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WP 7/2009

This research was funded by the Autonomous Province of Trento, as the sponsor of the OPENLOC research project under the call for proposals "Major Projects 2006". Partners of the project are: the E. Mach Foundation, the Manchester Institute of Innovation Research, the Trento Museum of Natural Sciences, the University of Bologna and the University of Trento



PROVINCIA AUTONOMA
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Outsourcing and firm productivity: evidence for an Italian local production system*

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Paper prepared for the EAEPE 2008 Conference on
“Labour, Institutions and Growth in a Global Knowledge Economy”
Rome, Faculty of Economics “Federico Caffè” - University Roma Tre

November 6-11, 2008

Abstract

The paper investigates empirically the impact that outsourcing strategies have on the labour productivity of firms embedded in a local production system characterized by idiosyncratic techno-economic and organizational features. A diachronic cross-section econometric model of the productivity impact of outsourcing is applied to a sample of firms based in the local production system (LPS) of Reggio Emilia (RE) (in Emilia Romagna, Italy). The application confirms some of the results the empirical literature reports for other no or less context specific empirical applications, in particular their dependency on the kind of outsourced activities, the internationalization of the outsourcing firm and time horizon of the productivity effects. On the other hand, when the actual extent at

*Although the four authors contributed equally to the paper, Section 6 could be attributed to Davide Antonioli, Section 4 to Massimiliano Mazzanti, Section 2 and 3 to Sandro Montresor, Section 5 to Paolo Pini. We thank the participants to the Final Workshop of the PRIN2005 on “Fragmentation and Local Development”, Padua (Italy), June 3-4, 2008, and to the 2008 ENEF Meeting on “Knowledge, Organization and the Firm, LEM, Scuola Superiore S. Anna, Pisa (Italy) September 11-12, 2008, for their suggestions on an earlier version of the paper. The usual disclaimers apply.

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which the different kinds of activities are outsourced is retained, important exceptions to these results are obtained: the positive impact of the externalization of manufacturing activities is the most relevant and the most consistent with the district nature of the investigated LPS.

Keywords: outsourcing, productivity, transaction costs, industrial relations, innovation

JEL codes: L22, D23, J53

1 Introduction

Empirical evidence shows that both the volume and the value of intermediate inputs and business production services contracted out by firms, that is of *outsourcing*, have risen dramatically in the last two decades (Kirkegaard, 2005; Spencer, 2005). This has recently spurred a substantial interest in the issue, from several and different perspectives, spanning from the economics of the firm, through industrial organization, to international trade. In particular, the attention has focused on the analysis of outsourcing determinants, leading to the formulation and empirical tests of a number of theories of the vertical scope of the firms. Standard transaction-cost-economics (TCE) based explanations (e.g. Grossman and Helpman, 2002) have thus been both contrasted (e.g. Mahnke, 2001) and integrated (e.g. Jacobides and Winter, 2005) with capabilities and competences based ones, and, more recently, with an entrepreneurship kind of perspective (e.g. Zander, 2007). What is more, these explanations have found as many specifications and integrations as when applied to the very special case of international outsourcing, or *offshoring*, with respect to which “international fragmentation of production” (e.g. Jones and Kierzkowski, 2001), international trade in intermediate commodities and in services, and MNC networks (e.g. Kleinert, 2003) become relevant.

Quite surprisingly, this massive interest for the outsourcing determinants of the firms has not been accompanied by an as widespread attention for its effects on their performances. Indeed, most research on the outsourcing effects has mainly focused on concerns related to labour markets, trying to investigate the potential negative impact of it on such “hot issues” as employment losses, wage and skill biases: the recent OECD Report on “Offshoring and Employment: Trends and Impacts” (OECD, 2007) is just one of the proofs of this attention.

While extremely important, not to say increasingly politically charged, these aspects have somehow obscured the analysis of the impact that outsourcing has on the firms’ productivity and profitability. As one of the most extensive surveys of the literature states among the premises:

“Yet, little rigorous [empirical] research on offshoring and its impacts on productivity or firm performance has been conducted.” (Olsen, 2006, p.5).

It is the purpose of this paper to contribute filling this gap by providing some evidence on the impact that outsourcing has on the labour productivity of firms embedded in a local production system characterized by idiosyncratic techno-economic and organizational features. In so doing, the main value added

of the paper is that of testing whether such an embeddedness might make the productivity impact of outsourcing dependent on a number of factors, which are not usually considered in the analysis of big-companies' externalization, and which could possibly end up with mitigating, if not even reversing, the theoretical and empirical results obtained with respect to them.

More precisely, such a test is performed by applying a diachronic cross-section econometric model of the productivity impact of outsourcing to a sample of firms based in the local production system (LPS) of Reggio Emilia (in Emilia Romagna, Italy), for which survey-based outsourcing and balance-sheet data have been collected for, respectively, 1998-2001 and 2002-2005.

The paper consists of five more sections. Section 2 outlines the issue and briefly presents the “contrasting” links between outsourcing and firm performance (productivity, in particular), which emerge by integrating the dominant “positive” view with a more recent, “negative”, one. Section 3 reports the scanty confirmations that these theoretical arguments have found in their not numerous empirical applications at the firm level, and point to some critical methodological drawbacks which could have affected the results. Section 4 presents an econometric model which is able to address some of these problems. Section 5 describes the context of the province of Reggio Emilia, to which such a model will be applied, along with the datasets used in the application. Section 6 comments its main results. Some conclusive remarks and research agenda for the future (Section 7) close the paper.

2 The theoretical link between outsourcing and firm performance

2.1 The issue at stake

Running the risk of becoming another “buzzy-word”, *outsourcing* is nowadays used by different scholars and professionals to denote different phenomena, and often used interchangeably with other similar words as *offshoring*, *insourcing*, and the like. Accordingly, clarifying the meaning we attach to it in the paper is necessary at the outset.

By referring to the OECD conceptual framework (OECD, 2007, p.15), with outsourcing we here generally mean “the use of goods and services produced outside the enterprise”: no matter if this is also outside the national boundaries of the firm or not, providing it is outside the firm's boundaries (Table 1). In other words, our outsourcing encompasses both *domestic* and *international* outsource-

		Locations	
		National	International
Sourcing	Between firms (Outsourcing)	Domestic outsourcing	International outsourcing
	Within firms (Insourcing)	Domestic supply Within countries	International insourcing Between countries

Table 1: The OECD outsourcing framework (OECD, 2007)

ing. Of course, we are aware of the fact that the two phenomena overlap only partially in terms of determinants and implications. However, also for the sake of consistency with the empirical application we will carry out – whose dataset reports the two indistinguishably – in the following we will refer to their “least common multiple” and differentiate their analysis whenever necessary only.

The theoretical literature on outsourcing at the firm level is really massive, and mainly concentrates on the outsourcing determinants.¹ Quite surprisingly, the relative contributions rarely encompass among these determinants, at least directly, a prospective increase in the performance of the outsourcing firms, either in terms of productivity or profitability. Indeed, firms are usually recommended to shift from “make” to “buy” in order to save on their internal administration costs (e.g. Williamson, 1975; Grossman and Helpman, 2002), providing the relative ownership re-allocation does not threaten asset specific investments (e.g. Grossman and Hart, 1986), or the ensued agency relationship does not pose asymmetric-information problems (e.g. Aghion and Tirole, 1997). Recently, outsourcing has also been envisaged as a tool for firms to specialize on their core competences, escape “learning-traps” by tapping into the providers (Mahnke, 2001; Jacobides and Winter, 2005), if not discover and implement new entrepreneurial opportunities (e.g. Hsieh, Nicherson, and Zenger, 2007), especially in terms of innovation (Mazzanti, Montresor, and Pini, 2007a).

In all these contributions, a positive impact on the outsourcing firm’s performance is envisaged only indirectly, if not just implicitly, although to a variable extent depending on the specific approach: in the resource-competence-based

¹For a schematic survey of the literature related to the outsourcing firm as an organization, production, industrial and innovation unit of analysis see, for example, Mazzanti, Montresor, and Pini (2007b).

view, for example, of a more managerial nature, specialization and competitive advantages emerge more clearly. However, if one wants to find a more explicit theoretical account of the firm performance impact of outsourcing, she has to integrate the literature at the firm level with that at a more aggregate level, mainly sectoral and intersectoral, and, what is more, support purely theoretical predictions with empirical ex-post rationalizations (Olsen, 2006).

2.2 Gains and losses from outsourcing

In so doing, it seems to us that the “dominant” view is a positive one, according to which firms should gain from outsourcing, both in terms of productivity (labour and total) and profitability, both in the short and in the long-run.

Starting with productivity gains, in the short-run they should accrue to mainly in the form of labour productivity increases: either because external inputs become available at lower costs – exploiting cost differentials in international labour markets (e.g. Kohler, 2004) or economies of scale of national external suppliers (e.g. Grossman and Helpman, 2005) – or because specialist suppliers provide inputs of higher quality (e.g. Heshmati, 2003). In the long-run, further increases in labour productivity could be associated to changes in factor shares, namely to the externalization of less skill-intensive tasks and to the reallocation of labour toward more skill-intensive ones (e.g. Feenstra and Hanson, 1999). Over time outsourcing could be also expected to positively affect total factor productivity, along with its growth and that of labour productivity itself. Indeed, by outsourcing firms could focus on their core competencies and thus increase their innovativeness (Mazzanti, Montresor, and Pini, 2007a), or/and integrate more efficient external business services into their manufacturing operations (ten Raa and Wolff, 2001). Although less explored, positive appears to be in general also the expected impact that outsourcing should theoretically have on firms’ profitability, given the *organizational competitiveness* they gain by focusing on those internal resources and competences which are relatively scarce and durable (Sharpe, 1997).²

While the main theoretical, or “quasi-theoretical”, view is positive, a number of negative views on the performance impact of outsourcing are emerging, especially in the form of ex-post rationalizations of empirical studies. This is particularly so when productivity is considered in the short-run, as labour-market rigidities could initially hamper the re-skilling of the workforce in the

²Given the focus of the paper on productivity-based performance measures, the profitability impact of outsourcing will be postponed to our future research agenda.

aftermath of outsourcing. Furthermore, cultural and linguistic barriers to an efficient exploitation of foreign providers could add in the case of international outsourcing (e.g. Egger and Egger, 2006).

Productivity and productivity growth, both labour and total, might be negatively affected by outsourcing in the long-run too: for example, because by decoupling production (outsourced) from R&D (in-house) activities, outsourcing lessens the feed-backs from the former to the latter, especially in the case of international distances, and thus the outsourcing firm's innovation capabilities (Naghavi and Ottaviano, 2006). Similar outsourcing losses have been theorized, this time more extensively than the positive counter-part, also in terms of profitability: both in the short-run, due to the managers under-estimation of its transaction costs (Young and Macneil, 2000; Benson, 1999), and in the long-run, given the emergence of imitative behaviors of successfully outsourcing firms (Gorzig and Stephan, 2002).

Although, as we said, relatively less established, these negative positions deserve particular attention once compared with the positive view. In particular, it turns interesting to establish whether the two views hold alternatively, or rather simultaneously with respect to different time horizons, a task for which the empirical evidence becomes extremely important.

3 The empirical link between outsourcing and productivity at the firm level

3.1 The general evidence

In the impact analysis of outsourcing at the firm level, productivity has attracted much more attention than profitability (Olsen, 2006). Although a number of studies have been recently published which retain gross-operating-surplus (GOS) as dependent variable (e.g. Gorzig and Stephan, 2002), productivity-based measures seem to offer more accurate and reliable interpretations than balance-sheet performance data. This justifies the choice of the present study, to start investigating the impact that outsourcing in LPS firms has on labour productivity, and to postpone the analysis of its impact on TFP and on profitability to our future research agenda (Section 7).

The number of empirical tests of the productivity impact of outsourcing has increased dramatically in the last few years. Out of the 24 papers ECONLIT reports to have hosted "outsourcing AND productivity" in their titles since the celebrated 1992 article by Siegel and Griliches (1992), as many as 12 have

been published in the last three years, that is since 2006. On the other hand, this explosion of studies have occurred piecemeal at different levels of analysis, lacking of comparability and restricting genuinely congruent general results.

What is more, the attention of the policy makers for the outsourcing implications for domestic labour markets, the readiness of the famous Feenstra-Hanson sectoral measures of outsourcing, and the increasing availability of input-output data with which to increase their accuracy (e.g. Falzoni and Tajoli, 2008; Daveri, Iommi, and Jona-Lasinio, 2006) have determined a quantitative supremacy of studies using aggregate data (e.g. Lo Turco, 2007). Which is particularly unfortunate, as it has been shown that, even within narrowly defined industries, the investigated relationship is affected by large and persistent heterogeneity across firms, so that evidences at the micro level are needed (Bartelsman and Doms, 2000).

Even by focusing on the relative few evidences at the firm and/or plant level, the picture remains quite blurred. What emerges from the most comprehensive review of this kind of micro-literature is actually the lack of clear patterns as to outsourcing affects productivity (Olsen, 2006, p.28). However, some general results can be stated to hold even beyond the numerous specifications of these studies.³

i) First of all, the *temporal horizon* of the computed effect matters, and possibly makes the positive and negative theoretical views both valid, but with respect to different time spans. Indeed, in those few studies which distinguish short-run from long-run effects, a positive effect is found in the latter case, and a negative one in the former, especially with respect to service outsourcing (Gorzig and Stephan, 2002), a point we will consider in the following. On the other hand, requiring a comprehensive panel-structure of the microdata to be captured, such a result appears less systematically than at the aggregated-industry level, at which is detected to hold with respect to several geographical contexts, especially in terms of international outsourcing (e.g. Siegel and Griliches, 1992; Fixler and Siegel, 1999; Egger and Egger, 2006).

ii) Second, the *kind of activity* which is outsourced matters too. Material outsourcing, particularly international, impacts productivity – when it does – to a lesser extent than service outsourcing and, in turn, service outsourcing impacts productivity more when it is done by service rather than manufacturing firms. Unlike the previous result, this is one for which sectoral evidences have been accompanied by numerous studies at the firm-plant level, although with

³For a more conventional survey of these studies, see (Olsen, 2006, Tab.1, p.24) and the first part of Gorg, Hanley, and Strobl (2008).

respect to specific geographical contexts – such as Ireland (Gorzig and Hanley, 2003; Gorg and Hanley, 2005; Gorg, Hanley, and Strobl, 2008) and United Kingdom (Criscuolo and Leaver, 2005) – and industrial sectors – such as the Italian automotive suppliers sector (Calabrese and Erbetta, 2004).

iii) Third, the degree of the *firm's internationalization* increases the extent at which outsourcing impacts its productivity, although this appears the case of material outsourcing only. This is an aspect the empirical literature at the firm level has been able to control quite accurately, not only by distinguishing the domestic vs. international location of the plants in terms of FDIs (e.g. Tomiura, 2005), but also their exporting status (e.g. Gorg, Hanley, and Strobl, 2008).

As we said, these are quite general results which emerge from the review of the empirical literature, in the sense that they hold true with respect to an appreciable number of countries and sectors of applications. Nonetheless, their generality degree diminishes when their methodology is considered more in depth. Indeed, from their methodological discussion a number of issues emerge, with respect to which the present paper, as we will see in Section 4, aims at bringing its value added.

3.2 The empirical methodology

The first methodological issue has to do with the heavy burden of *firm-specific elements* of which the above mentioned general results are “stuffed”. Just by scrolling the “remarks” column of the synthetic Table 1 Olsen (2006) builds up to compare the literature, one is stroked by the high number of specificities on which the results are conditional: economic sector, product market and market structure, position along the value chain (up vs. downstream), size, capital intensity, just to mention a few. What is more, different studies use a limited number of different controls, while a general account of them is missing, mainly because of the accounting origin of the used information. What is more, and for the same reason, almost never these controls encompass firm-specific elements which refer to its embeddedness into specific local system of production (LPS), neglecting the territorial dimension of the outsourcing impact.

This is particularly unfortunate, as several contributions in the domain of regional studies have shown that, in specific territorial contexts, outsourcing often follows a ‘cooperative’ kind of pattern, quite at odds with the ‘competitive’ mode usually envisaged when large, innovative, advanced firms sub-contract parts of their production processes to technologically backward small firms (Taymaz and Kilicaslan, 2005). In brief, “relying on tacit performance agreements, trust, and

reciprocal adjustment” (Suarez-Villa, 1988, p.7), typical of LPS, outsourcing has been proved to prevent the emergence of those disparities among firms - for example, in access to physical and human capital, knowledge and competences - which could result in the transaction impoverishing the innovative capabilities of the smaller, or weaker partner and, conversely, to stimulate a number of context-specific “outsourcing economies”.

A second methodological flaw refers to the *outsourcing measurements* which are used. Also at the firm-level, in fact, national outsourcing (OUT_i) and international outsourcing (OFF_i) are inferred quite grossly by referring to a Feenstra-Hanson kind of indicators (Feenstra and Hanson, 1999) such as the following:

$$OUT_i = \sum_i \frac{X_i^j}{Y_i} \quad (1)$$

$$OFF_i = \sum_i \frac{X_i^j}{Y_i} \times \frac{M_j}{C_j} \quad (2)$$

where X_i^j measures the intermediate inputs required by firm i to produce the commodity j , Y_i the total non-energy costs of firm i , M_j and C_j the imports and the final consumption of j , respectively.

While quite handy to use, and possibly sharpened through input-output data, at the sectoral and intersectoral level, these indicators become quite cavalier proxies of outsourcing once referred to the firm level. Although easy to draw from the firms’ balance-sheets, and to compare on their basis, their information power is in fact quite blurred. As an example, consider the notable study by Gorzig and Stephan (2002), carried out on as many as 43,000 German manufacturing companies over the period 1999-2000. The measures of outsourcing they use, related to internal labour costs, are, for material outsourcing, “material inputs costs”, for subcontracting, “external contract work costs”, and, for service outsourcing, “other costs not related to production”. Apart from the second kind of costs, it is immediate that the other two include some costs which are not related to outsourcing activities, of which they provide a clear overestimation.

The third and last methodological issue we have recognized in the empirical literature is the quite delicate one of *causality* or, putting differently, of endogeneity in addressing the relationship between outsourcing and productivity. Given that the relationship could equally go the other way round, this potential problem has to be taken very seriously, possibly by integrating the studies on

the productivity impact with those on the outsourcing determinants. In his recent study, for example, Tomiura (2005) found that the more productive firms are also those which tend to outsourcing more internationally, and that the same holds true for the firms with more labour-intensive production, computer usage intensity, highly skilled employees, and R&D expenditure per employee, considered as outsourcing determinants.

Unfortunately, the degree at which this potential problem has been actually addressed is not satisfactory, as many of the reviewed studies, even those with a pure cross-sectional nature, does not control for it. The same holds true with respect to the other two issues, of which the present paper tries to provide a more satisfactory kind of modelling.

4 Modelling the productivity impact of outsourcing: a methodological proposal

Apart from some few studies estimating total factor productivity (TFP) and carrying out TFP growth breakdowns and ANOVA analysis, the majority of the studies estimate the impact of outsourcing on productivity by referring to a production function framework (Olsen, 2006, p.9). In particular, sticking to a Cobb-Douglas function, and assuming that outsourcing works through the technology factor of the production function, an equation is estimated such as the following:

$$y_i - l_i = \beta_0 + \beta_1(l_i - k_i) + \beta_2 l_i + \beta_3 OUT_i + \epsilon_i \quad (3)$$

where $l_i = \log L_i$, $k_i = \log K_i$, $y_i = \log Y_i$ (L and K stay for labour and capital inputs, respectively, and Y for the firm's output), OUT_i refers to the measure of outsourcing, β_0 is a constant picking up the remaining production technology factors, and ϵ_i an error term with standard properties.⁴

As we noticed in the previous section, this formulation suffers from some limitations that we try to overcome by referring to a “knowledge-production-function” framework (Griliches, 1979) such as the following:

$$LABPROD_{i,t} = \beta_0 + \beta_1 OUT_{i,t-1} + \beta_2 PRODINPUT_{i,t-1} + \beta_3 CONT_{i,t-1} + \epsilon_{i,t} \quad (4)$$

⁴When the growth rate of labour productivity is estimated, instead, i.e. by first-differencing the base equation above, outsourcing is generally a firm-specific effect.

where $LABPROD_t$ stands for labour productivity at time t , $PRODINPUT_{t-1}$ refers to the firm’s inputs at time $t - 1$ (i.e. physical capital per employee and number of employees), while $CONT_{t-1}$ refers to a suitable array of controls (i is the usual firm subscript).

In other words, Equation 4 defines a reduced form which attempts to provide an explanation of the productivity impact of outsourcing by exploiting a theoretically consistent set of covariates. Furthermore, in order to address the methodological problems identified above, it encapsulates a number of solutions. First of all, let us observe that, as a first attempt to deal with potential endogeneity, a diachronic cross-section econometric model is used, with a temporal lag on the outsourcing measure, OUT . As we will say in Section 7, a rigorous endogeneity test, and an actual integration with previous studies we have carried out on the outsourcing determinants of the same firms of the application, is instead postponed to our future research agenda.

Second, in order to address the firm-specificity problem, the set of the controls, $CONT$, retains simultaneously a wide number of variables which refer to, in addition to such standard structural elements as size, sector and the like, idiosyncratic techno-economic and institutional elements which are shared by firms which are co-located in a specific LPS: the nature of industrial relations and the kind of innovation patterns of the investigated firms are just two notable examples that we are able to capture due to the survey-based nature of our data (see Section 5).

Last, but no least, we try to provide a more accurate measurement of outsourcing, by using, rather than balance-sheet outsourcing proxies, a direct indicator of *general outsourcing intensity*, built up through survey data, such as the following:

$$OUT_i = \sum_{j=1,2,3} OUT_{ij} \times s_j \quad (5)$$

In Equation 5, OUT_{ij} is the *outsourcing intensity* of a certain kind of activities j , that is the number of the same kind of activities j which are actually outsourced by firm i (n_{ij}) out of a certain total of activities j identified with respect to a theoretical value chain (N_j):

$$OUT_{ij} = \frac{n_{ij}}{N_j} \quad (6)$$

s_j is a weight which considers the increasing difficulties for the firm of outsourcing what we will call “ancillary activities” ($j = 1$ and $s_j = 1$), “production

supporting activities” ($j = 2$ and $s_j = 2$), and “production activities” as such ($j = 3$ and $s_j = 3$) (see Section 5).

In brief, our outsourcing measure is a weighted average of the relative number of activities which are outsourced by a certain firm, whose weights increase with the difficulties of outsourcing increasingly more core activities.⁵

In addition to this synthetic indicator, the *outsourcing intensity* of the firm i by activity j , that is Equation 6 will be also used.

Finally, the previous two measures will be contrasted with the results obtained by using standard dummy-like kind of variables controlling for the simple presence of at least one outsourcing operation for each kind of activity j . Far from being pure technical devices in search for superior significance, the intensity and the dummy measures have a substantial different nature. Indeed, while the latter account for the simple choice of resorting to outsourcing or not, being a sort of proxy of the make-or-by decision, the former also controls for the extent at which, according to the production specialization of the firm itself, outsourcing is used. Considering both of them is therefore more than opportune.

5 Outsourcing in the LPS of Reggio Emilia

5.1 The context

The empirical application we carry out in the paper refers to the province of Reggio Emilia (RE). Based in the Italian region of Emilia-Romagna (Figure 1), which the works by Giacomo Becattini (e.g. Becattini, 2001), Sebastiano Brusco (Brusco, 1982) and their scholars have made internationally well-known for its “industrial districts”, RE actually shares the typical features of the LPS of the Italian North-East (Seravalli, 2001).

A recent survey, carried out on a population of 257 firms with at least 50 employees in 2002, reports some interesting insights in this last respect (Pini, 2004).

First of all, although the sample of the respondents is characterized by a high density of firms whose size is ‘medium’, these firms are actually made up of 2 or 3 plants, of which 1 or 2 only are usually located in RE, with an average employment of no more than 145 employees (Pini, 2004, Appendix 1, Tables 11A and 11B of CD data).

Second, a considerable number of the surveyed firms are actually located in ‘industrial districts’, characterized by few but strong production specializations,

⁵For an extended discussion of this measure see Mazzanti, Montresor, and Pini (2007b).



Figure 1: The province of Reggio-Emilia

namely: non-electrical machinery and equipments - machinery for mechanical energy and agriculture in particular - and non metallic mineral products - ceramic tiles in particular. A large-scale kind of specialization is instead represented by other sectors such as clothing and communication equipments.⁶

Third, and most important for the sake of this paper, the analysis of a representative sample of the firm population (described in the following) reveals that RE is characterized by an extensive resort to outsourcing. Nearly 87% of the sample have decentralised some of their activities from 1998 to 2001 (Antonioni and Tortia, 2004, pag. 68), and as many as 52.3% of them to sub-contractors. What is more, many of them has actually externalized their activities abroad, making the LPS and the relative districts enter “global-value-chains” which represent for them an important opportunity of capabilities upgrading and/or costs saving but, at the same time, a serious challenge to their internal system coherence, especially as far as job issues and industrial relations are concerned (Carabelli, Hirsch, and Rabellotti, 2007; Mazzanti, Montresor, and Pini, 2008).⁷

On the other hand, differences in outsourcing decisions emerge among the RE firms by considering the number and the nature of the activities which are externalised. In this last respect, as we said, the survey we are referring to distinguishes as many as 17 activities, which we have grouped into 3 classes according to a functional criterion: (i) “ancillary activities” (e.g. janitorial services), so to say accessory to the production process as such, in turn meant as the transformation of production inputs into output ; (ii) “production supporting activities” (e.g. engineering), not primarily productive, but contributing to the production process more directly than the former ; (iii) “production activities” as such (Table 2).

On the basis of this classification, let us observe that cleaning services, for example, have been decentralized in 85.55% of the cases, while the percentage falls to around 8% for non purely ancillary activities such as human-resource-

⁶For a more detailed analysis of these facts see Mazzanti, Montresor, and Pini (2007b).

⁷As we will say, the dataset of the present application does not distinguish domestic from international outsourcing, so that an accurate quantification of the phenomenon is not yet possible. On the other hand, as we have shown elsewhere (Mazzanti, Montresor, and Pini, 2008), the number of RE actually involved in offshoring strategies is quite remarkable. Out of 192 RE firms interviewed in a more recent survey for 2004, just 18% have made FDI regardless of their export activities, but more than 56% established an agreement with a foreign network in supporting their foreign commercial activities. What is more, anecdotal evidences reveal how international outsourcing has in some cases reached the so called far “emerging powers”: such as the case of Ognibene SPA which, after having opened an establishment in Caxias do Soul (Brazil) in 2006, moved to Pune (India) in 2007, to arrive in Suzhou (China) in 2008 (www.ognibene.com/img-gen/worldita.JPG).

Outsourced activities		Outsourcing firms (% of the total)
Ancillary activities		
1	Inventories management	14.45%
2	Internal logistics	24.86%
3	Distribution logistics	24.28%
4	Cleaning services	85.55%
5	Plants maintenance	77.46%
6	Machinery maintenance	63.01%
7	Data processing	31.79%
Production supporting activities		
8	Marketing	11.56%
9	Engineering	20.81%
10	Research & Development	16.18%
11	Labor consultancy	58.96%
12	Human resource management	8.67%
13	Quality control	8.09%
Production activities		
14	Supply of intermediate products	52.52%
15	Production stages	44.60%
16	Products & Trademarks	14.39%
17	Other production activities	9.35%
		100 = 166 (sample of respondent firms)

Table 2: Reggio Emilia: outsourcing firms of the sample by activity (1998-2001)

management (8.67%) and quality control (8.09%) (Table 2). More in general, a distinction seems to emerge between material, routine-based activities with a low-value added, which are often decentralized, and intangible activities with a higher value-added, which instead are better performed internally.

As it has been shown in other studies of ours, these and other specific patterns of outsourcing are related to the characteristics of the RE firms (Mazzanti, Montresor, and Pini, 2008). In particular, it emerges that the role that unions and industrial relations have in them is quite important (Mazzanti, Montresor, and Pini, 2007b)⁸, as well as that of their innovation patterns (Mazzanti, Mon-

⁸Out of the 199 cases in which it has been possible to detect it, for example, 20.5% of the firms informed the unions of their outsourcing decisions, and in 6% of the cases unions were even consulted (Antonioli and Tortia, 2004).

tesor, and Pini, 2007a). Also and above all in the light of these results, it turns out interesting to investigate whether the estimates of Equation 4 are consistent with the general patterns which have been identified in Section 3.1 in terms of productivity impact. Or whether these LPS features work as counteracting forces. An exercise that we will carry out by using the dataset illustrated in the following section (Section 5.2).

5.2 The dataset

In the paper the LPS of RE is analyzed by combining two different datasets. The first, used to build up our outsourcing indicators and to draw the relevant controls, is based on the results of a wide firm-level survey – to which we have referred in the previous section – carried out in 2002, with respect to the period 1998-2001, on the manufacturing firms located in RE. Out of a population of 257 firms with at least 50 employees in 2001 (Pini, 2004)⁹, a sample of 166 has been extracted which have replied to both of two questionnaires addressed to management and union representatives, respectively, and which had balance-sheets available.¹⁰

The distribution of the sampled firms of the survey by sector and size is characterized by a limited bias when comparing the 166 firms with all the 257 surveyed firms: the textile sector and ‘small-size’ firms (50 to 99 employees) are slightly under-represented. However, a significant distortion in all other sectors and dimensional employees’ classes has been tested and rejected (Cochran, 1977) (Table 6 Appendix).

The second dataset, used to build up our productivity measures, is represented by a collection of coherent balance-sheets data for manufacturing firms located in RE over the period 1994-2005: that is, a period which spans from the time of the previous survey (1998-2001) to the most recent year for which comparable data-sheets are available (2005). Although the number of firms of this second dataset is quite large too – the average number of firms over the period is around 136 – its merger with the previous one determines a substantial collapse of the final working sample. In fact, when the year with the lowest number of surveyed firms with subsequent balance-sheet data available is re-

⁹Several official sources were used to construct the firm population: Reggio Emilia Chamber of Commerce, Istat Census, Aida data bank, Impero data bank, balance sheets data bank of the Reggio Emilia Camera del Lavoro Territoriale.

¹⁰The reply rate for management was of 77,4%, 199 firm out of the 257 of the population. The union delegates interviewed were 181, which represents about the 79% of the firm population with union representatives (228 firms).

tained, the merged dataset reduces to 116 firms. To be sure, for some of the single years of the period, the result of the matching is a higher number, although with a tendency to a reduction as we move far away from the period of data collection through the questionnaire.¹¹ However, in order to homogenize the results to the “same” working sample, and compare them over time, the econometric estimates which follow refer to the minimum sample of 116 firms. Such a sample is of course less representative. However, the Cochran (1977) test excludes significant problems of the working sample as a whole and makes it a reliable sample of analysis, notwithstanding some inevitable distortions for specific sectors or size classes (Table 6 Appendix).

6 How far does outsourcing increase labour productivity in Reggio Emilia?

As we said in Section 3.2, an accurate analysis of the productivity impact of outsourcing should first of all address the delicate issue of endogeneity. To start with, before adopting a standard two-stages approach, in the present paper this will be done by referring to the diachronic nature of Equation 4 and by distinguishing the different results obtained with respect to different time horizons. We will thus run regressions for it using, at first, the average labour productivity of the 116 firms over the period 2002-2005, then the productivity shown by them in 2002 – that is the closest year to the period for which outsourcing has been detected (1998-2001) – and, finally, the firms’ productivity in 2005 – that is the most far year from the same period.

In spite of the absolute closeness of the years, this econometric strategy will also allow us to distinguish, at least in relative terms, short-run from medium-long-run productivity effects, as one of the most important points which emerges from the literature review of the empirical studies (Section 3.1).

As far as the other crucial methodological problem is concerned, that of firm heterogeneity, in order to mitigate it, the regressions will be run by retaining a quite large number of controls, both in the *CONT* vector of Equation 4 and in the form of multiplicative interaction terms with the relevant outsourcing variables (Tables 7 and 8 Appendix). In particular, on the basis of the results of the empirical literature and of the studies we have carried ourselves on the outsourcing determinants of the RE firms, additive structural controls will be

¹¹Taking into consideration the two extremes of the period 2002-2005, for example, the number of interviewed firms with balance sheets in 2002 is 152, while in 2005 it goes down to 123.

progressively extended from quite standard structural ones (Specification 1), through innovation related variables (Mazzanti, Montresor, and Pini, 2007a) (Specification 2), to industrial relations based ones (Mazzanti, Montresor, and Pini, 2007b) (Specification 3). Multiplicative interaction terms will be instead built up in order to capture sector specificities *a la* Pavitt¹² (Specification 4) and, above all, the internationalization degree of the outsourcing firm (Specification 5), here proxied with the firm belonging to an international rather than national business group.¹³

Coming to the main results of the regressions¹⁴, an interesting point should be stressed at the outset. Although quite illustrative in our previous studies on outsourcing determinants (Mazzanti, Montresor, and Pini (2007a,b)), the general outsourcing intensity index of Equation 5, OUT_i , referring to the weighted outsourcing intensity of *all* the firm's activities, does not turn out significant, in any of the suggested specifications.¹⁵ What is more, similar results are obtained by referring to the unweighted average of the outsourcing intensities of the three groups of activities (for scope constraints, the relative results are omitted). This seems to suggest that, while different kinds of activities might have at least some common determinants, this is not true for their productivity effects, which turn out to be different, as the empirical literature actually suggests (Section 3.1).

The productivity analysis of outsourcing thus requires to distinguish what is actually outsourced: manufacturing or services, ancillary or core, low or high value added. As a first step in this direction, let us consider, as independent

¹²The starting point of this classification is the quite well-known Pavitt taxonomy (Pavitt, 1984), where he identifies four types of firms according to a set of characteristics he detected through an extensive analysis carried out on 2000 innovations in Britain: supplier dominated firms, scale-intensive firms, specialized suppliers and science-based firms. On this basis the OECD has recently modified the Pavitt classification introducing five types of firms: scale-intensive firms, specialized suppliers, science-based, labour intensive firms and resource intensive firms. The latter taxonomy is the one which we base part of our analysis on.

¹³We are aware that the simple dummy that captures the belonging to an international group is quite limited in its power of explaining the degree of firm internationalization, but at the same time we believe in its capacity of capturing some sort of international openness of a firm.

¹⁴In all the reported regressions, the heteroskedasticity is addressed using robust standard errors. As we are not interested in elasticities, t ratios only are shown. As a rule of thumb, we have discarded those covariates having a t ratio lower than 0.5 in order to end up with a parsimonious specification through a process going from general to particular. The full set of controls as reported in Tables 7 and 8 of the Appendix is used in the starting specifications. The set of sector dummies is usually fully preserved in the specifications. Only the significant variables in at least one specification are reported.

¹⁵The relative results have been omitted for scope constraints and are available from the authors at request.

variables, simple dummy variables accounting for the presence of at least one externalization in each of the three groups of activities (Table 2), that is: *production* ($OUTPROD_{Dum}$), encompassing what is usually called *material outsourcing* (e.g. intermediate inputs), *production-supporting* ($OUTSUPROD_{Dum}$), mainly referring to high-valued added services (e.g. R&D), and *ancillary* activities ($OUTANCD_{um}$), within which we find low valued-added service outsourcing (e.g. of cleaning and janitorial services). In other words, let us start by disregarding the intensity of outsourcing of each of this kind of activities and estimate the productivity impact of being fully or non-fully vertically integrated with respect to each of them.

6.1 Outsourcing or not outsourcing? “The law of diminishing returns” and service outsourcing

Quite interestingly, when the actual number of outsourced activities per kind is disregarded, the average labour productivity over the 2002-2005 period is only affected by the externalization of service outsourcing: positively, by that of high-value added services ($OUTSUPROD_{Dum}$) and negatively, although non fully significantly, by that of low-value added ones ($OUTANCD_{um}$) (Table 3).

This appears consistent with what Olsen (2006) called the “law of diminishing returns from outsourcing”, according to which the potential gains from outsourcing low value-added activities are exhausting, while a strategy of outsourcing high value-added activities still provides margins of gain.

Insert Table 3 around here

Still on line with other empirical results which do not present the territorial specification of the present one, the interactive terms with the firm’s belonging to an international business group are strongly significant, for all the three kind of activities, and with a positive sign with respect to production ones ($OUTPROD_{Dum}$): although by retaining the approximation of such a dummy, this seems to confirm that those firms which are more open to international trade and investments are also more prone to benefit from the advantages of outsourcing and, possibly, of *offshoring* in particular.

The analysis of the productivity impact of the outsourcing dummies in 2002 and 2005 (Table 3) provides another apparent confirmation of what we know from the investigations of big-companies’ externalization strategies, that is the importance of the time horizon. On the one hand, the gains from outsourcing production supporting activities are not immediate, as it seems to be needed a

workforce re-skilling in order to reap the potential benefits of high value added outsourcing on labor productivity. On the other hand, the negative sign on the productivity of ancillary activities emerges over time too, suggesting that firms that outsource these activities do it in order to cut down production costs, without planning further or contextual high value-added outsourcing activities.

So far, then, those results the empirical literature reports for other no or less context specific empirical applications appear to be confirmed in the LPS of RE. Although quite interesting, however, such a confirmation has been obtained under the implicit assumption that the marginal propensity to outsource is invariant across the three kinds of activity. Were this the case, RE would confirm what we already know on outsourcing and its impacts on firm productivity. On the other hand, this is not realistic as the actual propensity of externalizing each group of activities should be retained as an idiosyncratic feature of the context outsourcing firms are embedded in, an aspect that many empirical studies seem to ignore. A more accurate dependent variable in this last respect can be the outsourcing intensity by kind of activity of Equation 6, whose results are illustrated in the following section.

6.2 How much is actually outsourced? The role of material outsourcing

Re-running the regressions with respect to Equation 6, the picture of the results changes substantially. Starting with the average productivity over the 2002-2005 period (Table 4), the only kind of activity whose outsourcing significantly affects it is represented by production activities as such (*OUTPROD*), in all the first three specifications, that is irrespectively from the covariates utilized, such as innovation indexes (Specification 2) and industrial relations variables (Specification 3). The externalization of inner phases of the production process thus seems to be the only one with a positive impact on the RE firms' performance, while that of service outsourcing, both low (*OUTANC*) and high (*OUTSUPROD*) value-added, apparently vanishes. Quite at odds with the "generic" empirical literature on the topic, this result appears instead consistent with the district nature of this LPS, where firms increase their productivity also by tapping into the superior competences of external, (possibly) geographically closer, manufacturing suppliers. Indeed, the embodied nature of the knowledge of this kind of activities, along with the same district atmosphere of the RE province, both work in mitigating the risk of knowledge leakage which usually hampers its effects.

Insert Table 4 around here

Looking at the two specifications with the interaction terms with respect to the firm internationalization and sector of activity, more specific relationships emerge (Table 4). On the one hand, it seems that the resource-intensive firms that outsource production activities are those which gain more from such a strategy (Specification 4). This appears consistent with our previous interpretation, as this kind of firms, usually “low-knowledge intensive” (Foss and Laursen, 2005), might need to find outside the firm boundaries the competences enabling them to deal with changes in production activities required by the market. On the other hand, and more important, the interaction with the internationalization degree of the outsourcing firm (Specification 5) yields back the general result we got by working with the relative dummies: the outsourcing of high-value added services (that is, our *OUTSUPROD*) positively affects the firm’s productivity, but of international firms only, while the belonging to any kind of national or international group makes significant and negative the productivity impact of the outsourcing of low-value added services (that is, our *OUTANC*). This is another extremely interesting results, which suggests that the “high-road” to the benefits of outsourcing high-level services requires firms to draw on international markets and is thus possibly reserved to multinational corporations through offshoring and global sourcing strategies.

As expected, when the indexes of outsourcing intensity per activity are regressed against the simultaneous productivity of the investigated firms, that is for 2002, no one of them appears significant, apart from production activities (*OUTPROD*), which is just marginally significant when innovation related variables (Table 5, Specification 2) are considered. If we also except the cases of labour intensive and specialized suppliers firms, for which reorganization problems does not seem to be large enough to prevent an immediate productivity impact of production supporting and production activities, respectively (Specification 4), working with outsourcing indexes confirms the general result, in turn confirmed by working with outsourcing dummies, of the need of a temporal delay for outsourcing to affect labour productivity. In general, then, the productivity impact of outsourcing is not a short-run phenomenon, also when the reference is to specific LPS such as that of RE.¹⁶

¹⁶Such a general result is confirmed by an important exception, as the interaction terms involving the dummies national/international group and the outsourcing indexes obtains the same results we got using the average productivity over the period 2002-2005 (Specification 5). This is somehow unexpected, when one considers the larger difficulties that firms working on international markets have in reorganizing in the aftermath of outsourcing. On the other

Insert Table 5 around here

When productivity is considered as far as possible from the occurrence of outsourcing, that is in 2005 (Table 5), the outsourcing intensity of production activities (*OUTPROD*) turns out to be significant in all of the first three specifications. Overall, this suggests that the sign and the level of significance of the impact of *OUTPROD* on the average productivity of the period 2002-2005 are driven by the last years of the period over which the performance variable is computed: and this provides a further evidence of the temporal dimension of the phenomenon we have investigated. The positive and significant sign of this kind of outsourcing is confirmed also by the results of the two other specifications with interactive terms (Specification 4 and 5). Furthermore, these last specifications confirm the sectoral and geographical qualifications which mediate the productivity impact of the outsourcing of the high-value-added services encompassed in the production supporting activities (*OUTSUPROD*): indeed, this occurs only for firms which belong to an international group and mainly for those which are specialized suppliers, an aspect that appears consistent with the nature of the intersectoral flows of the Pavitt taxonomy.

7 Conclusions and future research agenda

As a way to conclude, it seems to us important to establish whether the results we have obtained about the productivity impact of the outsourcing strategies of the RE firms are or not corroborative of what we know from the (scanty) empirical evidence on the issue. Unfortunately, the answer is not unambiguous.

On the one hand, also with respect to the specific LPS under investigation, as with respect to other no or less geographical-specific contexts, the productivity impact of outsourcing is highly dependent on the outsourced activity. What is more, when the actual intensity of the different kinds of outsourcing is neglected, diminishing returns from outsourcing manufacturing activities and low value-added (ancillary) services vs. positive productivity impacts from outsourcing high value-added (production supporting) activities emerge in RE as in many other studies at the national level, from which local specifications are absent. Finally, by assuming an equal propensity to outsource across the different kinds of considered activities, the analysis of RE confirms other two general results, that is: the need of a temporal lag for outsourcing to exert its positive and negative impacts on productivity, and the amplification effects that on productivity

hand, it is also true that the roughness of our proxy might hinder other counteracting factors, such as a superior efficiency imposed by international vs. national markets.

has the outsourcing implemented by firms with a higher internationalization degree.

On the other hand, when the actual extent at which the different kinds of activities are outsourced is retained, as a distinguishing feature of the context in which the outsourcing firms are embedded, the RE picture appears less supportive of the general evidence and rather shows some important exceptions to it. First of all, the analysis of outsourcing intensity seems to make vanish the productivity impact of service outsourcing, both low and high value added, and makes instead emerge the positive one of the externalization of inner phases of the production process. As we said, this is an important exception with respect to the “generic” empirical literature on the topic, but a result which seems to us consistent with the district nature of the investigated LPS. Second, and related, the outsourcing of production supporting activities is not just strengthened, but even conditioned and actually allowed by the internationalization degree of the outsourcing firm. Accordingly, in the investigated LPS context, benefiting from the externalization of high value-added services seems to be a privilege of multinational or transnational firms. Last, but not least, although quite unexpected, for the same kind of international firms, the temporal span which is normally required for outsourcing to impact on productivity seems to become unnecessary.

As we have repeatedly noticed, the results we have just summarized represent a sort of first crop of a research program which aims at refining them in more than one respect. First of all, formal testings of endogeneity will be carried out and, eventually, the results of the present paper will be confronted with those obtained by working out the productivity impact of an estimated outsourcing variable, obtained on the basis of previous works of ours on the outsourcing determinants of RE firms. Second, the delicate issue of firm heterogeneity will be further addressed by enriching the number of controls and, above all, by refining the analysis of the internationalization degree of the firms and of their outsourcing strategies. Last, but not least, the analysis will be progressively extended to the impact of outsourcing on profitability, total factor productivity and to the relative rates of growth. Indeed, these are possibly more intriguing issues to investigate, with respect to which, however, the one we have addressed in the present paper represents at least a useful background.

References

- AGHION, P., AND J. TIROLE (1997): “Formal and real authority in organizations,” *Journal of Political Economy*, 105, 129.
- ANTONIOLI, D., AND E. TORTIA (2004): “Caratteristiche delle imprese e delle rappresentanze,” in *Innovazioni, Relazioni Industriali e Risultati d’Impresa. Un’analisi per il sistema industriale di Reggio Emilia*, ed. by P. Pini, pp. 57–83. Franco Angeli, Milan.
- BARTELSMAN, E., AND M. DOMS (2000): “Understanding productivity: lessons from longitudinal microdata,” *Journal of Economic Literature*, 38, 569–595.
- BECATTINI, G. (2001): *The caterpillar and the butterfly. An Exemplary Case of Development in the Italy of the Industrial Districts*. Le Monnier, Florence (I).
- BENSON, J. (1999): “Outsourcing, organisational performance and employee commitment,” *Economic and Labour Relations Review*, 10(1), 1–21.
- BRUSCO, S. (1982): “The Emilian model: productive decentralization and social integration,” *Cambridge Journal of Economics*, 6(2), 235–261.
- CALABRESE, G., AND F. ERBETTA (2004): “Outsourcing and firm performance: evidence from Italian automotive suppliers,” mimeo, 13th Annual IPSERA Conference.
- CARABELLI, A., G. HIRSCH, AND R. RABELLOTTI (2007): “Italian SMEs and industrial districts on the move: Where are they going?,” in *Small firms, global markets: competitive challenger in the New Economy*, ed. by J. Haar, G. Hirsch, and R. Rabellotti. Palgrave-McMillan, London.
- COCHRAN, W. (1977): *Sampling Techniques*. John Wiley and Sons, New York.
- CRISCUOLO, C., AND M. LEAVER (2005): “Offshore outsourcing and productivity,” mimeo.
- DAVERI, F., M. IOMMI, AND C. JONA-LASINIO (2006): “Quantifying the productivity counterpart of outsourcing in the Italian manufacturing industries,” mimeo.
- EGGER, H., AND P. EGGER (2006): “International outsourcing and the productivity of low-skilled labour in the EU,” *Economic Inquiry*, 44(1), 98–108.

- FALZONI, A. M., AND L. TAJOLI (2008): “Does offshoring affect the domestic labor market?,” mimeo.
- FEENSTRA, R., AND G. H. HANSON (1999): “The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990,” *Quarterly Journal of Economics*, 114(3), 907-940.
- FIXLER, D., AND D. SIEGEL (1999): “Outsourcing and productivity growth in services,” *Structural Change and Economic Dynamics*, 10(2), 177-194.
- FOSS, N., AND K. LAURSEN (2005): “Performance pay, delegation and multitasking under uncertainty and innovativeness: an empirical investigation,” *Journal of Economic Behavior & Organization*, 58, 246-76.
- GORG, H., AND A. HANLEY (2005): “International outsourcing and productivity: evidence from the Irish electronics industry,” *North American Journal of Economics and Finance*, 16(2), 255-269.
- GORG, H., A. HANLEY, AND E. STROBL (2008): “Symposium on firm-Level adjustment to globalization: productivity effects of international outsourcing: evidence from plant-Level data,” *Canadian Journal of Economics*, 41(2), 670-688.
- GORZIG, B., AND A. HANLEY (2003): “International outsourcing and productivity: evidence from plant level data,” Discussion paper, University of Nottingham.
- GORZIG, B., AND A. STEPHAN (2002): “Outsourcing and firm-level performance,” Discussion Paper 309, German Institute for Economic Research.
- GRILICHES, S. (1979): “Issues in assessing the contribution of R&D to productivity growth,” *Bell Journal of Economics*, 10, 92-116.
- GROSSMAN, G. M., AND E. HELPMAN (2002): “Integration versus outsourcing in industry equilibrium,” *The Quarterly Journal of Economics*, 117(1), 85-120.
- (2005): “Outsourcing in a global economy,” *Review of Economic Studies*, 72(1), 135-160.
- GROSSMAN, S., AND O. HART (1986): “The costs and benefits of ownership: a theory of vertical and lateral integration,” *Journal of Political Economy*, 94, 85-120.

- HESHMATI, A. (2003): “Productivity growth, efficiency and outsourcing in manufacturing and service industries,” *Journal of Economic Surveys*, 17(1), 79–112.
- HSIEH, C., J. NICHESON, AND T. ZENGER (2007): “Opportunity discovery, problem solving and a theory of the entrepreneurial firm,” *Journal of Management Studies*, 44, 1255–77.
- JACOBIDES, M. J., AND S. G. WINTER (2005): “The co-evolution of capabilities and transaction costs: Explaining the institutional structure of production,” *Strategic Management Journal*, 26, 395–413.
- JONES, R. W., AND H. KIERZKOWSKI (2001): “A framework for fragmentation,” in *Fragmentation: New Production Patterns in the World Economy*, ed. by S. W. Arndt, and H. Kierzkowski. Oxford University Press, Oxford.
- KIRKEGAARD, J. F. (2005): “Outsourcing Stains on the White Collar?,” Working paper, Institute for International Economics.
- KLEINERT, I. (2003): “Growing trade in intermediate goods: outsourcing, global sourcing, or increasing importance of MNE networks?,” *Review of International Economics*, 11, 464–482.
- KOHLER, W. (2004): “Aspects of international fragmentation,” *Review of International Economics*, 12(5), 793–816.
- LO TURCO, A. (2007): “International outsourcing and productivity in Italian manufacturing sectors,” *Rivista Italiana degli Economisti*, 12(1), 125–145.
- MAHNKE, V. (2001): “The process of vertical dis-integration: an evolutionary perspective on outsourcing,” *Journal of Management and Governance*, 5, 353–379.
- MAZZANTI, M., S. MONTRESOR, AND P. PINI (2007a): “Outsourcing and innovation: evidence for a local production system of Emilia Romagna,” *Innovation: Management, Policy, Practice*, 9, 324–343.
- (2007b): “Outsourcing and transaction costs in “real” time and space: evidence for a province of Emilia-Romagna (Italy),” *The Icfai Journal of Industrial Economics*, IV, 07–23.
- (2008): “Outsourcing, delocalization and firm organization: transaction costs vs. industrial relations in a local production system of Emilia Romagna,” Working paper 16/2008, DEIT, University of Ferrara.

- NAGHAVI, A., AND G. OTTAVIANO (2006): “Offshoring and Product Innovation,” CEPR Discussion Papers 6008.
- OECD (2007): *Offshoring and Employment: Trends and Impacts*. OECD, Paris.
- OLSEN, K. B. (2006): “Productivity impacts of offshoring and outsourcing: a review,” *OECD Science, Technology and Industry Working Papers*, 2006(1).
- PAVITT, K. (1984): “Sectoral patterns of technical change: towards a taxonomy and a theory,” *Research Policy*, (13).
- PINI, P. (ed.) (2004): *Innovazione, Relazioni Industriali e Risultati d’Impresa*. Franco Angeli, Milan.
- SERAVALLI, G. (2001): “Sviluppo economico e mercato del lavoro a Reggio Emilia,” Working paper, CGIL.
- SHARPE, M. (1997): “Outsourcing, organizational competitiveness, and work,” *Journal of Labor Research*, 18(4), 535–549.
- SIEGEL, D., AND Z. GRILICHES (1992): “Purchased Services, Outsourcing, Computers, and Productivity in Manufacturing,” in *Output Measurement in the Service Sectors*, ed. by Z. Griliches, pp. 429–458. University of Chicago Press, Chicago.
- SPENCER, B. J. (2005): “International outsourcing and incomplete contracts,” Working Paper 11418, NBER.
- SUAREZ-VILLA, L. (1988): “The structures of cooperation: downscaling, outsourcing and the networked alliance,” *Small Business Economics*, 10(1), 5–16.
- TAYMAZ, E., AND Y. KILICASLAN (2005): “Determinants of subcontracting and regional development: an empirical study on Turkish textile and engineering Industries,” *Regional Studies*, 39(5), 633–645.
- TEN RAA, T., AND E. N. WOLFF (2001): “Outsourcing of services and the productivity recovery in US manufacturing in the 1980s and 1990s,” *Journal of Productivity Analysis*, 16, 149–165.
- TOMIURA, E. (2005): “Foreign outsourcing, exporting, and FDI: a productivity comparison at the firm level,” Discussion paper, Kobe University, Series No. 168.

- WILLIAMSON, O. E. (1975): *Markets and Hierarchies*. Free Press, New York.
- YOUNG, S., AND J. MACNEIL (2000): “When performance fails to meet expectations: managers’ objectives for outsourcing,” *Economic and Labour Relations Review*, 11(1), 136–168.
- ZANDER, I. (2007): “Do you see what I mean? An entrepreneurship perspective on the nature and boundaries of the firm,” *Journal of Management Studies*, 44, 1141–64.

Dependent	LnVA/ Emp0205	LnVA/ Emp0205	LnVA/ Emp0205	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp05	LnVA/ Emp05	LnVA/ Emp05
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 1	Spec. 2	Spec. 3
Covariates											
Past Balance											
Sheets Variables											
lnPhysCap/Emp9801	3.28***	2.82***	3.24***	4.53***	4.18***	n.s.	2.37**	2.30**	2.37**	2.30**	1.99*
LnEmp9801	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	3.66***	3.58***	3.66***	3.58***	3.53***
Outsourcing											
OUTPROD-Dum	n.s.	n.s.	-	n.s.	n.s.	-	n.s.	2.09**	n.s.	2.09**	-
OUTSUPPROD-Dum	2.00**	2.13**	-	n.s.	n.s.	-	2.00**	1.68*	2.00**	1.68*	-
OUTANC-Dum	n.s.	n.s.	-	n.s.	n.s.	-	-2.26**	-2.47**	-2.26**	-2.47**	-
Controls											
Sector Dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
SKILL	n.s.	n.s.	1.70*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
ENTR	-2.10**	-1.88*	n.s.	n.s.	n.s.	n.s.	-2.25**	-2.32**	n.s.	n.s.	n.s.
GROUP	n.s.	n.s.	-	n.s.	n.s.	-	-	-	-	-	-
Innovation Activities											
TECINNO	n.s.	-2.04**	n.s.	n.s.	-2.67***	n.s.	n.s.	-2.30**	n.s.	-2.30**	n.s.
Interaction Terms											
OUTANC-NAT-dum	-	-	n.s.	-	-	n.s.	-	-	-	-	-2.42**
OUTPROD-INT-dum	-	-	1.70*	-	-	n.s.	-	-	-	-	n.s.
OUTSUPPROD-INT-dum	-	-	2.83***	-	-	1.94*	-	-	-	-	1.94*
OUTANC-INT-dum	-	-	-4.20***	-	-	-1.98*	-	-	-	-	-4.25***
-cons	13.08***	12.08***	14.06***	10.49***	10.70***	12.60***	7.60***	7.68***	7.60***	7.68***	7.81***
N	114	114	114	116	116	116	116	116	116	116	116
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2	0.32	0.34	0.38	0.37	0.40	0.41	0.28	0.30	0.28	0.30	0.29
VIF	3.42	3.09	3.57	2.59	2.52	2.94	2.59	2.46	2.59	2.46	2.96

NB: *t* ratios only are shown with the following notation:

*: significant at 10%; **: significant at 5%; ***: significant at 1%.

- : the variable is not included in the specification; n.s.: not significant but included in the specification;

VIF: Variance Inflation Factor measure of the degree of multicollinearity (threshold for multicollinearity: 10)

Table 3: Regression results: outsourcing dummies per activity, 2002-2005; 2002; 2005

Dependent	LnVA/ Emp0205	LnVA/ Emp0205	LnVA/ Emp0205	LnVA/ Emp0205	LnVA/ Emp0205
	Spec. 1	Spec. 2	Spec. 3	Spec. 4	Spec. 5
Covariates					
Past Balance Sheets Variables					
lnPhysCap/Emp9801	3.14***	2.72***	3.40***	4.3***	2.87***
Outsourcing					
OUTPROD	1.83*	2.26**	1.94*	n.s.	n.s.
Controls					
Sector Dummies	yes	yes	yes	no	yes
ENTR	-2.32**	-2.09**	-2.88***	-1.90*	n.s.
Innovation Activities					
TECINNO	-	-2.31**	-	-1.77*	-1.69*
Industrial Relations					
UNION	n.s.	n.s.	n.s.	n.s.	n.s.
FORMINDREL	n.s.	n.s.	n.s.	n.s.	n.s.
RELMANUNI	n.s.	n.s.	n.s.	n.s.	n.s.
Interaction Terms					
OUTPROD-RI	-	-	-	3.64***	-
OUTSUPROD-INT	-	-	-	-	2.20***
OUTANC-INT	-	-	-	-	-2.08***
-cons	14.36***	13.42***	11.71***	14.11***	13.88***
N	114	114	101	114	114
F	0.00	0.00	0.00	0.00	0.00
R2	0.32	0.35	0.37	0.35	0.34
VIF	3.45	3.08	2.46	1.99	3.22

NB: *t* ratios only are shown with the following notation:

*: significant at 10%; **: significant at 5%; ***: significant at 1%.

- : the variable is not included in the specification; n.s.: not significant but included in the specification;

VIF: Variance Inflation Factor measure of the degree of multicollinearity (threshold for multicollinearity: 10)

Table 4: Regression results: outsourcing intensity per activity, 2002-2005

Dependent	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp02	LnVA/ Emp05	LnVA/ Emp05	LnVA/ Emp05	LnVA/ Emp05	
	Spec. 1	Spec. 2	Spec. 3	Spec. 4	Spec. 5	Spec. 1	Spec. 2	Spec. 3	Spec. 4	Spec. 5	Spec. 1	Spec. 2	Spec. 3	Spec. 4	Spec. 5
Covariates															
Past Balance Sheets Variables															
lnPhyCap/Emp9801	4.31***	3.95***	5.02***	5.27***	3.81***	2.25**	2.16**	1.74*	2.82***	1.97*	2.75***	2.69***	2.29**	3.05***	3.13***
LnEmp9801	n.s.	1.66*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	2.09**	2.33**	2.03**	n.s.	n.s.
Outsourcing															
OUTPROD	n.s.	1.70*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Controls															
Sector Dummies	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
ENTR	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-2.21**	n.s.	n.s.
MAN	n.s.	n.s.	n.s.	-1.78*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
GROUP	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-1.72*	-1.79*	n.s.	-1.80*	n.s.
FIRMAGE	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-1.80*	n.s.	-1.83*	n.s.
Innovation															
TECINNO	-	-2.92***	-	-2.41**	-2.69***	-	-	-	-	-	-	-2.25**	-	-2.11**	n.s.
Industrial relations															
UNION	-	-	-1.91*	-	-	-	-	-	-	-	-	n.s.	-	-	-
Interaction terms															
OUTSUPROD-LI	-	-	-	2.08**	-	-	-	-	-	-	-	-	-	n.s.	-
OUTSUPROD-SS	-	-	-	n.s.	-	-	-	-	-	-	-	-	-	1.84*	-
OUTPROD-RI	-	-	-	n.s.	-	-	-	-	-	-	-	-	-	2.83***	-
OUTPROD-SI	-	-	-	n.s.	-	-	-	-	-	-	-	-	-	2.61**	-
OUTPROD-SS	-	-	-	1.67*	-	-	-	-	-	-	-	-	-	n.s.	-
OUTSUPROD-INT	-	-	-	-	1.74*	-	-	-	-	1.74*	-	-	-	-	2.00**
OUTANC-INT	-	-	-	-	-1.71*	-	-	-	-	-1.71*	-	-	-	-	2.24**
-cons	11.49***	11.89***	10.90***	13.89***	11.25**	7.78***	7.84***	9.17***	9.06***	6.31***	7.78***	7.84***	9.17***	9.06***	6.31***
N	116	116	101	116	116	116	116	102	116	116	116	116	102	116	116
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2	0.37	0.41	0.32	0.35	0.43	0.26	0.29	0.29	0.33	0.25	0.26	0.29	0.29	0.33	0.25
VIF	2.63	2.56	2.16	2.20	2.81	2.62	2.50	2.22	1.52	2.56	2.62	2.50	2.22	1.52	2.56

NB: *t* ratios only are shown with the following notation:

*: significant at 10%; **: significant at 5%; ***: significant at 1%.

- : the variable is not included in the specification; n.s.: not significant but included in the specification;

VIF: Variance Inflation Factor measure of the degree of multicollinearity (threshold for multicollinearity: 10)

Table 5: Regression results: outsourcing intensity per activity, 2002 and 2005

A Appendix

Firm population: 257 firms Istat Ateco91 Sectors (2 digit)	Size (Number of Employees)						Total %
	50-99	100-249	250-499	500-999	> 999	Total	
Food and beverage	2	5	3	2	2	14	0.05
Other industries	2	0	0	0	0	2	0.01
Paper and printing	4	0	3	0	0	7	0.03
Chemicals, fibres, rubber & plastic	8	7	2	0	1	18	0.07
Wood products	0	2	0	0	0	2	0.01
Metal products & equipments, mechanical machinery, office equipments, transport equipments and others	72	41	13	7	9	142	0.55
Non metal minerals	25	17	5	7	2	56	0.22
Textiles & clothing	4	4	7	0	1	16	0.06
Total	117	76	33	16	15	257	1.00
Total %	0.46	0.30	0.13	0.06	0.06	1.00	
Questionnaire respondents: 166 firms							
Istat Ateco91 Sectors (2 digit)	50-99	100-249	250-499	500-999	> 999	Total	Total
Food and beverage	0	3	3	2	2	10	0.06
Other Industries	2	0	0	0	0	2	0.01
Paper and printing	3	0	3	0	0	6	0.04
Chemicals, fibres, rubber & plastic	7	4	2	0	0	13	0.08
Wood products	0	1	0	0	0	1	0.01
Metal products & equipments, mechanical machinery, office equipments, transport equipments and others	43	28	10	5	8	94	0.57
Non metal minerals	11	11	4	6	2	34	0.20
Textiles & clothing	3	1	1	0	1	6	0.04
Total	69	48	23	13	13	166	1.00
Total %	0.42	0.29	0.14	0.08	0.08	1.00	
Final working sample: 116 firms							
Istat Ateco91 Sectors (2 digit)	50-99	100-249	250-499	500-999	> 999	Total	Total
Food and beverage	0	3	0	0	0	3	0.03
Other Industries	0	0	0	0	0	0	0.00
Paper and printing	1	0	1	0	0	2	0.02
Chemicals, fibres, rubber & plastic	5	2	1	0	0	8	0.07
Wood products	0	0	0	0	0	0	0.00
Metal products & equipments, mechanical machinery, office equipments, transport equipments and others	33	24	9	4	7	77	0.66
Non metal minerals	6	7	3	5	1	22	0.19
Textiles & clothing	3	1	0	0	0	4	0.03
Total	48	37	14	9	8	116	1.00
Total %	0.41	0.32	0.12	0.08	0.07	1.00	

Table 6: Reggio Emilia: representativeness of the sample

Variable	Description	Mean	Min	Max
labour productivity				
LnVA/Emp0205	Mean of the log ratio between value added and employees over 2002-2005	3.921957	3.1422	5.061713
LnVA/Emp02	Log ratio between value added and employees in 2002	3.942544	3.1235	5.374915
LnVA/Emp05	Log ratio between value added and employees in 2005	3.91696	2.3788	5.201183
Past Balance Sheets Variable				
LnPhysCap/Emp-year	Log ratio between physical capital and employees	-	-	-
LnEmp-year	Log of the employment	-	-	-
Outsourcing				
OUT	General outsourcing intensity	2875556	0	0.882
OUTPROD-Dum	Dummy for outsourcing at least one production (PROD) activity	-	0	1
OUTSUPPROD-Dum	Dummy for outsourcing at least one production-supporting (SUPPROD) activity	-	0	1
OUTANC-Dum	Dummy for outsourcing at least one ancillary (ANC) activity	-	0	1
OUTPROD	PROD outsourcing intensity	0.232906	0	0.75
OUTSUPPROD	SUPPROD outsourcing intensity	0.18241	0	1
OUTANC	ANC outsourcing intensity	0.409111	0	1
OUTPROD-SI;-LI;-RI;-SS	OUTPPROD multiplied by Pavitt sector dummies	-	-	-
OUTSUPPROD-SI;-LI;-RI;-SS	OUTSUPPROD multiplied by Pavitt sector dummies	-	-	-
OUTANC-SI;-LI;-RI;-SS	OUTANC multiplied by Pavitt sector dummies	-	-	-
OUTPROD-NAT(-dum)	OUTPPROD multiplied by the national group dummy	0.044872	0	0.75
OUTSUPPROD-NAT(-dum)	OUTSUPPROD multiplied by the national group dummy	0.047026	0	1
OUTANC-NAT(-dum)	OUTANC multiplied by the national group dummy	0.079385	0	1
OUTPROD-INT(-dum)	OUTPPROD multiplied by the international group dummy	0.014957	0	0.5
OUTSUPPROD-INT(-dum)	OUTSUPPROD multiplied by the international group dummy	0.007128	0	0.333
OUTANC-INT(-dum)	OUTANC multiplied by the international group dummy	0.029316	0	0.857
	dum if the outsourcing dummy is used			

Table 7: Descriptives and variable construction - Part I

Variable	Description	Mean	Min	Max
Controls				
Sector dummies	Based on a two-digit classification from ISAT ATECO91	-	0	1
GROUP	Dummy for belonging to a business group	0.293103	0	1
SKILL	Skill ratio between qualified employees and total employees	37.3719	0	77.07
FIRIMAGE	Log of (2002 - set-up year of the firm)	3.400672	1.609	4.949
MAN	Dummy for firm managed by managers	0.205128	0	1
ENTR	Dummy for firm managed by owner	0.42735	0	1
GEODIV	Geographical diversification for the revenues 'location' : regional, national, EU and international markets	0.478879	0	0.95
LI,RI,SI,SS	Sector Pavitt dummies: Labour Intensive (LI), Resource Intensive (RI), Scale Intensive (SI) and Specialized Suppliers (SS)	-	0	1
Innovation				
TECINNO	Synthetic index of technological innovation	0.640836	0	1
ORGINNO	Synthetic index of new organizational practices	0.498276	0	1
FLEXINNO	Synthetic index of flexibility indicators	0.302172	0.061	0.462
TRAIN	Synthetic index of training activities	0.61431	0	0.9
Industrial Relations				
FORMINDREL	Synthetic index of formal industrial relations	0.576154	0.04	0.96
RELMANUNI	Index of relations between management and union representatives	0.310169	0	0.787879
UNION	Union density	0.377586	0	0.74

Table 8: Descriptives and variable construction - Part II