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Globalisation of production and innovation: how outsourcing is reshaping an advanced manufacturing area

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Globalisation of production and innovation:

How outsourcing is reshaping an advanced manufacturing area

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Abstract

This paper investigates the determinants and the spatial and functional dimensions of firms' outsourcing. Based on a large survey of manufacturing firms in Lombardy, the analysis shows that outsourcing is remarkably wide across sectors and has a clear regional dimension, concerning highly skilled firms at most. Offshoring is still a minor fraction of the deverticalisation process, largely related to wider strategies of internationalisation by foreign group subsidiaries at intermediate stages of the value

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3 chain. The evidence suggests the regional system is inserting onto global knowledge
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5 networks, but also points at the risk of "branch plant effects" in high tech segments.
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10 Keywords: Outsourcing, Offshoring, Regional production system, Manufacturing
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12 industry, Italy
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17 JEL Classification: D21, F23, L23, O32
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20 La mondialisation de la production et de l'innovation:
21 comment l'approvisionnement à l'extérieur réorganise une zone industrielle avancée.
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25 Cusmano et al.
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28 Cet article cherche à examiner les déterminants et la portée géographique et
29 fonctionnelle de l'approvisionnement à l'extérieur des entreprises. A partir d'une
30 enquête détaillée des entreprises industrielles situées en Lombardie, l'analyse laisse voir
31 que l'approvisionnement à l'extérieur s'avère très généralisée à travers les secteurs et a
32 une portée nettement régionale en ce qui concerne notamment les entreprises dont la
33 main-d'oeuvre est hautement qualifiée. Les activités offshore représentent toujours une
34 proportion négligeable du processus de désintégration verticale et se rapporte
35 étroitement aux stratégies d'internationalisation des filiales des groupes étrangers aux
36 étapes intermédiaires de la chaîne des valeurs. Les preuves laissent supposer que le
37 système regional s'insère dans des réseaux de connaissance mondiaux, mais indique
38 également la menace que pose des "effets établissement" dans les secteurs à la pointe de
39 la technologie.
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44 Approvisionnement à l'extérieur / Activités offshore / Système de production régional /
45 Industrie / Italie
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49 Classement JEL: D21; F23; L23; O32
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51 **Die Globalisierung von Produktion und Innovation: Wie sich eine**
52 **fortgeschrittene Produktionsregion durch Outsourcing verändert**
53

54 Lucia Cusmano, Maria Luisa Mancusi and Andrea Morrison
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57 In diesem Beitrag untersuchen wir die Determinanten sowie die räumlichen und
58 funktionellen Dimensionen des Outsourcing von Firmen. Ausgehend von einer
59 umfangreichen Erhebung unter produzierenden Firmen in der Lombardei geht
60 aus der Analyse hervor, dass das Outsourcing in den verschiedenen Sektoren
bemerkenswert weit verbreitet ist und eine eindeutig regionale Dimension

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3 aufweist, die vor allem Firmen mit hohem Qualifikationsniveau betrifft. Die
4 Verlagerung ins Ausland stellt weiterhin einen kleinen Bruchteil des
5 Devertikalisierungsprozesses dar und ist größtenteils mit den breiter angelegten
6 Internationalisierungsstrategien von Filialen ausländischer Konzerne auf den
7 mittleren Stufen der Wertschöpfungskette verknüpft. Die Belege lassen darauf
8 schließen, dass sich das regionale System in die globalen Wissensnetzwerke
9 einfügt, weisen aber auch auf das Risiko von "Zweigwerkseffekten" in Hightech-
10 Segmenten hin.
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14 Keywords:

15 Outsourcing

16 Verlagerung ins Ausland

17 Regionales Produktionssystem

18 Produzierende Industrie

19 Italien
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21 JEL Classification: D21, F23, L23, O32
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25 Globalización de producción e innovación: cómo la contratación externa
26 remodela un área manufacturera avanzada

27 Lucia Cusmano, Maria Luisa Mancusi and Andrea Morrison
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30 En este artículo investigamos los determinantes y las dimensiones espacial y
31 funcional de la contratación externa de empresas. Basándonos en un
32 importante estudio de empresas manufactureras de Lombardía, en este análisis
33 mostramos que la contratación externa está muy extendida en todos los
34 sectores y tiene una clara dimensión regional, sobre todo con respecto a las
35 empresas altamente cualificadas. La externalización de servicios representa
36 todavía una fracción menor del proceso de desverticalización, y en gran medida
37 relacionada con estrategias más extensas de la internacionalización por parte
38 de filiales de grupos extranjeros en fases intermedias de la cadena de valores.
39 La evidencia indica que el sistema regional se inserta en las redes de
40 conocimiento globales pero también señala el riesgo de "efectos de las
41 sucursales" en segmentos de alta tecnología.
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44 Keywords:

45 Contratación externa

46 Externalización de servicios

47 Sistema de producción regional

48 Industria manufacturera

49 Italia
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52 JEL Classification: D21, F23, L23, O32
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19 development”).
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1- Introduction

Over the last decades, industrial restructuring in the form of outsourcing has been emerging as a defining character of the capitalist dynamics, transforming business models and affecting the spatial structure of industrial systems. In particular, the international dimension of outsourcing (offshoring) has been lately drawing much attention at both the analytical and policy level, as a key driver of changes in the competitive position of advanced and emerging regions (UNCTAD, 2004; OECD, 1998; AMITI and WEI, 2005).

The outsourcing phenomenon in advanced regions dates back to the mid 70s and has been accelerating during the 1990s (GEREFFI and STURGEON, 2004), signalling the “deverticalization” of the *modern corporation* (CHANDLER, 1977). Moreover, the structure of outsourcing has been widening in functional terms, as outsourcing strategies no longer concern only, or mostly, fairly specialised repetitive tasks in production and assembly. Rather, outsourcing increasingly involves services of various type and content, including sensitive functions and knowledge-intensive tasks, such as design and R&D (HOWELLS, 2000; LEIBLEIN *et al.*, 2002). As a consequence, the increasing “distributedness” of production processes is followed (and affected) by a growing “distributedness” of knowledge-intensive functions and innovation processes, so that value creating resources and capabilities ever more frequently reside across the boundaries of the firm (COOMBS and METCALFE, 1998).

The functional breadth of the outsourcing phenomenon is but one dimension of the complex emerging trend, to which the spatial dimension should be added. On the one hand, the internationalisation of value chains, or global “fragmentation”, has been attracting much media hype, but also increasing theoretical interest, because of its consequences on the positioning of countries in the international division of labour (e.g.

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3 FEENSTRA and HANSON, 1996; ARNDT and KIERZKOWSKI, 2001; GROSSMAN
4 and HELPMAN, 2002). On the other hand, agglomeration advantages and cluster-
5 centred flexible specialisation in core-regions are being re-interpreted (e.g. SCOTT,
6
7 1988; GAROFOLI, 2002; BOSCHMA; 2004), as their relevance and geographical scale
8 are affected themselves by post-Fordist dynamics (PHELPS, 2004; TORRE and
9 RALLET, 2005).

10
11 Although lively, the theoretical and policy debate has found still limited empirical
12 application for two main reasons. First, empirical investigations have been mainly
13 directed at specific sectors or local production systems (e.g. CORÒ and
14 GRANDINETTI, 1999; AMIGHINI and RABELLOTTI, 2006), specific functions, as
15 in the case of the growing literature on business service externalisation (e.g.
16 O'FARRELL *et al.*, 1993; BEYERS and LINDAHL, 1996; COE, 2000) or specific
17 actors, such as multinational branch plants or service-related headquarters (e.g.
18 PHELPS, 1993; PERKMANN, 2006). Second, quantitative studies based on large panel
19 datasets have been mostly based on very broad definitions of outsourcing, rarely
20 differentiating externalisation of activities from more general purchasing strategies in a
21 "make or buy" framework, and have often employed data at a high (mostly industry)
22 level of aggregationⁱⁱ.

23
24 The present paper contributes to fill this gap by investigating the diversified patterns of
25 externalisation across manufacturing industries and business actors in an advanced area,
26 Lombardy, the Italian leading economic region, which represents a mature and highly
27 heterogeneous industrial system, where large corporations specialised in high-tech
28 sectors coexist with traditional industrial districts populated by small firms.

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30 Drawing on original and representative firm-level survey data, the paper explores the
31 extent of the externalisation practices, detailing *direction*, *breadth* and *depth* of
32 outsourcing strategies, thus providing an original empirical contribution to the
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3 outsourcing debate. In particular, the international outsourcing of production, services
4 and R&D activities is confronted with regionally contained dynamics, and the
5 characteristics of business actors driving the process at different spatial levels are
6 explored. In doing so, the paper adds to the sparse empirical literature on the
7 determinants of outsourcing and offshoring at the firm-level (GIRMA and GÖRG ,
8 2004; GÖRG *et al.* 2004; GROSSMAN and HELPMAN, 2002; SWENSON, 2004;
9 TOMIURA, 2005), and provides original insights for discussing both the implications at
10 the system level and the related arguments proposed by the relevant literature.
11

12 The paper is organised as follows. Section 2 summarises the main issues emerging from
13 the literature and policy debate about outsourcing and off-shoring, focussing on the
14 motives for outsourcing and their relationship with its *direction* (local vs. international
15 outsourcing), *depth* (total vs. partial outsourcing) and *breadth* (scope of functional
16 outsourcing). Section 3 presents the survey methodology and the dataset. Section 4
17 provides an extensive description of outsourcing patterns in Lombardy, across industries
18 and activities. Section 5 focuses on the characteristics of firms driving the process of
19 deverticalisation, presenting an econometric assessment which differentiates between
20 regional and international outsourcing. Section 6 concludes, discussing implications of
21 the observed trend for the regional system evolution and competitiveness.
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23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 2. Outsourcing: economic drivers, spatial dimension and firm characteristics 48 49 50

51 Different strands of literature, ranging from management approaches, to transaction cost
52 economics and more regional oriented studies, have investigated the factors
53 underpinning firms' decisions to outsource their internal activities, the spatial dimension
54 of the externalisation process and the associated firms' characteristics. However, while
55 the motives for outsourcing and its geographical scope are often (and naturally) studied
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3 together in the literature, the interpretation of fragmentation trends and spatial
4 restructuring in terms of firm-level characteristics is more recent and mostly discussed
5 in empirical contributions.
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10 Cost factors have featured prominently in the debate about vertical disintegration and its
11 spatial dimension. The transaction cost analytical framework represents in this sense the
12 main theoretical reference, suggesting that firms externalise activities when and where
13 external provision is less expensive than internal procurement (WILLIAMSON, 1985).
14 Scott (1988) argues that in capitalist societies the organisation of production, including
15 its spatial distribution, is constantly scrutinised by firms with the purpose of reducing
16 costs. This often implies seeking for factor price differences across locations, countries
17 or regions, particularly, though not exclusively, when labour-intensive production and
18 assembling are concerned. Accordingly, the spatial distribution of outsourcing reflects
19 factor cost differentials, involving peripheral areas of advanced countries or developing
20 regions, which attract routinised unskilled production, while core-regions dominate in
21 unstandardised skilled labour or contact-intensive activities, characterised by high unit
22 linkage costs (LEUNG, 1993). The recent integration of international markets and the
23 increasing competitive pressure they have brought about help explaining the late
24 upsurge in international subcontracting towards low-cost areas (FEENSTRA, 1998).
25 Evidence of total outsourcing at international level comes especially from traditional
26 manufacturing sectors, heavily hit by competition from emerging economies. Cost-
27 cutting strategies have been favouring the emergence of "lean and mean" global players,
28 transforming producers into international buyers, which co-ordinate global production
29 networks of subcontractors in many different countries (GEREFFI, 1999).
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55 The transaction cost perspective also emphasises the additional cost burden associated
56 with international outsourcing, as spatial dispersion can result in longer lead times,
57 larger inventories, communication and co-ordination problems, difficulties in
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3 contractual specification and monitoring, which tend to rule out distant subcontracting
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5 of non standardised functions (GILLEY and RASHEED, 2000). The transaction cost
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7 approach therefore suggests that outsourcing to local suppliers is to be preferred when
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9 market relationships are less expensive at closer distance. In the case of advanced high
10
11 cost areas, proximity is an advantage in terms of contractual specification and
12
13 monitoring, which are all the more relevant when non-standardised tasks or specific
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15 assets are concerned. As a consequence, advanced services tend to locate much close to
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17 their primary source of demand, since they entail significant customisation, frequent
18
19 contacts between users and providers, or even simultaneous production and
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21 consumption (HOWELLS, 2000).
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26 However, as standardisation and asset specificity evolve, international outsourcing
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28 concerns a wider range of functions and products, including apparently strategic
29
30 activities, such as design and R&D. In this respect, Freeman and Soete (1997) underline
31
32 that not all R&D has high degrees of uncertainty and complexity attached to it. Indeed,
33
34 several knowledge intensive activities have been undergoing a process of
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36 "commoditisation", generally reflected in declining terms of trade and harsher price
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38 competition, even in segments of high tech industries (MINIAN, 2006). As such, firms
39
40 find it preferable to outsource these activities to suppliers who can offer standardised
41
42 products or services at a lower cost. In addition, improved communication technologies
43
44 make codification easier and increase the ability of firms to monitor and compare the
45
46 quality of external suppliers, thus creating alternatives to direct or close control and
47
48 minimising the need for close user-producer interactions (TETHER *et al.*, 2001;
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50 NARULA, 2001). "Organized proximity" (TORRE and RALLET, 2005), i.e. common
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52 behavioural rules and routines and means for sharing information and knowledge, offers
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54 powerful mechanisms for long-distance coordination, thus widening the scope for
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56 outsourcing relational intensive activities at international level.
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3 Cost-advantages related to standardised input provision can also be found in relatively
4 high cost areas, if providers serve a large market and enjoy economies of scale and
5 specialisation, as in the case of territorial agglomeration of clients. This might explain
6 why off-shoring is still, in absolute terms, a limited phenomenon (AMITI and WEI,
7 2005) and also why, in core regions, outsourcing has been contributing to the expansion
8 of service complexes or thickening of local business service markets (WOOD *et al.*,
9 1993; ONO, 2007).

10
11 Scott (1988) relates the cost-advantages of subcontracting at the local level to self-
12 reinforcing marshallian externalities, as those which characterise urban agglomerations
13 (ILLERIS, 2005) or manufacturing clusters. Marshallian externalities are a
14 multidimensional concept, comprising both pecuniary externalities and knowledge
15 externalities. These are characterised by different tendencies.

16
17 On the one hand, pecuniary externalities are considered to be increasingly less
18 important in driving agglomeration of suppliers and, as a consequence, in explaining
19 localised vertical disintegration (PHELPS, 2004; PHELPS and OZAWA, 2003). In fact,
20 improvements in transport and communication technology and infrastructure have
21 reduced the need for geographical proximity. Location in one area does not preclude
22 access to externalities generated in another one, if the two are strongly connected. In
23 this sense, pecuniary externalities are increasingly related to "accessibility" rather than
24 simply "proximity". Indeed, the wider availability of pecuniary externalities tend to act
25 as a centrifugal force, deconstructing traditional industrial agglomerations and changing
26 the scale at which agglomeration advantages are perceived (MARTIN, 1999; PHELPS,
27 2004).

28
29 On the other hand, knowledge externalities and benefits from labour market pooling
30 continue to act as a significant centripetal force, favouring agglomeration of specialised
31 suppliers and flexible specialisation models in core regions (GAROFOLI, 2002). In this
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3 context, externalisation of production and service activities is mainly driven by
4 motivations other than costs, such as production smoothing, core-competence focus, or
5 expertise- and knowledge-searching strategies.
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10 Production smoothing and the search for flexibility are, according to Beyers and
11 Lindahl (1996), "quasi-cost" factors, in the sense that they are indirectly related to cost-
12 reduction strategies. In environments characterised by unstable market conditions,
13 subcontracting emerges as a mechanism for rapidly adjusting to changes in the market,
14 without harmful effects on the level of efficiency (AJAYI, 2005). It stands as a defining
15 character of flexible regimes of capital accumulation, in which internal economies of
16 scale are largely replaced by external economies (SCOTT, 1988; STORPER and
17 SCOTT, 1989). Production smoothing often takes place at the local level, as rapidity
18 and monitoring of quality control are greatly important, unless bulky and highly
19 standardised activities are involved. However, it is a strategy which typically involves
20 "capacity" or concurrent subcontracting (IMRIE, 1986: 956), rather than downsizing
21 through externalisation.
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37 Externalisation is more likely to occur in rapidly evolving markets, which require
38 innovative responsiveness, feeded by specialised providers and integration of different
39 mixes of information and expertise (COFFEY and BAILLY, 1992). As products
40 become more sophisticated and production relies on an increasing range of specialised
41 technological understanding, firms can hardly develop internally all the capabilities and
42 competences required to bring a product to the market. Especially in environments
43 characterised by strong competition and short product life cycle, firms devote internal
44 resources to strengthen their core business, while outsourcing non-core activities. This
45 occurs, for instance, in the case of ancillary services, which are usually labour intensive
46 (ABRAHAM and TAYLOR, 1996), but also for those complex activities in which firms
47 would be unable to keep the pace with changes and challenges posed by specialised
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3 suppliers. In this case, subcontracting to external specialised providers responds to the
4 related needs of strengthening core competences, diverting resources and attention from
5 non-core activities, and accessing highly specialised expertise, which complement in-
6 house capabilities.
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11 The expanding need for specialised knowledge also explains the widening functional
12 scope of outsourcing decisions, which increasingly involve non-manufacturing
13 functions (WOOD, 1991). Indeed, outsourcing of service activities to specialised
14 suppliers has been a hallmark of recent industrial restructuring in advanced regions,
15 concerning an ever larger range of service functionsⁱⁱⁱ. Business service functions are
16 becoming increasingly sophisticated and manufacturing firms generally lack resources
17 and strategic incentives to invest in their development (COE, 2000). Total outsourcing
18 of services is commonplace for SMEs, which, by definition, have a limited amount of
19 resources to invest and little scope for economies of scale in the intra-organisational
20 provision. However, in advanced areas, where manufacturing competitiveness
21 increasingly depends on knowledge contents, even large corporations may be unable to
22 produce innovative services and normally refer to external knowledge intensive
23 providers for expertise and consultancy (WOOD *et al.*, 1993), although the resulting
24 relationship rarely takes the form of "pure" service externalisation (BEYERS and
25 LINDAHL, 1996). More often, and especially when knowledge intensive or strategic
26 activities are involved, we observe complementary relationships between in-house
27 departments and specialised suppliers (MAHNKE, 2001). In such cases, outsourcing
28 responds to the need of reaping specialisation gains while exposing to a variety of
29 learning experiences. The risk associated with this strategy is that, if it implies dismissal
30 of strategic capabilities, it may also undermine firms' absorptive capacity (MAHNKE,
31 2001). This is one of the firm-level characteristics that have attracted the attention of
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3 recent contributions interpreting the trends of fragmentation and spatial restructuring in
4 terms of features of business players which are driving the outsourcing dynamics.
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7 Firm-specific factors such as size (ABRAHAM and TAYLOR, 1996; MARTINEZ and
8 RUBIERA, 2004; KIMURA, 2002; GIRMA and GÖRG, 2004; TAYMAZ and
9 KILIÇASLAN, 2005; MAZZANTI *et al.* 2006), productivity (KIMURA, 2002;
10 TOMIURA, 2005; OLSEN, 2006), R&D intensity (BARNEY, 1999; MAHNKE, 2001;
11 MOL, 2005), human capital (TOMIURA, 2005; MAZZANTI *et al.*, 2006), export or
12 FDI strategies (GEREFFI, 1999; GROSSMAN and HELPMAN, 2002; TOMIURA,
13 2005) are discussed and related to the cost arguments, specialisation or knowledge-
14 searching strategies commented above^{iv}. Evidence on the matter is however mostly
15 anecdotic or based on case studies. Investigation based on large firm-level datasets is in
16 its early stages, often referring to specific industries or local production systems.
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33 3. Sample identification and survey method

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37 The empirical analysis draws on a representative and large dataset concerning the main
38 manufacturing sectors of Lombardy. The region represents a fully fledged and mature
39 industrial system, recently affected by substantial *tertiarisation*, although still exhibiting
40 important remnants of a manufacturing core. The region accounts for about 1/5 of the
41 Italian GDP and is leading the country in most of the rankings related to innovation and
42 internationalisation, although such leadership has been gradually eroding at the national
43 level, and the region has been lately losing ground with respect to other advanced
44 European areas (CUSMANO and MALERBA, 2005). Its openness makes it particularly
45 exposed to international changes and pressures, which affect in different manners its
46 highly heterogeneous sectors of specialization and productive milieux, characterised by
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3 a significant presence of both high tech multinationals and small firm-based traditional
4 industrial districts^v.
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8 The target sample of 1200 firms is drawn from the national firm Census (ISTAT, 2001)
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10 and is stratified according to geographical location, manufacturing activity and firm
11 size.
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14 Geographical stratification groups into four macro areas neighbouring provinces, which
15 exhibit significant within-group similarities in terms of productive specialization: a)
16 Milan; b) North-East (Varese, Como, Lecco and Sondrio); c) North-West (Brescia and
17 Bergamo); d) South (Pavia, Lodi, Cremona, Mantova).
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21 Stratification based on manufacturing activity is obtained with reference to eight macro-
22 sectors:
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30 a. Energy & Chemistry: mining, extraction of crude petroleum and gas, coal and
31 lignite, chemistry, rubber and plastic, electricity, gas and water supply;
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33 b. Food & Tobacco: food products, beverages and tobacco;
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35 c. Textile & Clothing: textile, wearing apparel, tanning and leather, footwear;
36
37 d. Wood & Furniture: wood and product of wood, furniture;
38
39 e. Paper & Publishing: publishing, printing and reproduction of recorded media;
40
41 f. Mechanics & Transport: basic metals, other non metallic mineral products
42 fabricated metal products, machinery and equipments, motor vehicles, jewellery;
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44 g. Electronics & Optics: electrical machinery, radio communication equipment and
45 apparatus, precision and optical instruments, watches and clocks, accounting and
46 computing machinery;
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48 h. Construction: Construction and housing.
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3 Size dimension stratification is based on the number of employees and is built around
4 five cells: (1) 6-9; (2) 10-49; (3) 50-249; (4) 250-499; (5) more than 500. These size
5 classes are based on the EU classification, but explicitly exclude micro-firms (i.e. firms
6 with less than six employees).
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10 The number of firms in each stratum of the target sample has been obtained assuring
11 proportionality to the total number of employees in the same stratum of the population.
12 However, appropriate balancing criteria have been adopted in order to avoid strata with
13 small or medium sized firms to have an insufficient number of firms and ensure a
14 satisfactory estimates' precision.
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18 Data were collected through an original firm-level survey conducted in 2005. Each firm
19 in the target sample was contacted by a survey agency, which interviewed via telephone
20 either the chief executive officer, the managing director, or the chief administrative
21 officer. A second target sample was available to the survey agency to replace non
22 respondents. This allowed obtaining a final sample of 1,148 regionally-based firms,
23 which corresponds to a response rate equal to 96%. The sample industry and size
24 composition is reported in Table 1, which shows that the Mechanics & Transport
25 macro-sector accounts for the relative highest share of firms in the sample (34.8%),
26 followed by Textile & Clothing (14.5%), Energy & Chemistry (14.5%) and
27 Construction (12.5%). The table also reports the response rate by sector, which shows
28 that firms from Wood & Furniture and Construction were used by the survey agency to
29 replace non respondents in other sectors. As a consequence, appropriate survey
30 estimation methods are employed in the empirical analysis to control for the potential
31 bias originating from this non-response/over-response bias.
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TABLE 1

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3 The sample is mostly composed of small and medium-sized firms (about 50% of our
4 firms belong to the 10-49 employees class). The share of SMEs is particularly dominant
5 in the Wood & Furniture industry and in Construction, where about 2/3 of the firms
6 have less than 50 employees. On the other hand, a non-negligible share of large firms
7 characterises a few sectors, such as Energy & Chemistry, Paper & Publishing and
8 Mechanics & Transport (Figure 1).
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FIGURE 1

4. Outsourcing patterns in Lombardy: breadth, depth and internationalisation

The survey conveys information on firms' outsourcing decisions, where outsourcing is intended here as the procuring of activities originally performed internally. More specifically, the respondent was first asked to indicate which functions the firm performs in-house, differentiating among the following functional categories: (a) production and assembling; (b) R&D and design; (c) services (IT, personnel administration, logistics and distribution, packaging, maintenance). For each function the respondent was then asked to specify if activities originally performed within firm boundaries had been contracted out. If so, the respondent was also asked to indicate whether the contractor is located in Lombardy, in another Italian region or abroad. These sets of questions allow us to draw a picture of both the geographical dimension of outsourcing and the depth of the phenomenon across functions.

The outsourcing phenomenon appears to have pervasively affected the manufacturing system in Lombardy. In fact, outsourcing involves nearly half of the firms in the sample, and is uniformly distributed across industries. The two significant exceptions are Paper & Publishing and Electronics & Optics, which represent, respectively, the

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3 upper (60.7% of firms outsourcing) and the lower (42.5%) tails of the distribution
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5 (Table 2).
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TABLE 2

Direction

Outsourcing has a clear regional dimension: on average more than 40% of firms (83% of outsourcers – i.e. firms outsourcing at least one function) refer to a regional supplier for some of the functions they have decided to contract out. This pattern prevails in sectors which are at the heart of regional industrial districts, such as Wood & Furniture, Textile & Clothing and Mechanics & Transport, or which are mostly a locally based business, such as Construction. This evidence is consistent with contributions stating that local knowledge and supply chains, inter-firm and inter-personal networks substantially increase the scope of outsourcing (e.g. MORGAN, 1997).

FIGURE 2

Furthermore, relying *exclusively* on regional contractors is effectively the most common option (Figure 2). This strategy is indeed followed by 30.8% share of firms in the sample (61.8% of all outsourcers). Again, it is the locally based Construction industry which is mostly involved in self-contained local networks of contracting. Regional outsourcing is an exclusive strategy also for a significant share of firms in Mechanics & Transport. Thus, restructuring through externalisation mainly generates localised linkages. As mentioned, this can be related to the presence of large local clusters, which are a distinctive feature of the competitive system of Lombardy in this and other traditional sectors and which are likely to capture the outsourced functions. In this sense the trend seems to be driven by highly localised advantages from division of labour and

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3 complementary specialisation, rather than by the search for cost differentials across
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5 space.
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8 The share of firms that rely on outsourcing to other Italian regions stands at significant
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10 distance, both in traditional sectors and in high tech ones (Table 2). Indeed, in
11
12 Electronics & Optics, international value chains attract outsourced activities to a larger
13
14 degree than national producers. This high-tech industrial area is however quite an
15
16 exception in the regional fragmentation dynamics. Off-shoring is, in fact, still a limited
17
18 phenomenon, accounting for a minor part of the overall outsourcing trend. The
19
20 participation to international fragmentation processes concerns less than 8% of the firms
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22 in the sample (and 16% of the actual outsourcers) and is unevenly distributed across
23
24 industries. Two highly different sectors stand well above the average: Electronics &
25
26 Optics and Textile & Clothing. The share of outsourcers that have been contracting
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28 activities abroad is equal to nearly 1/3 in the first and 1/4 in the latter. It is therefore in
29
30 these two sectors that the externalisation process mostly reflects integration into the
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32 increasingly international division of labour.
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40 *Breadth and depth*

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42 It is to be expected that the regional or international dimension of the outsourcing
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44 process is related to the content of the activities concerned, and that those activities are
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46 (performed and) outsourced differently across industries, reflecting industry differences
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48 in terms of competitive factors, competitive strategies of the firms and comparative
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50 advantages of the territories. Accordingly, we differentiate the functions being
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52 outsourced and explore the relationship between outward orientation (or regional
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54 embeddedness) and type of activity, always taking into account industry differences.
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58 We analyse the breadth and depth of outsourcing in relation to the three functional
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60 categories of production and assembling, R&D and design, and services. First of all, it

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3 is important to underline that firms have been performing these functions to a different
4 degree. Production/assembling activities are, as expected, the defining character of the
5 manufacturing system in Lombardy and, even when firms decide to turn to external
6 suppliers for activities they used to perform in-house, outsourcing rarely implies
7 complete disinvestment. As Table 3 shows, only a very minor share of firms (3%) never
8 carried out any production activities, whereas 94% exhibit dedicated functions. For
9 nearly 74% of firms, production or assembling have not been affected by any type of
10 outsourcing, while the remaining 20% of firms with dedicated functions have partially
11 outsourced them. Only 3% of firms in the sample have been going through complete
12 disinvestment in manufacturing activities. "Hollow companies" (FREEDMAN, 2004),
13 that is, firms turned into pure coordination structures, are therefore still rather
14 infrequent.
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30 Indeed, the strategy of full disinvestment (total outsourcing) concerns a small share of
31 firms across all the functions examined. The area in which turning to external suppliers
32 most frequently implies that firms dismiss the related function is R&D and design.
33 Among firms that have been performing some types of research activity (75% of the
34 sample)^{vi}, very few outsourced any of them, preferring to keep this strategic (and
35 sensitive) function close to the in-house core. However, when outsourcing took place, it
36 has been more likely, compared to other functions, that it turned into total out-
37 contracting. In other words, partial outsourcing is relatively less common for R&D than
38 for other functions.
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51 This evidence is at odds with the prediction of the resource-based view of the firm,
52 which would suggest that complementary relationships between in-house departments
53 and specialised suppliers are more likely to be observed in the case of knowledge-
54 intensive activities (MAHNKE, 2001), as dismissing these functions undermines firms'
55 absorptive capacity. This is less the case, if R&D-related activities present low degrees
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3 of uncertainty and complexity (FREEMAN and SOETE, 1997) or in environments
4 characterised by "open innovation models" (LAURSEN and SALTER, 2004), which
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7 would however require close ties and proximity (SORENSEN *et al.*, 2006).
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12 TABLE 3
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19 This evidence can be further qualified by considering the direction of outsourcing, in
20 both spatial and organisational terms. Table 4 presents the relevance of regional vs.
21 international suppliers, considering "potential outsourcers" only (i.e. firms that have/had
22 functions related to the area under investigation). For instance, nearly 40% of the firms
23 with in-house services experienced de-verticalisation. Among them, 85% referred, at
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TABLE 4

As far as R&D is concerned, over 82% of the firms performing some type of R&D activity has not experienced any (even partial) outsourcing. Regional markets are nevertheless relevant as location of suppliers, but also the share of firms referring to

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3 foreign contractors is similar to that observed in production and assembling. This result
4
5 however hides significant inter-industry differences (Figure 3). Industries exhibiting a
6
7 relatively higher percentage of firms outsourcing abroad include such different areas as
8
9 Textile & Clothing and Electronics & Optics. When uncovering the details about the
10
11 nature of the outsourced activities, it is however evident that the similar trend is related
12
13 to different strategies (and, supposedly, determinants). For Textile & Clothing, off-
14
15 shoring consists mainly in international outsourcing of production and assembling
16
17 activities and, to a lesser extent, services. The Electronics & Optics industry is
18
19 significantly more oriented towards international outsourcing of R&D and design,
20
21 although the off-shoring of production activities is also non-negligible. If nearly half of
22
23 the R&D outsourcers in the industry outsourced abroad, about 1/3 of those outsourcing
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25 production turn to international suppliers. Energy & Chemistry is the other industry
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27 whose international outcontracting is above the average in all functions and,
28
29 particularly, in R&D. At the other extreme, the Construction and Wood & Furniture
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31 industries refer almost entirely to the domestic market.
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37 The high share of international outsourcing in knowledge-intensive activities is partially
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39 to be related to strategies of multinational groups. In fact our data also show that, when
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41 offshored, the R&D function is indeed transferred to another group affiliate abroad (or
42
43 the foreign headquarter) more frequently than in the case of production and services^{vii}.
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45 This seems to suggest that regional high-tech industries are affected by a sort of "branch
46
47 plant effect", which is generally associated with peripheral areas (PHELPS, 1993).
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49 Multinational branch plants are "outsourced" of their R&D functions by headquarters,
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51 which implies a lower degree of regional embeddedness in the forms of localised
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53 knowledge-intensive linkages.
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58 FIGURE 3

5. Firm-level characteristics and the geographical dimension of outsourcing

5.1 Econometric model and description of the variables

Following recent empirical contributions on the determinants of outsourcing (GIRMA and GÖRG 2004; MAZZANTI *et al.*, 2006; MOL, 2005; TOMIURA, 2005), we model outsourcing decisions by firms as a function of a number of variables reflecting firm-specific characteristics, while accounting for sectoral specificities. We estimate different probit models, in order to assess the possible distinct relevance of these characteristics for the inward (regional) and the outward (foreign) orientation of the outsourcing strategy. In the first model, we consider exclusively regional outsourcing: our dependent variable is a dummy equal to one when the firm has been undertaking regional outsourcing only. The second model describes the probability of a firm performing international outsourcing: here the dependent variable is a dummy equal to one when the firm has outsourced some activity to another country. Finally, for the sake of comparison, we also estimate a third model where the dependent variable is a dummy equal to one when the firm performs any kind of outsourcing, i.e. independently of the localisation of the contractor. All models are estimated accounting for the effects of sampling design and response on population estimates by using pseudo-maximum likelihood methods and allowing for probability sampling weights and stratification.

We first test the explanatory power of a basic set of quantitative variables, also obtained from the survey (Table 5). The first explanatory variable, *PRODUCTIVITY* (sales over employees), is intended to test the hypothesis that firms engaged in outsourcing have higher productivity than vertically integrated firms (OLSEN, 2006). The rationale is that firms outsource activities in which they are less efficient or for which they do not enjoy

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3 much competitive advantage, based, for instance, on unique knowledge or skills, while
4 focusing on their core competencies or reallocating resources towards activities with
5 greater value added, and thus gaining in productivity. Only very few studies have
6 analysed the reverse direction of causality, providing however no clear cut evidence
7 (KIMURA, 2002; TOMIURA, 2005). For example Tomiura (2005) points to a greater
8 marginal relevance of productivity for international outsourcing than for generic
9 outsourcing, that would be explained by the high fixed costs for foreign contracting,
10 which makes this alternative viable for rather productive firms. Notice that our measure
11 of labour productivity could be positively related to outsourcing also because firms
12 contracting out their activities usually reduce the number of employees, while sales
13 remain constant.
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28 TABLE 5
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32 The second explanatory variable, *RDI* (R&D over sales), measures R&D intensity,
33 whose impact on outsourcing cannot be straightforwardly signed (MAHNKE, 2001;
34 MOL, 2005). The conventional view would argue that R&D intensive industries tend to
35 be vertically integrated in order to recover the high sunk costs generated by R&D
36 investment. A further and complementary argument, based on the transaction cost
37 approach, maintains that industries dealing with complex products face severe incentive
38 and appropriability problems, which they tend to solve through vertical integration
39 (MOL, 2005; TEECE, 1986). On the other hand, R&D intensity would be associated to
40 extensive outcontracting in the literature conceiving the firm as an open platform,
41 developing external networks, in particular international ones, to access relevant
42 capabilities, rather than building them internally (BARNEY, 1999). The growing
43 complexity of technologies is one of the key reasons for firms to search for external
44 sources of knowledge (BRUSONI et al., 2001) and relationships with suppliers
45 represent important channels for accessing capabilities. Local outsourcing provides
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3 advantages of generally lower transaction costs and continuous interaction, favouring
4 interactive learning and incremental change. On the other hand, international
5 outsourcing can be aimed at entering global knowledge networks, and recent advances
6 in communication technologies have made this easier (MOL, 2005).
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10 A further explanatory variable is a measure of firm size (*SIZE*), here evaluated in terms
11 of number of employees. There seems to be disagreement on the direction of the impact
12 of size. The core competence literature, for instance, would indeed suggest that small
13 firms are more likely to outsource, since they have a strong incentive to devote their
14 limited internal (physical, financial and intangible) resources to core activities and bring
15 out non-core ones (ABRAHAM and TAYLOR, 1996; CORÓ and GRANDINETTI,
16 1999). In the case of local systems, regionally confined outsourcing by SMEs is to be
17 interpreted in the framework of a strong division of labour, which allows local
18 producers to enjoy increasing returns from specialisation, and the local system to
19 achieve a high degree of “flexible specialisation” (GAROFOLI, 2002). On the other
20 hand, small firms are expected to outsource fewer activities, as they have a smaller
21 scope to start with, and, especially as far as service activities are concerned, fewer and
22 simpler needs than large firms (MARTINEZ and RUBIERA, 2004). The positive
23 relation between firm size and outsourcing is supported by the idea that subcontracting
24 is a strategy of "production smoothing", which allows large firms' to reduce costs and
25 enhance flexibility (IMRIE, 1986; KIMURA, 2002; TAYAZ and KILIÇASLAN, 2005).
26 The effect of size has been tested by some recent empirical works (GIRMA and GÖRG,
27 2004; MAZZANTI et al. 2006), which however do not provide clear cut evidence.
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53 The explanatory variable *HK* (share of employees having secondary education) is meant
54 to characterise the firm human capital endowment. Cost saving strategies would suggest
55 a positive relationship between human capital and outsourcing in general. The rationale
56 is that firms employing high skilled workers pay efficiency wages and are not able to
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3 pursue different wage strategies. However, in order to save costs, they would be keen to
4
5 outsource peripheral activities for which they employ workers that are paid above the
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7 market rate efficiency wage. On the other hand, the competence perspective points to
8
9 differentiated effects and to ambiguous empirical outcome. Mazzanti et al. (2006)
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11 underline that a high level of skills can represent an important incentive to specialise in
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13 knowledge intensive activities, while outsourcing more standard production. However,
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15 firms with high skills are less willing to outsource, if this creates the risk of losing some
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17 distinctive capabilities, thus impoverishing the organisational competences which are
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19 built upon them. Finally, other authors have emphasised that human capital is
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21 particularly relevant for contracting internationally. Qualified human skills are in fact
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23 deemed essential for engaging in contracting abroad, since this requires human capital
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25 intensive activities such as negotiating with partners in foreign languages and
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27 concluding contracts under different legal systems (TOMIURA, 2005).
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33 In all specifications we control for industry specific effects and introduce a dummy
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35 variable *FINAL PRODUCT*, which identifies firms engaged in the production of final
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37 goods^{viii}. We include this variable to account for the differentiated behaviour of firms
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39 operating at different stages of the value chain and we expect a positive relationship
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41 between outsourcing and downstream production activities (e.g. final transformation or
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43 assembling). This is because downstream producers tend to exhibit a greater scope of
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45 activities or functions for which outsourcing can take place. In addition, it is especially
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47 in downstream production that outsourcing represents an effective strategy for
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49 smoothing production over different subcontractors, thus coping with seasonal or
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51 demand peaks (IMRIE, 1986). More broadly, this finding would be consistent with the
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53 evidence on cost saving strategies, as pointed out in recent works on subcontracting
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55 relationships (TAYMAZ and KILIÇASLAN, 2005).
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3 We further control for the outward orientation of the firm and for organisational specific
4 effects. The outward orientation of the firm seems to be an important control for
5 offshoring behaviour and is captured by two indicators that should convey information
6 on the firm business experience in foreign countries. *EXPI* (Export/Sales) represents
7 export intensity, while *FDI* is an indicator variable, which takes the value 1 if the firm
8 has undertaken foreign direct investment^{ix}. We first control for the relevance of *FDI* per
9 se, and then we further distinguish between production and/or R&D FDI (*FDI_plant*)
10 on the one hand, and the mere opening of a sales office abroad (*FDI_sales*), on the other
11 hand. The empirical literature suggests a positive relationship between outward
12 orientation and international outsourcing (TOMIURA, 2005), which is consistent with
13 the likely reduction of fixed costs of foreign contracting when firms already have
14 business experience in foreign countries. In addition, Görg et al. (2004) underline the
15 potential advantage for exporters in accessing extensive knowledge on where to procure
16 competitively priced inputs. This is in line with the model by Grossman and Helpman
17 (2002), which stresses the relevance of search costs for international outsourcing. In
18 accordance, we expect both kinds of internationalisation strategies to affect positively
19 the probability of foreign outsourcing, and the productive type of FDI to have a larger
20 effect than the investment in sales units or offices.

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44 As far as organisational specific effects are concerned, we introduce a *GROUP* dummy,
45 which takes a value equal to 1 if the firm is part of an economic group and 0 otherwise.
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48 This variable is further split into the variable *SUBSIDIARY*, which identifies firms that
49 are subsidiaries in a group, and *GROUP_HEAD*, which identifies the headquarter^x. We
50 expect that being part of a group positively affects outsourcing, as firms are in principle
51 embedded in a larger network of providers and potential clients. In addition, we expect
52 subsidiary firms to be more likely than headquarters to do outsourcing, as the first are
53 generally more involved in production activities, whereas the latter are likely to host
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3 administrative and often strategic (e.g. R&D) functions, enjoying economies of scale
4 and scope in the provision of group-wide services. At the same time, being Lombardy a
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7 core region characterised by a dynamic business environment and a major tertiary area
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10 (Milan), we expect branch plants to rely significantly on local service markets.
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12 13 14 5.2 Results

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19 Table 6 reports correlations among the main explanatory variables and Table 7 shows
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21 the results from different specifications of probit estimation for survey data for each of
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23 the three dependent variables specified in the previous section (any outsourcing,
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25 exclusively regional outsourcing, international outsourcing)^{xi}.
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TABLE 6

39 Interestingly, in all regressions human capital appears to be a good and highly
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41 significant predictor of outsourcing behaviour. The result is consistent with both the
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43 cost saving explanation (GIRMA and GÖRG, 2004) and the idea of specialisation
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45 driven by skills. Human capital significance is observed when focussing both on
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47 regionally oriented outsourcers and on offshorers, even when outward orientation
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49 variables (EXPI, FDI) are taken into account. We can infer that human capital
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51 represents an important asset for operating in foreign markets, but also a relevant driver
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53 in the regionally based flexible specialisation.
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57 By contrast, productivity does not appear to be significant in any of the specifications
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59 tested, which is not surprising since the reverse causality has been in fact rarely
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observed in the empirical literature^{xii}. Furthermore the result might be affected by the

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3 prevalence of SMEs in our sample (and in the Lombardy, and more generally Italian,
4 production system), as the effect on productivity induced by the possible employment
5 reduction is likely to be marginal for SMEs.
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10 The R&D intensity variable (RDI) exhibits a similar pattern of significance. Differently
11 from Mol (2005), we do not find robust evidence that R&D intensive firms have a
12 higher overall probability to outsource, thus our findings do not support the perspective
13 of increasing specialisation and reliance on external sources by R&D oriented firms. If
14 R&D intensive firms outsource in order to search for competent external suppliers that
15 provide complementary resources, as suggested by the 'relational view' (MAHNKE,
16 2001), our findings may suggest that the regional scale is too small for creating a market
17 for competent suppliers (PHELPS and OZAWA, 2003), while in international markets,
18 where competition is harsher, knowledge intensive firms tend to be more sensitive to
19 the appropriability problems entailed by outsourcing.
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24 Size does not appear to be a good predictor for the general strategy of outsourcing. This
25 is in line with the evidence provided by Mol (2005). When specifying the direction of
26 outsourcing, the variable appears to exhibit a positive effect on international
27 outsourcing, that is large firms appear to be significantly more likely to engage in
28 offshoring. This result, which confirms findings in Tomiura (2005), seems to point to an
29 apparently trivial implication, that is, availability of a large pool of resources is relevant
30 for sourcing at the international level. However, the effect of size disappears once we
31 properly account for international orientation of firms through export intensity and FDI.
32
33 We find that a strong relationship exists between international outsourcing behaviour
34 and foreign business experience, as represented by both export activity (EXPI) and FDI.
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36 It is foreign investment in a production or R&D unit that really matters, while the mere
37 opening of a sales office abroad does not show any effect on the probability to do any
38 kind of outsourcing.
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3 A striking difference emerges between firms outsourcing at the regional level only and
4 those going abroad when focussing on the final product dummy. This is significant in
5 both cases (under all the specifications tested), but takes a positive value, as expected,
6 only when considering exclusively regional outsourcing. On the contrary, it exhibits a
7 significant negative relationship with offshoring. We maintain this result is only
8 apparently counterintuitive. In fact, it is consistent with findings in the trade literature
9 showing that intra-industry trade currently dominates international trade flows
10 (GROSSMAN and HELPMAN, 2002; MINIAN, 2006). In particular, multinationals
11 develop large networks among their affiliates, which source factories all over the world
12 (GEREFFI, 1999). In this respect, it is worth noticing that the final product variable is
13 still significant and negative for the estimation on the offshoring dependent variable
14 when controlling for group dummies.
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30 Related to the above, being part of a group matters for international outsourcing: we
31 find support to the evidence that group subsidiaries rather than headquarters are the
32 drivers of international outsourcing activities. Furthermore, once we control for foreign
33 ownership by interacting the dummy SUBSIDIARY with a dummy FOREIGN taking
34 value 1 if the firm is controlled by foreign actors^{xiii}, we find that it is foreign ownership
35 of subsidiaries that positively affects the probability of international outsourcing. This
36 suggests that foreign controlled units located in Lombardy “have been outsourced”, that
37 is, headquarters of foreign MNEs have either appropriated the function or transferred it
38 to another subsidiary/external firm. This adds to the evidence about R&D total
39 offshoring by firms in high tech industries in pointing to a sort of “branch plant effect”
40 in knowledge intensive segments (PHELPS, 1993).
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TABLE 7

6. Conclusions

This paper explores the extent of outsourcing from the perspective of individual firms located in an advanced manufacturing area. In doing so the paper contributes to the vast literature on firms outsourcing strategies and in particular to the understanding of the determinants of firms' outsourcing decisions. Results shed light on a number of relevant dimensions of outsourcing (i.e. *direction, breadth, depth*) and thereby complement and corroborate the prevalently qualitative and anecdotic evidence on this topic.

The first outcome of this investigation clearly indicates that, in the case of Lombardy, outsourcing is remarkably widespread and concerns to a similar extent all industrial sectors. Our findings support previous evidence showing that subcontracting in core regions (e.g. WOOD *et al.*, 1991; COE, 2000; ILLERIS, 2005) is mainly local. Indeed, overall outsourcing has a clear and predominant local dimension in those sectors which are highly rooted in regional clusters. In this sense, it appears that marshallian externalities are still relevant in driving deverticalisation and feeding the local dense web of productive relationships, which constitutes the defining character of the flexible specialisation model (SCOTT, 1988; STORPER and SCOTT, 1989). Our evidence suggests that in this core region externalisation is not leading to a loss of density of those traded relationships that represent the source of local competitive advantage (GAROFOLI, 2002).

Subcontracting in Lombardy (and in core regions) involves services to a large degree. Externalisation of service functions contributes to thickening the local service markets and feeds positive agglomeration effects in advanced areas. In this sense, core-competence focus, or "quasi-cost" factors (BEYERS and LINDAHL, 1996), and the search for complementary expertise at the territorial level seem to be more relevant than cost rationales. The importance of human capital in explaining regionally based

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3 specialisation further suggests that local fragmentation is driven by knowledge-oriented
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specialisation further suggests that local fragmentation is driven by knowledge-oriented
players. These actors, mostly downstream producers, maintain some related in-house
capabilities, which support flexibility and governance of close ties with selected
suppliers (O'FARRELL *et al.*, 1993).

Interestingly, outsourcing in value added services (i.e. R&D and design), is less
common – suggesting that firms are still very much concerned with appropriation
problems-, but is relatively more likely to span across regional or even national
boundaries.

The implications of our results for regional development - and the broad debate about
the impact of globalisation on regional clusters - are of particular interest. The risk of
local networks impoverishment has been the focus of much recent debate about distant
outsourcing. Regions are depositories of tangible and intangible resources, which
mostly reside in local firms and on which localised capabilities are built (BOSCHMA,
2004; MASKELL and MALMBERG, 1999). Distant outsourcing can seriously
undermine these capabilities, reduce the local relational density and the internal
cohesion of the regional system.

In the case of Lombardy, it seems that externalisation has been adding new ties or
reinforcing existing ones in the local production system. Especially in the area of
business services, opportunities have been created for focused niche players to enter
regional markets. Therefore, it appears the adjustment to global trends has been taking
place mostly within the model of flexible specialisation, driven by highly localised
advantages from division of labour and complementary specialisation. Insertion into
global production networks seems not to have been disruptive of industrial clusters,
deepening, rather than weakening, local linkages.

However, the strong inward orientation of the process raises other questions, in relation
to the long term development trajectory. In fact, dismantling and relocating activities

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3 outside a region does not necessarily imply negative effects for the local economy, in
4 terms of efficiency or development dynamics. Outward externalisation can lead to a
5 better allocation of resources, which shift from low yielding activities, or declining
6 sectors, to more productive ones. Furthermore, regions benefit from international
7 outsourcing when firms subcontract to high competent producers and/or markets, which
8 become channels for accessing new knowledge and preventing lock-in effects
9 (CAMAGNI, 1991).

10
11 Overall, our analysis indicates that international outsourcing is still a minor part of a
12 wider fragmentation trend, which concerns mainly traditional sectors, such as Textile
13 and Clothing. In this case, international outsourcing consists mainly of the
14 externalisation of production and assembling activities and seems to respond to
15 efficiency seeking strategies, which may positively affect regional dynamics.

16
17 However international outsourcing also touches knowledge intensive and large scale
18 sectors. On the one hand, this might favour or strengthen the insertion of the regional
19 system into global knowledge networks. On the other hand, if it implies dismissal of
20 high value added functions or loss of strategic assets at the local level, it might seriously
21 hinder the growth potential of the regional system. Our evidence suggests that the
22 region might indeed suffer from a sort of "branch plant effect" in knowledge intensive
23 segments, as R&D functions, when outsourced, are more likely to be entirely
24 appropriated by foreign headquarters or research units.

25
26 In this late phase of world capitalism, which Scott (2005) describes as marked by
27 intensified regionalisation of production overlaid by a global division of labour,
28 traditional industrial core regions, such as Lombardy, face the challenge of preserving
29 their internal cohesion, while governing their insertion into evolving global networks,
30 counteracting the centripetal forces which are redistributing knowledge intensive
31 functions and redefining the global geography of core and periphery.

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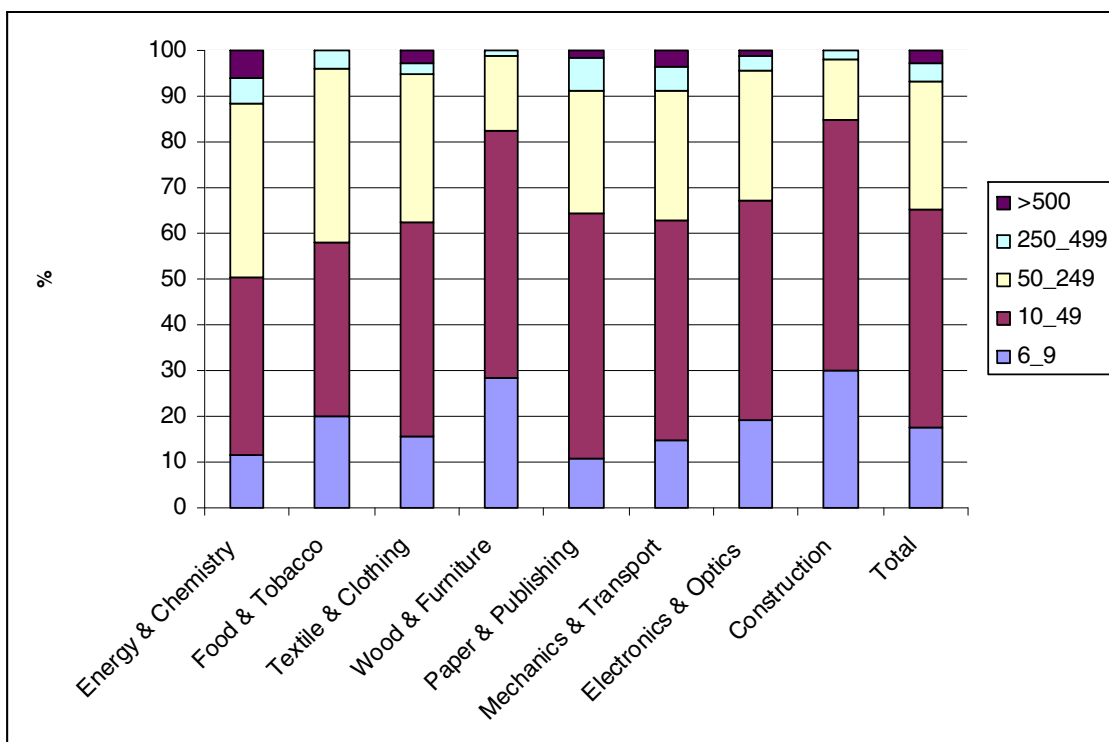
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Figure 1 - Sample composition, by size class (%) across industries

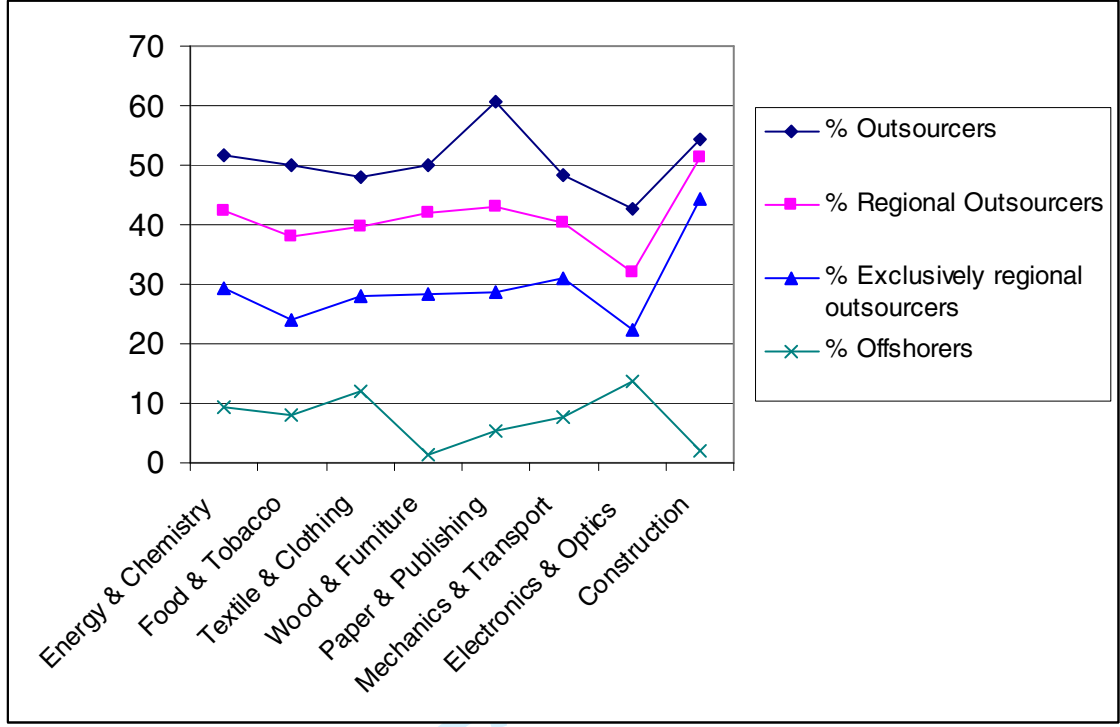


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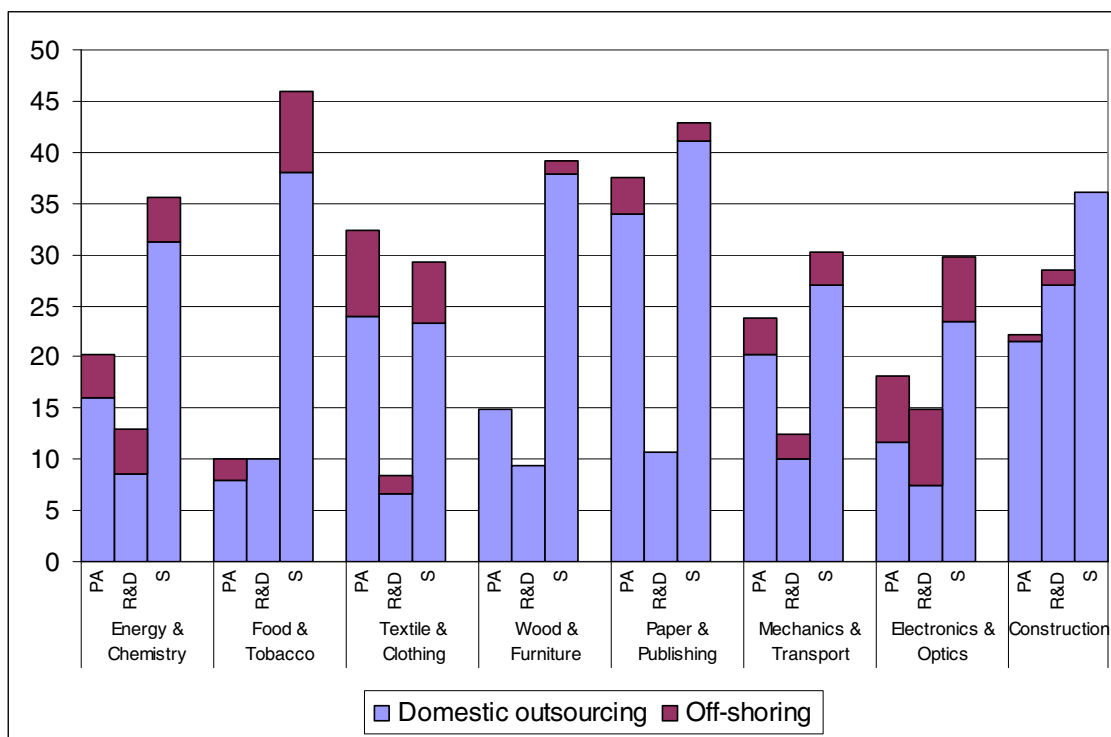
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Figure 2 - Regional outsourcing, by industry (% firms)



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Figure 3 - Breadth of domestic outsourcing and off-shoring, by industry (% of firms)



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Table 1 - Sample composition

| Industry | 6-9 | 10-49 | 50-249 | 250-499 | >500 | Total | Response rate |
|-----------------------|-----|-------|--------|---------|------|-------|---------------|
| Energy & Chemistry | 19 | 63 | 62 | 9 | 10 | 163 | 0.91 |
| Food & Tobacco | 10 | 19 | 19 | 2 | 0 | 50 | 0.82 |
| Textile & Clothing | 26 | 78 | 54 | 4 | 5 | 167 | 0.92 |
| Wood & Furniture | 21 | 40 | 12 | 1 | 0 | 74 | 1.35 |
| Paper & Publishing | 6 | 30 | 15 | 4 | 1 | 56 | 0.79 |
| Mechanics & Transport | 59 | 193 | 113 | 21 | 14 | 400 | 0.89 |
| Electronics & Optics | 18 | 45 | 27 | 3 | 1 | 94 | 0.79 |
| Construction | 43 | 79 | 19 | 3 | 0 | 144 | 1.76 |
| Total | 202 | 547 | 321 | 47 | 31 | 1,148 | 0.96 |

Table 2 - Outsourcing, by industry (% firms)

| Industry | % Outsourcers | of which (share) | | |
|-----------------------|---------------|-----------------------|-----------------------------------|--------------------------|
| | | Regional Outsourcers* | National Outsourcers [§] | Off-shorers [°] |
| Energy & Chemistry | 51.53 | 0.82 | 0.33 | 0.18 |
| Food & Tobacco | 50.00 | 0.76 | 0.52 | 0.16 |
| Textile & Clothing | 47.90 | 0.83 | 0.29 | 0.25 |
| Wood & Furniture | 50.00 | 0.84 | 0.41 | 0.03 |
| Paper & Publishing | 60.71 | 0.71 | 0.53 | 0.09 |
| Mechanics & Transport | 48.25 | 0.84 | 0.30 | 0.16 |
| Electronics & Optics | 42.55 | 0.75 | 0.30 | 0.33 |
| Construction | 54.17 | 0.95 | 0.15 | 0.04 |
| Total | 49.74 | 0.83 | 0.31 | 0.16 |

*Firms outsourcing at least one activity within the region.

[§]Firms outsourcing at least one activity in other Italian regions

[°]Firms outsourcing at least one activity abroad

Table 3 - Depth of outsourcing, by function (% of firms)

| Function | Never performed | Totally outsourced | In-house and outsourced | In-house only |
|---------------------------|-----------------|--------------------|-------------------------|---------------|
| Production/ Assembling | 2.96 | 3.05 | 20.30 | 73.69 |
| R&D/ Design | 25.70 | 6.36 | 7.40 | 60.54 |
| Services | 15.33 | 4.36 | 29.09 | 51.22 |

Table 4 - Direction of outsourcing, by localisation (% of potential outsourcers*)

| Function | % Outsourcers | of which (share) | |
|------------------------|---------------|-------------------------------------|----------------------------|
| | | % Regional Outsourcers [§] | % Off-shorers [°] |
| Production/ Assembling | 24.06 | 0.73 | 0.17 |
| R&D/ Design | 17.71 | 0.72 | 0.18 |
| Services | 39.51 | 0.85 | 0.11 |

*Firms performing or having performed the function

[§] Firms outsourcing at least one activity within the region.

[°]Firms outsourcing at least one activity abroad

Table 5 - Explanatory variables (in logs): descriptive statistics

| Variable | Measure | Mean | Std. Dev. | Min | Max |
|------------------|--------------------------------------|-------|--------------|------|-------|
| SIZE | Employees | 3.42 | 1.25 | 1.79 | 8.52 |
| PRODUCTIVIT Y | Sales/Employees | 11.88 | 1.31 | 4.29 | 17.73 |
| RDI | R&D/Sales | 0.69 | 1.02 | 0 | 4.62 |
| HK | % secondary educated employees | 3.11 | 1.21 | 0 | 4.62 |
| EXPI | Export/Sales | 2.015 | 1.74 | 0 | 4.62 |

Table 6 - Correlations among explanatory variables

| | SIZE | PRODUCTIVITY | RDI | EXPI | HK |
|--------------|-------|--------------|-------|-------|-------|
| SIZE | 1.000 | | | | |
| PRODUCTIVITY | 0.145 | 1.000 | | | |
| RDI | 0.251 | 0.043 | 1.000 | | |
| EXPI | 0.415 | 0.066 | 0.296 | 1.000 | |
| HK | 0.263 | 0.181 | 0.190 | 0.187 | 1.000 |

Table 7 - Estimation results

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|------------------|-------------------|----------------------------------|---------------------------|-------------------|----------------------------------|---------------------------|---------------------------|
| | All outsourcing | Exclusively regional outsourcing | International outsourcing | All outsourcing | Exclusively regional outsourcing | International outsourcing | International outsourcing |
| Size | -0.00 (0.05) | -0.01 (0.05) | 0.19*** (0.05) | -0.01 (0.05) | -0.00 (0.06) | 0.10 (0.07) | 0.07 (0.07) |
| Productivity | 0.03 (0.04) | -0.00 (0.04) | 0.03 (0.06) | 0.03 (0.04) | 0.00 (0.04) | 0.02 (0.06) | 0.02 (0.06) |
| Rdi | 0.08* (0.05) | -0.01 (0.05) | 0.05 (0.06) | 0.08 (0.05) | -0.02 (0.05) | 0.04 (0.06) | 0.04 (0.06) |
| Hk | 0.14*** (0.04) | 0.10** (0.04) | 0.21*** (0.08) | 0.14*** (0.04) | 0.10** (0.04) | 0.19** (0.08) | 0.19** (0.08) |
| Final product | 0.16 (0.12) | 0.25* (0.13) | -0.49*** (0.18) | 0.16 (0.12) | 0.25* (0.13) | -0.52*** (0.19) | -0.52*** (0.19) |
| Expi | | | | 0.03 (0.03) | 0.03 (0.03) | 0.11** (0.05) | 0.12** (0.05) |
| Fdi | | | | -0.09 (0.13) | -0.32** (0.14) | 0.31** (0.16) | |
| Fdi_plant | | | | | | | 0.65** (0.30) |
| Fdi_sales | | | | | | | 0.41 (0.34) |
| Constant | -0.82* (0.46) | -0.53 (0.47) | -2.95*** (0.73) | -0.81* (0.46) | -0.59 (0.48) | -2.54*** (0.79) | -2.48*** (0.78) |
| Industry dummies | yes | yes | Yes | Yes | yes | yes | yes |
| F stat | 2.33 | 2.14 | 6.27 | 2.05 | 2.18 | 7.31 | 6.88 |
| Prob>F | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 |
| Obs. | 1099 | 1099 | 1099 | 1099 | 1099 | 1099 | 1099 |

Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7 cont. – Estimation results

| | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|--------------------|-------------------|----------------------------------|---------------------------|-------------------|----------------------------------|---------------------------|---------------------------|
| | All outsourcing | Exclusively regional outsourcing | International outsourcing | All outsourcing | Exclusively regional outsourcing | International outsourcing | International outsourcing |
| Size | -0.01 (0.06) | 0.01 (0.06) | 0.04 (0.07) | -0.01 (0.06) | 0.01 (0.06) | 0.06 (0.07) | 0.05 (0.07) |
| Productivity | 0.03 (0.03) | 0.00 (0.04) | 0.01 (0.06) | 0.04 (0.04) | 0.01 (0.04) | 0.00 (0.06) | 0.00 (0.06) |
| Rdi | 0.07 (0.05) | -0.02 (0.05) | 0.04 (0.06) | 0.07 (0.05) | -0.02 (0.05) | 0.04 (0.06) | 0.04 (0.06) |
| Hk | 0.14*** (0.04) | 0.10** (0.04) | 0.17** (0.07) | 0.14*** (0.04) | 0.10** (0.04) | 0.17** (0.07) | 0.17** (0.07) |
| Final product | 0.16 (0.12) | 0.25* (0.13) | -0.51*** (0.19) | 0.16 (0.12) | 0.25* (0.13) | -0.51*** (0.19) | -0.53*** (0.19) |
| Expi | 0.03 (0.03) | 0.03 (0.03) | 0.12** (0.05) | 0.03 (0.03) | 0.03 (0.03) | 0.12** (0.05) | 0.12** (0.05) |
| Fdi_plant | -0.19 (0.22) | -0.75*** (0.22) | 0.55* (0.30) | -0.20 (0.22) | -0.78*** (0.22) | 0.58* (0.30) | 0.62** (0.30) |
| Fdi_sales | -0.17 (0.32) | -0.37 (0.30) | 0.32 (0.36) | -0.16 (0.32) | -0.37 (0.30) | 0.34 (0.36) | 0.39 (0.35) |
| Group | 0.10 (0.15) | -0.03 (0.15) | 0.32* (0.17) | | | | |
| Group head | | | | 0.25 (0.25) | 0.39 (0.29) | -0.30 (0.27) | -0.31 (0.27) |
| Subsidiary | | | | 0.07 (0.16) | -0.13 (0.16) | 0.40** (0.18) | 0.26 (0.20) |
| Subsidiary*Foreign | | | | | | | 0.59* (0.34) |
| Constant | -0.79* (0.46) | -0.63 (0.48) | -2.34*** (0.76) | -0.80* (0.46) | -0.68 (0.48) | -2.27*** (0.78) | -2.21*** (0.78) |
| Industry dummies | yes | yes | Yes | yes | yes | yes | Yes |
| F stat | 1.83 | 2.41 | 6.83 | 1.76 | 2.34 | 6.59 | 6.56 |
| Prob>F | 0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| Obs | 1099 | 1099 | 1099 | 1099 | 1099 | 1099 | 1099 |

Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

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ⁱⁱ TOMIURA (2005) provides a concise review.

ⁱⁱⁱ O'Farrell et al. (1993) define this process of vertical disintegration as "service unbundling".

^{iv} For the sake of clarity and to ease interpretation, we shall present these relationships in detail in section 5.1, when discussing the structure of the empirical analysis on firm-level characteristics and the geographical scope of outsourcing.

^v Lombardy has been the focus of early investigations about flexible production systems and industrial district models, emerging in the late 1970s as a peculiar case of diffused industrial development based on SMEs (GAROFOLI, 1983).

^{vi} The survey adopted a broad definition of R&D, which is intended as any activity oriented towards research and experimentation.

^{vii} 69% of firms off-shoring R&D activities do so, at least partially, to a group affiliate. The corresponding figures for production and services are, respectively, 64% and 52%. The difference is however more striking when considering firms off-shoring exclusively to group affiliates: these are 35% of firms off-shoring R&D, but only 2% of firms off-shoring production and 7% of firms off-shoring services.

^{viii} The survey specifically asked whether the firm produces a final good or an intermediate good.

^{ix} Here the survey first asked if the firm has pursued any foreign direct investment, distinguishing between: (a) production facilities; (b) R&D lab; (c) sales office.

^x In the survey, whenever the respondent declared the firm belonged to a group, he/she was asked to specify the position of the firm within the group.

^{xi} In the regressions, all continuous variables are measured in logs: to treat observations with zero value in some of the relevant variables, we added one before taking the logarithm.

^{xii} Mol (2005) finds a positive and significant effect of productivity on outsourcing, however in his regressions the coefficient of productivity is effectively zero.

^{xiii} This is again obtained from a survey question asking for the country of residence of the subjects retaining either the ownership or the control of the firm.