(1.79)	(7.87)						

1										
2	<i>quality</i>	1.51***	-0.43	5.23**						
3										
4		(0.51)	(0.72)	(2.56)						
5										
6										
7										
8	<i>inno</i>	0.60	0.55	6.75*						
9										
10		(0.68)	(0.71)	(3.53)						
11										
12										
13										
14	<i>export</i>						1.31	4.22**	2.67	
15										
16							(1.82)	(1.83)	(12.06)	
17										
18										
19										
20	Constant	-11.89***	-14.50***	-26.45**	-8.50***	-12.11***	-62.75***	-9.05***	-13.40***	-57.39***
21										
22		(3.01)	(4.78)	(12.19)	(1.36)	(2.99)	(9.99)	(3.25)	(4.74)	(16.39)
23										
24										
25										
26	chi2-statistic	102.38		54.38	137.26		66.41	54.41		22.08
27										
28	Prob > chi2	0.00		0.00	0.00		0.00	0.00		0.00
29										
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All independent variables have been used in logarithms; standard errors are given in parenthesis. \* 10% significance; \*\* 5% significance; \*\*\*1% significance

<sup>i</sup> In particular, we notice that two capital intensive functions, i.e. texturization and dyeing, are performed by a limited number of firms in the district.

<sup>ii</sup> With the robustness check we show that sample selection does not have an impact on our findings. Following HECKMAN (1970) we apply a probit model with selection (Van de VEN and Van PRAGG, 1981) that explicitly takes into account the possibility of a selection bias. Findings can be provided upon request.

<sup>iii</sup> Further analyses, in which we use production phases instead of firms as unit of analysis, show that the same innovative firms tend to outsource production phases in which machineries are less recent. For the sake of space constraints, we do not present such results in the present paper.

<sup>iv</sup> We restrict the analysis on the 57 firms that have answered the questions on exports. The analysis shows (right panel of table 8) that exporting raises the probability of outsourcing abroad even after controlling for firm size.