

Topics

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Estimating Sourcing Premia Using Italian Regional Data

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Abstract: This paper explores the link between sourcing and performance for a representative sample of manufacturing firms located in Lombardy, which is the leading region of the Italian economy. The survey estimation methods that we applied to our original database reveal certain performance premia for firms that engage in foreign rather than domestic sourcing and in- rather than outsourcing. This result is robust to different specifications, samples, performance measures, and definitions of sourcing strategies.

Keywords: sourcing, premia, regional data, manufacturing industry, Italy

JEL Classification: D23, F23, L23

1 Introduction

The present paper aims to estimate *sourcing premia* using Italian regional data.

Our interest in this topic is motivated by two main facts. First, firms that are committed to global markets make crucial decisions about *sourcing*, i.e., they choose the tasks that should be performed intra- or extra-firm in the domestic or foreign markets. Second, firms that are involved in international business exhibit certain internationalization *premia*, i.e., they are larger, more productive, or more capital intensive than purely domestic firms are.

Estimating sourcing premia means detecting any systematic performance difference among firms that are characterized by different sourcing behavior.¹

¹ Throughout the paper, we use the terms “sourcing strategies”, “sourcing behavior”, and “organizational modes” as synonymous.

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We believe that this is an interesting research question that has been only partially addressed in previous papers. Indeed, there is literature on *global sourcing under contractual incompleteness* that provides a basic taxonomy of sourcing strategies (for a survey, see: Spencer 2005; Gattai 2006; Antras and Rossi-Hansberg 2009; Antras 2014) and literature on *internationalization and performance* that investigates internationalization premia (for a survey, see: Lopez 2005; Wagner 2007, 2012; Greenaway and Kneller 2007; Singh 2010; Hayakawa, Kimura, and Machikita 2012). However, from our point of view, these strands do not convincingly address sourcing premia because they are concerned with either defining sourcing strategies or estimating trade premia.

To fill this gap, we integrate the two strands mentioned above, deriving the basic taxonomy of sourcing strategies from the former and the entire array of performance measures from the latter.

In the end, we pursue an open search for sourcing premia by using original survey data on a representative sample of manufacturing enterprises located in Lombardy, which is the leading region of the Italian economy. Lombardy accounts for 28% of Italy's total exports and 31% of imports; it involves 49% of inward and 35% of outward FDI, and it contributes to 21% of value added, 21% of GDP, and 29% of patent applications (ASR 2013). Moreover, the region exhibits a mature and highly heterogeneous industrial system, which makes it a suitable locus for investigating sourcing premia in a context of heterogeneity (Garofoli 1983; Corò and Grandinetti 1999; Garofoli 2002; Cusmano and Malerba 2005).

Our empirical analysis unveils certain performance differences among firms that make different sourcing decisions. Survey estimation methods reveal that foreign rather than domestic sourcing and in- rather than outsourcing² entail significant sales, value added, capital, productivity, profit, and skill intensity premia for Lombardy's enterprises, and this result is robust to different specifications, samples, performance measures, and definitions of sourcing strategies.

We believe our approach entails a few novelties compared with the existing literature. They concern the research question, data, and methodology. For the first issue, our attempt at integrating the two strands allows us to broaden the scope for research. Instead of studying the correlation between productivity and sourcing, as in the *global sourcing under contractual incompleteness* literature, or the correlation between performance and internationalization, as in the *internationalization and performance* literature, we analyze the link between sourcing

² For a definition of sourcing strategies, see Section 2.

and performance and thus provide a wider framework³ that encompasses previous empirical models. For the second issue, there is something unique to our data. On the one hand, they cover a different sample of firms for which it is interesting to replicate previous empirical exercises. On the other hand, and more importantly, we have information regarding firms' organizational choices for every task performed in the production process. This leads to our main contribution, which is on methodological grounds. Notably, we introduce an unprecedentedly rich taxonomy of sourcing strategies that distinguishes between mutually inclusive versus mutually exclusive and conservative versus liberal definitions. This results in a deeper characterization of firms' sourcing behaviors and eventually challenges previous findings by Kohler and Smolka (2011, 2012), and Federico (2010) based on a more elementary taxonomy.

For all of these reasons, we believe the present paper should be regarded as highly complementary to the previous ones on related topics.

The rest of the paper is organized as follows. Section 2 conducts a brief literature review and explains how this contribution concretely fits into the existing literature; Section 3 provides the data description; Section 4 defines sourcing strategies and comments on their descriptive statistics; Section 5 is completely devoted to the econometric analysis; and Section 6 concludes and sets forth future lines of research.

2 Literature Review

In this section, we briefly review the two strands of the literature that inspired the present research.

2.1 Global Sourcing under Contractual Incompleteness

For the sake of simplicity, consider a very stylized framework in which a firm is willing to produce a final good; the final-good production requires two tasks – input manufacturing and final-good processing – and the enterprise itself is responsible for processing. Under these assumptions, the firm can either manufacture components within its boundaries or purchase them from an independent

³ This is because sourcing covers instances of both domestic and foreign operations, and so it is broader than internationalization; at the same time, performance includes but is not restricted to productivity.

supplier; moreover, inputs can be made or bought in either the home or the host country. Depending on whether the input supplier is a domestic or a foreign enterprise and whether it belongs to the firm or it does not, four sourcing strategies may emerge, namely, domestic integration (DI), domestic outsourcing (DO), foreign integration (FI), and foreign outsourcing (FO)⁴ (Antras and Helpman 2004).

From a theoretical point of view, one candidate explanation of global sourcing stems from the wish to mitigate hold-up concerns in a context of contractual incompleteness.

The original intuitions of Grout (1984), Grossman and Hart (1986), and Hart and Moore (1990) are extended to the international context in McLaren (2000), Grossman and Helpman (2002, 2003, 2005), Antras (2003), Ottaviano and Turrini (2007), and Antras and Helpman (2004, 2008).

The framework maintained across these models is that a firm located in the north is the final-good producer and that final-good production requires relationship-specific investments to manufacture components. The difference is, instead, in the number of sourcing strategies that are analyzed. In particular, McLaren (2000), and Grossman and Helpman (2002) focus on DI as opposed to DO; Grossman and Helpman (2005) on DO rather than FO; and Grossman and Helpman (2003), Antras (2003), and Ottaviano and Turrini (2007) on FI rather than FO. Antras and Helpman (2004, 2008)⁵ are the only contributions that offer the full characterization of all sourcing modes in a unitary framework.

Despite the subset of strategies that are considered in the different papers, a common message emerges from this theoretical literature. In choosing between in- and outsourcing, firms trade off the benefits of ownership under the former with the benefits of better incentives for the manufacturer under the latter. In choosing between domestic and foreign sourcing, final-good producers trade off the benefits of lower variable costs in the south with the benefits of lower fixed

⁴ Throughout the paper, we label the trade-off between in- and outsourcing as a firm's "ownership decision" or "make-or-buy decision". In our terminology, in-sourcing (outsourcing) covers the instances of DI (DO) and FI (FO) in which input manufacturing occurs intra (extra)-firm. At the same time, we denote the trade-off between domestic and foreign sourcing as a firm's "location decision". In particular, domestic (foreign) sourcing applies to the cases of DI (FI) and DO (FO) in which input manufacturing occurs in the domestic (foreign) market. For the sake of clarity, note that FI can be referred to also as FDI and FO as international outsourcing or offshoring (Amiti and Wei 2006).

⁵ The difference between Antras and Helpman (2004) and Antras and Helpman (2008) is in the assumptions about contractual incompleteness. Indeed, the 2008 paper allows the degree of contractibility to vary across inputs and countries, which means that contractual incompleteness is treated as a continuous rather than a binary variable.

organizational costs in the north. By combining these effects, one obtains a clear understanding of the main factors that affect firm sourcing behavior.

An additional interesting question regards which firms are more likely to choose a specific sourcing strategy rather than the others. Clearly, this issue can be addressed only in a heterogeneous firm framework, as in Antras and Helpman (2004, 2008). Building on Melitz (2003), those authors assume that upon paying fixed entry costs, final-good producers draw a productivity level from a known distribution; after observing that level, each of them decides whether to exit the market or to start producing. In the end, the two papers demonstrate that in low-tech sectors, integration never occurs: Lower-productivity players choose DO, and higher-productivity players select FO. On the contrary, in high-tech sectors, all sourcing strategies may be undertaken: Lower-productivity firms buy inputs in the domestic market, and higher productivity firms buy inputs in the foreign market; among firms that source in the same country, the more productive ones vertically integrate, and the less productive outsource. These results provide unambiguous predictions about firm sorting into different sourcing modes. Put another way, firms are expected to self-select into one of the four mutually exclusive alternatives – DO, DI, FO, and FI – depending on their productivity levels.

In the last few years, a burgeoning empirical literature has grown rapidly that brings the intuition of Antras and Helpman (2004, 2008) to the data. The availability of large longitudinal datasets at the micro-level has recently helped obtain interesting findings about productivity and sourcing behavior and have offered a preliminary test of certain theoretical results and adding to previous industry-level evidence (Antras 2003; Nunn and Trefler 2008; Yeaple 2006; Federico 2012; Bernard et al. 2010).

Empirical papers of this sort differ in terms of their sourcing modes and geographical coverage. For the former issue, the majority of studies consider only a subset of strategies depending on the data availability. For instance, Tomiura (2005, 2009) and Ito, Tomiura, and Wakasugi (2011) focus on FO as opposed to DO, and Tomiura (2007a), Defever and Toubal (2013), and Corcos et al. (2013) study FO instead of FI, whereas Tomiura (2007b), Federico (2010), and Kohler and Smolka (2011, 2012) are the only papers to consider all strategies in the same econometric model, capturing the original spirit of Antras and Helpman (2004, 2008). For the geographical coverage, the existing studies provide evidence only for Japan (Tomiura 2005, 2007a, 2007b, 2009; Ito, Tomiura and Wakasugi 2011), France (Defever and Toubal 2013; Corcos et al. 2013), Italy (Federico 2010), and Spain (Kohler and Smolka 2011, 2012).

Despite these differences, important regularities also emerge throughout the empirical literature. First, heterogeneity is measured quite consistently in terms

of labor and total factor productivity; second, the results are quite similar: Firms that source abroad are, on average, better than firms that source domestically; moreover, vertically integrated enterprises are, on average, better than outsourcers. By and large, these findings are consistent with the theoretical framework of Antras and Helpman (2004, 2008) in that the most productive firms choose FI and the least productive opt for DO. However, no definite ranking emerges that encompasses all sourcing strategies because firms with intermediate levels of productivity self-select into either DI or FO (see, for instance, Federico 2010; Kohler and Smolka 2011). Hence, the theoretical sorting of firms into sourcing modes is preserved only at the extremes.

How does our contribution fit into the literature on *global sourcing under contractual incompleteness*? Estimating sourcing premia, in the global sourcing jargon, means analyzing the matching between heterogeneous enterprises and organizational modes. Our contribution then lays in the measure of heterogeneity, which is not restricted to productivity, and the characterization of organizational modes, which includes all sourcing strategies dissected by production tasks. Addressing the whole set of organizational modes, heterogeneity dimensions and definitions of sourcing strategies, we develop a wide research framework that encompasses previous results as a special case.

2.2 Internationalization and Performance

Starting from the seminal contribution of Bernard and Jensen (1995), a large number of scholars have investigated the relationship between internationalization and performance at the micro-level.

They document that globally engaged enterprises tend to be a minority compared with purely domestic players, but they perform better on a number of economic variables, including sales, wage, value added, and productivity.

Those authors also suggest two alternative but not mutually exclusive explanations for why firms that are involved in international business are better than domestic enterprises. Under the so-called *self-selection* argument, there are *ex-ante* performance differences between firms that will become international and firms that will keep serving the domestic market. The intuition is that operating abroad involves additional costs related to transportation, marketing, human capital and production that provide a natural entry barrier to less successful firms.

Under the so-called *learning-by-internationalization* argument, *ex post* performance differences emerge, instead, as a result of firm exposure to international markets. This is because in interacting with foreign competitors and customers, firms derive information about reducing costs and quality rising

processes; moreover, to keep pace with their rivals, they are strongly encouraged to innovate, increase their scales, and become more efficient.

Since the publication of the research of Bernard and Jensen (1995), a rapidly growing body of empirical literature has comprehensively investigated these issues, identifying typical internationalization premia, defined as the average percentage differences in performance between international and domestic players.

In the following, we focus more specifically on the papers that address the internationalization and performance of Italian enterprises to allow for comparing the results in Sections 4 and 5, in which we present original evidence from the same country.⁶ For expositional convenience, we review the related literature according to the following issues. First, we portray the global involvement of Italian firms considering the relative prevalence of different internationalization strategies; second, we discuss the main internationalization premia as highlighted in the existing studies.

With regard to the first issue, evidence provides unambiguous results. Italian firms are active in a number of internationalization strategies, which range from importing to exporting, from FDI to international outsourcing, and from international partnerships to subcontracting. If one considers these strategies together, global firms prove to be the majority compared with purely domestic players (Basile, Giunta, and Nugent 2003; Benfratello and Razzolini 2009; Castellani and Zanfei 2007). If one instead considers one strategy at a time, different patterns emerge. In particular, exporters and importers tend to be quite numerous, representing more than 50% of the entire population (see, among others, Crinò and Epifani 2012; ISGEP 2008; Razzolini and Vannoni 2011; Serti and Tomasi 2008b, 2012; Serti, Tomasi, and Zanfei 2010). On the contrary, firms that engage in FDI represent a minority, accounting for less than 10% of the overall sample (Barba Navaretti et al. 2011; Casaburi, Gattai, and Minerva 2007; Castellani and Giovannetti 2010; Giovannetti, Ricciuti, and Vilucchi 2009), and the same is the case for international outsourcing (Barba Navaretti et al. 2011; Casaburi, Gattai, and Minerva 2007).

With regard to the second issue, the majority of the literature emphasizes the existence of some internationalization premia related to the foreign exposure of Italian enterprises.⁷ Notably, each category of foreign involvement entails certain performance advantages compared with the purely domestic operations

⁶ For a survey on internationalization and performance of Italian enterprises, see Gattai 2015.

⁷ A few exceptions are due to Razzolini and Vannoni (2011), Bugamelli and Infante (2003), Bugamelli, Cipollone, and Infante (2000), and Crinò and Epifani (2012), who document certain internationalization discounts.

(see, among others, Basile 2001; Bratti and Felice 2012; Castellani 2007; Mayer and Ottaviano 2007). Furthermore, a systematic performance ranking emerges for players characterized by different degrees of internationalization or that pursue more than a single strategy, with FDI makers at the top and exporters at the bottom (see, for instance, Benfratello and Razzolini 2009; Casaburi, Gattai, and Minerva 2007; Castellani and Zanfei 2007; Serti and Tomasi 2008b, 2012; Castellani, Serti, and Tomasi 2010; Mayer and Ottaviano 2007; Castellani and Giovannetti 2010). Finally, there is evidence in favor of both self-selection and learning-by-internationalization (see, for instance, Basile 2001; Bratti and Felice 2012; Castellani and Giovannetti 2010; Ferragina and Quintieri 2001; ISGEP 2008; Serti and Tomasi 2008a, 2012).

How does our contribution fit into the literature on *internationalization and performance*? Estimating sourcing premia in the *internationalization and performance* jargon can be rephrased as searching for systematic performance differences between firms that choose foreign sourcing, our “international” players, and firms that choose domestic sourcing, our “domestic” players. Because domestic and foreign sourcing can be further dissected by firms’ ownership decisions, we end up with a wider framework in which different types of domestic and international enterprises can be considered at the same time. Therefore, we expect to obtain more general results to be compared with the FDI and international outsourcing premia that were detected before.

3 Data

The present study draws on an original survey that we conducted between 2010 and 2011 of a representative sample of manufacturing firms located in Lombardy.

Our target sample of 300 firms is drawn from the national firm Census (ISTAT 2001) and stratified according to geographical location, manufacturing activity, and firm size. Geographical location stratification is based on four macro areas that group neighboring provinces according to their productive specialization; they are designated as follows: northwest (including Como, Lecco, and Varese), northeast (including Bergamo, Brescia, and Sondrio), southwest (including Lodi, Milano, Monza Brianza, and Pavia), and southeast (including Cremona and Mantova). The manufacturing activity stratification follows the taxonomy of Bell and Pavitt (1993), which groups industries into four macro categories according to the source of technology and technical change; they are designated as supplier-dominated, specialized-supplier-dominated, science-based and scale-intensive.

Firm size stratification reflects the number of employees, and it is based on three main cells: firms with fewer than 50 employees, firms with 50–249 employees, and firms with more than 249 employees.

The number of firms in each stratum of the target sample was obtained to ensure proportionality to the total number of firms in the same stratum of the population.

All firms were contacted by phone, and a multiple-choice questionnaire was submitted by email (70%) or fax (30%) to senior managers and CEOs.

The questionnaire consists of two sections: First, we ask about the background information of the local firms, including balance sheet details and intangible assets for the period 2005–2009; second, we investigate their sourcing behavior and international experience in 2007. This approach to the data collection reflects our attempt to exclude any effects of the financial crises on sourcing behavior and international experience, as self-reported by firms, while benefiting from a longer time span for the performance variables.

With a response rate of 76%, this study provides a detailed outline of 228 enterprises.

As displayed in Table 1, our sample is highly representative of the entire population.

Table 1: Sample versus population of Lombardy enterprises, by geographical location, manufacturing activity, and firm size.

	Sample		Population	
	No. firms	%	No. firms	%
Geographical location				
Northwest	61	26.75	17,400	20.54
Northeast	69	30.26	24,695	29.15
Southwest	83	36.40	36,064	42.57
Southeast	15	6.58	6,553	7.74
Manufacturing activity				
Supplier-dominated	74	32.46	26,607	31.41
Specialized-supplier-dominated	37	16.23	16,006	18.89
Science-based	11	4.82	4,664	5.51
Scale-intensive	106	46.49	37,435	44.19
Firm size				
<50	217	94.90	81,667	96.41
50–249	9	4.14	2,667	3.15
>249	2	0.96	378	0.45
Tot. manufacturing	228	100.00	84,712	100.00

Concerning the geographical location, the majority of firms are from the southwest of the region (36.4%), followed by the northeast (30.26%), the northwest (26.75%), and the southeast (6.58%). This suggests that the manufacturing core of Lombardy is centered in Lodi, Milano, Monza Brianza, and Pavia, whereas Cremona and Mantova account for a limited share of the local business.

For the manufacturing activity, scale-intensive operations prove to be the main economic activity, involving 46.49% of the sampled firms. They are followed closely by the supplier-dominated (32.46%) industry, and the specialized-supplier-dominated (16.23%) and science-based (4.82%) industries represent the smallest segments. These data confirm that the industrial texture of the region is highly diversified, with multiple specializations leading to a balanced mixture of traditional and high-tech activities.

Finally, with respect to firm size, our sample is characterized by the sharp prevalence of small enterprises (94.9%) with fewer than 50 employees. On the contrary, medium and large firms account for a limited 4.14% and 0.96% of the total, respectively. Given the well-documented relevance of Lombardy for the Italian economy (ASR 2013), this suggests that a mass of small and medium enterprises, rather than a handful of huge conglomerates, is responsible for remarkable shares of the national value added, GDP, export, import, and FDI.

4 Definition of Sourcing Strategies and Descriptive Statistics

In this section, we provide a detailed definition of sourcing strategies and comment on the descriptive statistics to portray Lombardy firms' global sourcing.

4.1 Definition of Sourcing Strategies

Defining sourcing strategies correctly is crucial to the present study. The main challenge of our survey is to obtain all of the relevant information to translate the theoretical definition into a convenient empirical proxy.

According to the theory, firms are uniquely mapped into four mutually exclusive sourcing strategies depending on their ownership and location responses to input procurement concerns. As mentioned in Section 2, this is the result of two simplifying assumptions: First, the production process involves only two tasks; and second, ownership and location decisions apply only to one task.

In designing the questionnaire, we relaxed these assumptions in a way that provided a richer taxonomy of sourcing strategies while preserving the stylized theoretical framework as a special case. More precisely, we disaggregate the production process into four tasks, rather than two: input manufacturing, final-good processing, research & development (R&D), and other services (e.g., informative, logistics). Moreover, we allow firms to engage in the ownership and location decisions for every task performed in their production process, not solely for input manufacturing. In this way, we are able to collect very detailed information on which tasks are performed within the boundaries of the firm, a foreign affiliate, an independent Italian firm, and an independent foreign firm. Unlike the stylized theoretical framework delineated in Section 2, these are not intended as mutually exclusive categories, which means that the same task may be performed both intra- and extra-firm and both domestically and abroad.

Drawing on our survey data, we give four definitions of DO, DI, FO, and FI.

First, we distinguish between the so-called conservative and liberal definitions of sourcing strategies (Table 2). Consistent with the theory, the former focuses only on input manufacturing, whereas the latter considers all

Table 2: Conservative versus liberal definitions of sourcing strategies.

Sourcing strategy	Conservative definition	Liberal definition
Firms are said to engage in:		
DO	When they perform a positive fraction of <i>input manufacturing</i> within the boundaries of an independent Italian firm.	When they perform a positive fraction of <i>input manufacturing or R&D or other services</i> within the boundaries of an independent Italian firm.
DI	When they perform a positive fraction of <i>input manufacturing</i> within their boundaries.	When they perform a positive fraction of <i>input manufacturing or R&D or other services</i> within their boundaries.
FO	When they perform a positive fraction of <i>input manufacturing</i> within the boundaries of an independent foreign firm.	When they perform a positive fraction of <i>input manufacturing or R&D or other services</i> within the boundaries of an independent foreign firm.
FI	When they perform a positive fraction of <i>input manufacturing</i> within the boundaries of a foreign affiliate.	When they perform a positive fraction of <i>input manufacturing or R&D or other services</i> within the boundaries of a foreign affiliate.

production tasks except for final-good processing.⁸ The main advantage of the conservative definition is that the results are likely to be neat and not difficult to confront with the theoretical priors; however, the definition exploits only part of the information that was collected from the survey interviews, thus offering a somewhat standard treatment of sourcing strategies. The liberal definition creates, instead, a more general overview of firms' organizational solutions. Taking advantage of the rich dataset might disclose new facts about global sourcing; however, evaluating its results according to the theory is not clear.

Second, we distinguish between the so-called mutually inclusive and mutually exclusive definitions of sourcing strategies (Table 3). In the former case, we assign to each firm any sourcing strategy that results from the interviews, whereas in the latter case, we assign each firm only one sourcing strategy. Following Kohler and Smolka (2011), when a firm is active in two or more sourcing modes simultaneously, it is assigned the least prevalent category in the overall sample, according to the ranking of the most frequent choice, that

Table 3: Mutually inclusive versus mutually exclusive definitions of sourcing strategies.

Sourcing strategy	Mutually inclusive definition	Mutually exclusive definition
Firms are said to engage in:		
DO	When they perform any of the following combinations of sourcing strategies: <i>DO, DIDO, DOFI, DOFO, DIDOFI, DIDOFO, DOFIFO, DIDOFIFO</i>	When they perform any of the following combinations of sourcing strategies: <i>DO, DIDO</i>
DI	When they perform any of the following combinations of sourcing strategies: <i>DI, DIDO, DIFI, DIFO, DIDOFI, DIDOFO, DIFIFO, DIDOFIFO</i>	When they perform any of the following combinations of sourcing strategies: <i>DI</i>
FO	When they perform any of the following combinations of sourcing strategies: <i>FO, DIFO, DOFO, FIF, DIDOFO, DIFIFO, DOFIFO, DIDOFIFO</i>	When they perform any of the following combinations of sourcing strategies: <i>FO, DIFO, DOFO, DIDOFO</i>
FI	When they perform any of the following combinations of sourcing strategies: <i>FI, DIFI, DOFI, FIF, DIDOFI, DIFIFO, DOFIFO, DIDOFIFO</i>	When they perform any of the following combinations of sourcing strategies: <i>FI, FIF, DIFI, DOFI, DIDOFI, DIFIFO, DOFIFO, DIDOFIFO</i>

⁸ The rationale behind the liberal definition is to extend the notion of intermediate goods to include strategic assets such as R&D and other services and add them to more traditional inputs.

is, DI-DO-FO-FI.⁹ The main advantage of the mutually inclusive definition is that it preserves all information from the data; however, the results might be difficult to interpret in light of the theoretical models. The mutually exclusive definition is, in contrast, more arbitrary in that we make a choice, out of a set, regarding the strategy that should be assigned to each firm; however, the results are likely to be clear and not difficult to confront with the theoretical predictions.

In light of the above discussion, because each definition entails certain pros compared with the others, we prefer retaining all of them for empirical purposes. This eventually enables us to make comparisons and reach a better understanding of global sourcing.

4.2 Descriptive Statistics

Table 4 disaggregates the sampled firms into all possible combinations of DO, DI, FO, and FI – in italics – to provide a first observation of the data.

Table 4: Sampled firms' sourcing strategies, conservative versus liberal definitions.

Sourcing strategy	Conservative definition	Liberal definition
<i>DI</i>	69	78
<i>DO</i>	8	1
<i>FI</i>	1	1
<i>FO</i>	1	0
<i>DIDO</i>	72	98
<i>DIFI</i>	1	3
<i>DIFO</i>	5	2
<i>DOFI</i>	0	0
<i>DOFO</i>	3	0
<i>FIFO</i>	0	0
<i>DIDOFI</i>	3	7
<i>DIDOFO</i>	8	19
<i>DIFIFO</i>	0	0
<i>DOFIFO</i>	0	0
<i>DIDOFIFO</i>	1	6
Total number of sourcing firms	172	215
Average number of sourcing strategies	1.62	1.8
No sourcing firms	56	13
Total number of firms in the sample	228	228

⁹ See the following subsection on this point. Please note that combinations of sourcing strategies appear in italics. They should not be confused with sourcing strategies, as defined according to the conservative versus liberal and mutually inclusive versus mutually exclusive perspectives.

According to the conservative (liberal) definition, no-sourcing firms (NS)¹⁰ represent only 25% (11%) of the overall sample, whereas sourcing firms are the majority.

If we observe the pure strategies,¹¹ *DI* is the most frequent choice, followed by *DO*, *FO*, and *FI*. Notice also that *FO* and *FI* are quite marginal in our data, accounting for a negligible number of observations. This result is strongly consistent with the Japanese firms portrayed by Tomiura (2007b), for which the same ranking emerges; on the contrary, Kohler and Smolka (2011, 2012) report that Spanish enterprises are primarily active in *DO*, followed by *FO*, *DI*, and *FI*, and the same is true for the sample of Italian firms that were analyzed in Federico (2010). If we instead observe the mixed strategies, the most frequent combination is *DIDO*. Interestingly, *DI* occurs quite often both alone and together with *DO*, *FO*, and *FI*, whereas the other strategies tend to be chosen only as part of a mixed design.

For the ownership and location decisions that underlie firm sourcing behavior, Table 4 reveals that in choosing between home and foreign, Lombard respondents tend to prefer home, and in choosing between make and buy, they tend to select make, consistent with the theoretical case of Antras and Helpman (2004, 2008).

Interestingly, our sampled firms' sourcing strategies appear to be complementary rather than substitutes for each other. This becomes evident after observing the average number of modes per firm, which is 1.62 below the conservative definition and 1.8 below the liberal definition. These results are aligned with the previous evidence reported by Kohler and Smolka (2011, 2012) and indicate the benefit of maintaining both mutually inclusive and mutually exclusive proxies for empirical purposes.

For the sake of completeness, Figures 1 and 2 extract mutually inclusive and mutually exclusive sourcing strategies from the data reported in Table 4; this may help the reader focus on a few facts.

First, mutually inclusive and mutually exclusive definitions produce only a partially overlapping ranking of the most preferred sourcing strategies, that is, *DI-DO-FO-FI* in the former case and *DO-DI-FO-FI* in the latter case. Second, these rankings are robust to the conservative versus liberal perspective.

10 According to the conservative definition, firms are said to be no-sourcing when they do not perform input manufacturing; according to the liberal definition, firms are said to be no-sourcing when they do not perform input manufacturing, R&D, and other services.

11 In this context, we define *DO*, *DI*, *FO*, and *FI* as "pure" strategies, which means that they occur alone, whereas a "mixed" strategy denotes a combination that involves some of them. These labels are used only for expositional convenience and should not be confused with the game theory labels.

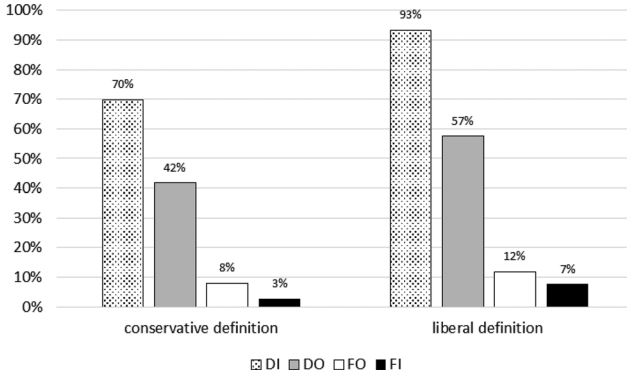


Figure 1: Sampled firms’ mutually inclusive sourcing strategies, conservative versus liberal definitions.

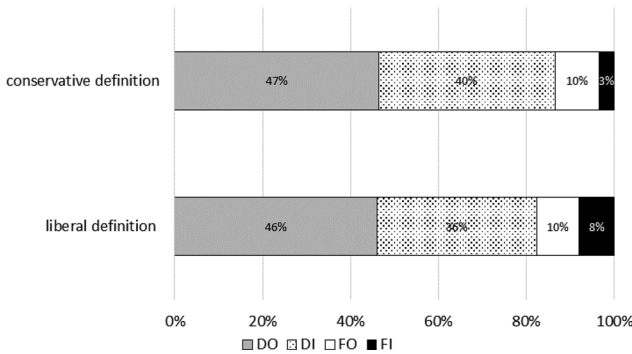


Figure 2: Sampled firms’ mutually exclusive sourcing strategies, conservative versus liberal definitions.

Taking advantage of our data, this evidence can be further dissected by province, industry, and type of firm.¹² In particular, we ask the following: How do sourcing behaviors differ for firms that are headquartered in the regional capital? Are “true-headquarters firms” more or less likely to engage in a certain sourcing mode? Does any sectoral pattern reflect the relative prevalence of DI, DO, FO, and FI?

Figure 3 answers these questions and displays mutually inclusive sourcing strategies.

¹² We thank an anonymous Referee for this suggestion.

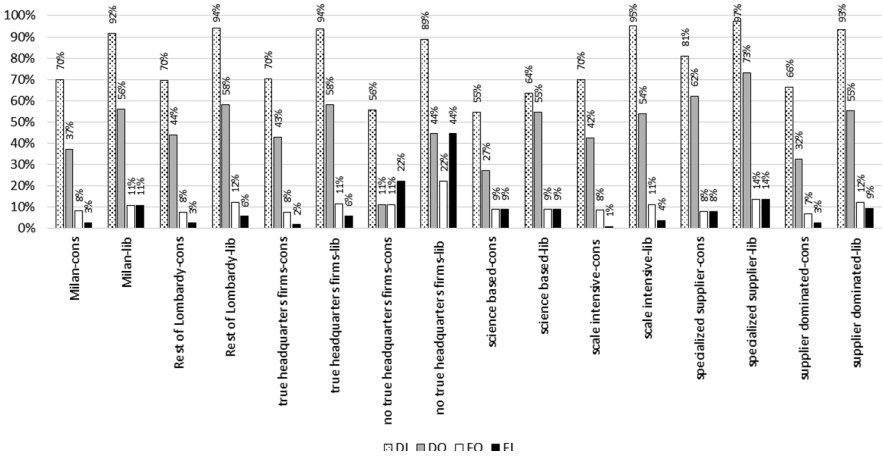


Figure 3: Sampled firms’ mutually inclusive sourcing strategies, by province, type, and industry, conservative versus liberal definitions.

Concerning the province, we distinguish between Milan – the regional capital – and the rest of Lombardy. Our descriptive statistics reveal that firms headquartered in Milan are the most likely to retain strategic high-value functions, such as R&D and other services, within the boundaries of a foreign affiliate. On the contrary, there seems to be no “metropolitan hub-effect”, given that the percentages of DI are very similar throughout the sample and do not display any sizeable differences based on the conservative versus liberal definitions.

For type of firm, we introduce the notion of “true-headquarters” to denote those companies that have less than 50% external participation in their joint capital (Kohler and Smolka 2011, 2012). Identifying true-headquarters firms is important for controlling for firms’ discretion over their input procurement choice.¹³ Interestingly, companies that have more than 50% of external participation rely more on internationalization than do true-headquarters firms. Moreover, the former tend to perform strategic high-value functions abroad more often than the latter.

Finally, Figure 3 dissects the Lombard firms’ sourcing behavior according to the Bell and Pavitt (1993) industries. All sectors produce a ranking of the most

¹³ The theory regarding *global sourcing under contractual incompleteness* takes for granted that firms have full discretion over their input procurement choices. However, this might not be the case for real-world companies that have more than 50% of external participation. Under these circumstances, firms are likely to follow the sourcing strategies dictated by their parent companies without exerting any discretionary choice.

preferred sourcing strategies that is consistent with the sample average displayed in Figure 1. However, some specific patterns emerge as well. To mention just a few, specialized supplier-dominated firms are those that rely the most on domestic sourcing; scale-intensive firms have the smallest percentage of foreign integration; and, not surprisingly, science-based firms seem quite reluctant to engage in outsourcing, especially that of R&D and other services.

For the sake of completeness, Figure 4 displays mutually exclusive sourcing strategies by province, industry, and type of firms. The results are broadly consistent with those described above for the mutually inclusive case.

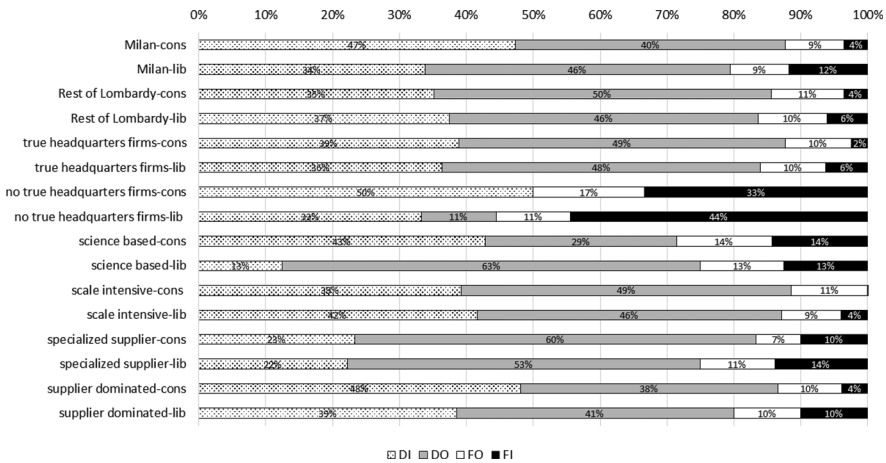


Figure 4: Sampled firms’ mutually exclusive sourcing strategies, by province, type, and industry, conservative versus liberal definitions.

5 Econometric Analysis

In this section, we explore the relationship between sourcing and performance by using econometric techniques.

5.1 Variables and Specification

Following the methodology of Bernard and Jensen (1995, 1999), we define sourcing premia as the average percentage difference of performance between firms engaged in a particular strategy compared with the others. To compute these premia, we regress firm performance on sourcing dummies, controlling for a number of additional variables that may also affect performance.

Our econometric model is set accordingly. For every performance measure, three equations are estimated, designated [1], [2], and [3].

Equation [1] has a very parsimonious specification because performance (*performance_i*) is regressed only on sourcing strategies (*sourcing strategy_i*) for the unrestricted sample of respondents, called $\Omega_unrestr$:

$$performance_i = \alpha sourcing\ strategy_i + \varepsilon_i \quad \text{for } i \in \Omega_unrestr \quad [1]$$

This basic equation is then completed by firm controls (*firmctrl_i*), together with industry (*industryctrl_i*) and province (*provincectrl_i*) controls, as in eq. [2].

$$performance_i = \alpha sourcing\ strategy_i + \beta firmctrl_i + \gamma industryctrl_i + \sigma provincectrl_i + \varepsilon_i \\ \text{for } i \in \Omega_unrestr \quad [2]$$

Equation [3] is the same as eq. [2], with the only difference being that it is estimated in the restricted sample of true-headquarters firms, called Ω_restr , to account for the potential effect of foreign ownership on performance.¹⁴

$$performance_i = \alpha sourcing\ strategy_i + \beta firmctrl_i + \gamma industryctrl_i + \sigma provincectrl_i + \varepsilon_i \\ \text{for } i \in \Omega_restr \quad [3]$$

A number of variables are considered in eqs [1], [2], and [3] as a proxy for firm *performance_i*. They range from *sales* to *value added* and from *profit* to productivity (*TFP*) and *skill intensity* to investigate many potential premia related to sourcing strategies. With regard to productivity, we follow the estimation method of Levinsohn and Petrin (2003) to address the simultaneity and selection bias.¹⁵ In particular, we assume the production function of firm *i*, at a given point in time to be Cobb-Douglas:

$$Y_i = \delta + \omega_L L_i + \omega_K K_i + \omega_M M_i + \omega_i + \varepsilon_i \quad [4]$$

where Y_i is the logarithm of firm output, measured by value added; L_i and M_i are the logarithms of the freely variable inputs labor and intermediate input, approximated by the number of employees and the cost of raw materials, respectively; and K_i denotes the logarithm of the state variable capital, proxied

¹⁴ Another possibility is to include a dummy for foreign ownership in eq. [2]. Unreported estimates reveal that sourcing premia are robust to this specification and that foreign ownership, when significant, displays a positive sign. Additional results are available upon request.

¹⁵ For a discussion of the benefits of the Levinsohn and Petrin methodology, see Petrin, Poi, and Levinsohn (2004). An alternative approach is that of Olley and Pakes (1996).

by total assets. All variables in eq. [4] are deflated by the Producer Price Index for the appropriate two-digit NACE industry.

The independent variables can be distinguished into two main groups: the “core” and “control” regressors. Core regressors denote the main variables of interest, namely, *sourcing strategy_i*. A number of dummies are available (*DO_con_incl*, *DI_con_incl*, *FO_con_incl*, *FI_con_incl*, *DO_con_excl*, *DI_con_excl*, *FO_con_excl*, *FI_con_excl*, *DO_lib_incl*, *DI_lib_incl*, *FO_lib_incl*, *FI_lib_incl*, *DO_lib_excl*, *DI_lib_excl*, *FO_lib_excl*, and *FI_lib_excl*), depending on the conservative versus liberal and mutually inclusive versus mutually exclusive definitions of sourcing strategies. In addition to the core regressors, eqs [2] and [3] consider a number of “controls” to verify the robustness of the sourcing dummies to the inclusion of firm, industry, and province variables. In particular, firm-level controls include firm *size*, *age*, *group* affiliation, and *export* experience; industry effects are measured through sector dummies following Bell and Pavitt (1993), and a dummy for Milan, the regional capital, captures the province effect.

OLS estimations are retained throughout the empirical analysis, with the only exception being the *skill intensity* equation, which follows a probit model. Under the OLS estimation, sourcing premia can be directly discerned from the α coefficient, which captures the percentage change in performance due to a given sourcing solution¹⁶; under the probit estimation, the same is true for marginal effects.

At this stage, it is worth mentioning that survey estimation methods are employed throughout the empirical analysis to control for the potential bias originating from the response rate. Each combination of a single geographical location (out of four) and a single manufacturing activity (out of four) denotes a stratum (16 in total). In the econometric analysis, we use sampling information to obtain consistent and efficient estimates and to draw conclusions about Lombardy as a whole. Specifically, we weight each observation by the inverse of the probability of being sampled using, for every stratum, location- and industry-specific information on the total number of firms in the population and in the sample.

To avoid simultaneity, all dependent variables refer to 2009, whereas the regressors date back to 2007. Unfortunately, the cross-sectional design of our data does not allow us to implement rigorous econometric methods, apart from lagged variables, to account for endogeneity.¹⁷ Therefore, one should not

16 Because the TFP equation is set to regress the ln of TFP on sourcing dummies and control variables, the premia must be calculated with the formula $100(\alpha - 1)$. See Bernard and Jensen (1995, 1999) on this point.

17 To properly assess the direction of causality, purely cross-sectional data are not appropriate because they do not enable researchers to see whether certain performance outcomes precede or follow firms' sourcing behavior. To provide conclusive evidence on this issue, one needs to

interpret regressions as indicating the exact direction of causality but as a convenient way of summarizing the statistical regularities among variables.

A detailed variables description is available in Table 9, in the Appendix, while Tables 10 and 11 provide some summary statistics and correlations between firm-level regressors.

5.2 Results

In this section, we comment on the main estimation results.

Tables 5 and 6 report the empirical evidence about sourcing premia when the conservative definition is applied to mutually inclusive (Table 5) and mutually exclusive (Table 6) sourcing strategies. According to eqs [1], [2], and [3], for every dependent variable, three specifications are displayed.

A first look at Tables 5 and 6 suggests some interesting facts.

With regard to core variables, *FI_con_incl* is found to be statistically significant, with a positive sign, in every specification. This means that FDI makers enjoy superior performance in terms of *sales*, *value added*, *profit*, *capital*, *TFP*, and *skill intensity*. *FO_con_incl* is found to be positive and statistically significant as well, but its explanatory power is limited to the *sales*, *value added*, and *profit* equations. These results are robust to firm, industry, and province controls, and they hold for both the unrestricted and restricted samples of true-headquarters firms. Our evidence thus unveils that foreign sourcing is key to Lombardy's performance, regardless of whether it is pursued intra- or extra-firm. On the contrary, we find no effect for domestic sourcing because *DO_con_incl* and *DI_con_incl* are not significant. Consistent with Kohler and Smolka (2011, 2012) and Federico (2010), the magnitude of the FI effect is the largest, which means not only that FI discloses precious premia for Lombard enterprises but also that these sourcing premia are the highest possible.

Concerning control variables, *size*, *age*, and *group* affiliation seem to play a role in shaping firm performance. Indeed, they are positive drivers of many dependent variables such as *sales*, *value added*, *profit*, *capital*, and *skill intensity*, thus confirming the previous evidence on Italian enterprises reported by Barba Navaretti et al. (2008), Bugamelli, Cipollone, and Infante (2000), Conti, Lo Turco, and Maggioni (2010), and Bugamelli and Infante (2003). On the contrary,

consider the temporal dimension. Depending on the data, a few strategies are available, including lagged variables, instrumental variables, the study of performance dynamics, and an explicit test for causality based either on Bernard and Jensen's (1995) methodology or on propensity score matching.

Table 5: Estimation results under the conservative definition of mutually inclusive sourcing strategies.

	Sales						Value added			Profit		
	OLS estimates			OLS estimates			OLS estimates			OLS estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_con_incl</i>	-1,893.374 (0.353)	-1,337.905 (0.465)	-621.088 (0.728)	-641.910 (0.414)	-435.7369 (0.536)	-352.801 (0.618)	34.299 (0.841)	79.042 (0.651)	34.073 (0.847)	34.299 (0.841)	79.042 (0.651)	34.073 (0.847)
<i>DL_con_incl</i>	138.774 (0.947)	-463.213 (0.785)	-1,243.597 (0.447)	597.270 (0.434)	332.4621 (0.560)	249.422 (0.658)	-7.331 (0.973)	-60.419 (0.746)	-12.801 (0.944)	-7.331 (0.973)	-60.419 (0.746)	-12.801 (0.944)
<i>FO_con_incl</i>	7,383.892 (0.014)**	7,101.281 (0.050)**	6,266.567 (0.068)*	2,463.172 (0.020)**	2,383.095 (0.058)*	2,326.433 (0.061)*	885.081 (0.051)*	724.517 (0.059)*	800.481 (0.061)*	885.081 (0.051)*	724.517 (0.059)*	800.481 (0.061)*
<i>FL_con_incl</i>	355,855.2 (0.023)**	323,003 (0.031)**	275,222.3 (0.032)**	171,683.9 (0.040)**	156,607.6 (0.049)**	153,229.2 (0.051)*	37,328.13 (0.039)**	33,324.96 (0.047)**	35,765.16 (0.046)**	37,328.13 (0.039)**	33,324.96 (0.047)**	35,765.16 (0.046)**
<i>Size</i>		19.101 (0.074)*	53.986 (0.003)**		9.350 (0.000)**	11.887 (0.095)*		2.973 (0.004)**	1.187 (0.054)*		2.973 (0.004)**	1.187 (0.054)*
<i>Age</i>		153.311 (0.087)*	146.056 (0.098)*		53.406 (0.099)*	51.521 (0.143)		5.279 (0.297)	5.240 (0.307)		5.279 (0.297)	5.240 (0.307)
<i>Export</i>		-108.825 (0.963)	-622.733 (0.790)		-283.343 (0.755)	-331.417 (0.716)		198.266 (0.272)	225.138 (0.213)		198.266 (0.272)	225.138 (0.213)
<i>Group</i>		6,722.374 (0.013)**	4,472.655 (0.054)**		1,644.749 (0.036)**	1,337.111 (0.070)**		-412.840 (0.263)	-309.043 (0.406)		-412.840 (0.263)	-309.043 (0.406)
<i>Province</i>		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Industry</i>		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Obs</i>	197	197	191	197	197	191	197	197	191	197	197	191
<i>R²</i>	0.245	0.370	0.459	0.322	0.464	0.482	0.246	0.408	0.418	0.246	0.408	0.418

(continued)

Table 5: (continued)

	Capital			TFP			Skill intensity		
	OLS estimates			OLS estimates			Probit estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_con_incl</i>	-957,591.7 (0.185)	-832,533.2 (0.169)	-765,832.3 (0.207)	-0.022 (0.867)	0.090 (0.573)	-0.079 (0.623)	-0.056 (0.528)	0.014 (0.884)	-0.016 (0.868)
<i>DL_con_incl</i>	931,113.9 (0.182)	767,813.6 (0.167)	715,324 (0.187)	0.111 (0.357)	0.149 (0.210)	0.144 (0.228)	-0.083 (0.371)	-0.101 (0.280)	-0.097 (0.302)
<i>FO_con_incl</i>	1,618,867 (0.143)	1,640,580 (0.159)	1,711,970 (0.139)	0.181 (0.554)	0.236 (0.400)	0.200 (0.472)	0.007 (0.965)	-0.078 (0.610)	-0.075 (0.626)
<i>FL_con_incl</i>	4,79e+07 (0.001)***	3,85e+07 (0.004)***	4,17e+07 (0.006)***	1.462 (0.000)***	1.189 (0.000)***	0.384 (0.026)**	0.626 (0.000)***	0.628 (0.002)***	0.250 (0.005)***
<i>Size</i>		5,407.092 (0.000)***	3,295.865 (0.075)*		0.001 (0.439)	0.002 (0.217)		0.001 (0.053)*	0.001 (0.093)*
<i>Age</i>		52,478.88 (0.044)**	46,685.17 (0.069)*		-0.004 (0.274)	-0.004 (0.266)		0.004 (0.098)*	0.004 (0.104)
<i>Export</i>		-275,810.5 (0.717)	-277,517.9 (0.716)		-0.017 (0.920)	-0.031 (0.854)		0.114 (0.246)	0.111 (0.252)
<i>Group</i>		1,638,212 (0.056)*	1,217,429 (0.097)*		-0.090 (0.423)	-0.133 (0.275)		0.143 (0.316)	0.146 (0.323)
<i>Province</i>		yes	yes		yes	yes		yes	yes
<i>Industry</i>		yes	yes		yes	yes		yes	yes
<i>Obs</i>	197	197	191	171	171	162	223	223	214
<i>R²</i>	0.076	0.240	0.297	0.056	0.113	0.120	0.024	0.081	0.090

Note: *** Significant at 1%, ** at 5%, * at 10%. Coefficients and p-values (in parenthesis) are shown. In the skill intensity equation, marginal effects are shown instead of coefficients.

Table 6: Estimation results under the conservative definition of mutually exclusive sourcing strategies.

	Sales						Value added			Profit		
	OLS estimates			OLS estimates			OLS estimates			OLS estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_con_excl</i>	-1,264.622 (0.303)	876.096 (0.574)	-1,038.429 (0.482)	56.398 (0.860)	145.745 (0.748)	131.910 (0.765)	92.113 (0.579)	87.423 (0.583)	96.525 (0.544)			
<i>DL_con_excl</i>	1,997.467 (0.469)	2,153.718 (0.351)	1,047.481 (0.640)	1,278.09 (0.213)	1,206.726 (0.143)	1,080.06 (0.189)	297.87 (0.197)	260.618 (0.196)	317.659 (0.110)			
<i>FO_con_excl</i>	5,599.424 (0.064)*	5,916.38 (0.108)	5,157.574 (0.155)	1,985.986 (0.027)**	2,052.865 (0.056)*	1,994.282 (0.064)*	888.703 (0.069)*	760.231 (0.089)*	828.626 (0.098)*			
<i>FL_con_excl</i>	359,052.5 (0.024)**	325,790.9 (0.031)**	277,470.4 (0.033)**	173,282.3 (0.040)**	158,015.3 (0.049)**	154,635.4 (0.051)*	37,920.92 (0.039)**	33,760.91 (0.047)**	36,286.79 (0.046)**			
<i>Size</i>		19.167 (0.071)*	53.918 (0.003)**		9.362 (0.000)**	11.858 (0.199)		2.978 (0.004)**	1.169 (0.550)			
<i>Age</i>		144.520 (0.099)*	136.614 (0.096)*		51.724 (0.133)	49.849 (0.148)		4.087 (0.429)	4.163 (0.425)			
<i>Export</i>		205.961 (0.928)	314.884 (0.890)		-161.603 (0.855)	-209.976 (0.813)		251.273 (0.161)	277.249 (0.124)			
<i>Group</i>		7,087.604 (0.009)**	4,767.552 (0.041)**		1,778.184 (0.024)**	1,464.361 (0.050)**		-365.635 (0.302)	-254.618 (0.475)			
<i>Province</i>		yes	yes		yes	yes		yes	yes			Yes
<i>Industry</i>		yes	yes		yes	yes		yes	yes			Yes
<i>Obs</i>	197	197	191	197	197	191	197	197	191			191
<i>R²</i>	0.244	0.369	0.457	0.322	0.464	0.413	0.246	0.407	0.317			0.317

(continued)

Table 6: (continued)

	Capital			TFP			Skill intensity		
	OLS estimates			OLS estimates			Probit estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_con_excl</i>	1,148,879 (0.196)	1,220,455 (0.101)	1,094,970 (0.130)	0.083 (0.562)	0.066 (0.690)	0.069 (0.677)	-0.156 (0.125)	-0.125 (0.236)	-0.123 (0.241)
<i>DL_con_excl</i>	73,013.06 (0.874)	204,914.7 (0.705)	194,544.4 (0.715)	0.157 (0.283)	0.235 (0.169)	0.226 (0.191)	-0.102 (0.355)	-0.108 (0.339)	-0.103 (0.362)
<i>FO_con_excl</i>	1,503,604 (0.181)	1,661,170 (0.161)	1,700,382 (0.148)	0.245 (0.419)	0.285 (0.291)	0.254 (0.348)	-0.104 (0.525)	-0.151 (0.332)	-0.146 (0.345)
<i>FL_con_excl</i>	4,90e+07 (0.001)***	3,96e+07 (0.004)***	4,29e+07 (0.006)***	1.487 (0.000)***	1.202 (0.000)***	-0.283 (0.013)**	0.617 (0.000)***	0.6222 (0.006)***	0.096 (0.008)*
<i>Size</i>		5,411.039 (0.001)***	3,291.744 (0.379)		0.001 (0.457)	0.001 (0.258)		0.001 (0.452)	0.001 (0.697)
<i>Age</i>		53,216.61 (0.038)**	47,586.09 (0.059)*		-0.004 (0.291)	-0.004 (0.283)		0.003 (0.136)	0.003 (0.135)
<i>Export</i>		-283,304.8 (0.706)	-288,527.4 (0.703)		-0.007 (0.968)	-0.019 (0.906)		0.113 (0.246)	0.111 (0.252)
<i>Group</i>		1,753,131 (0.048)**	1,314,465 (0.083)*		-0.056 (0.633)	-0.097 (0.445)		0.131 (0.361)	0.134 (0.367)
<i>Province</i>		Yes	yes		yes	yes		yes	yes
<i>Industry</i>		Yes	yes		yes	yes		yes	yes
Obs	197	197	191	171	171	162	223	223	214
R ²	0.075	0.242	0.298	0.057	0.118	0.121	0.028	0.093	0.098

Note: *** significant at 1%, ** at 5%, * at 10%. Coefficients and *p*-values (in parenthesis) are shown. In the *skill intensity equation*, marginal effects are shown instead of coefficients.

we find no significant effect of international experience on economic performance, which is quite surprising in light of the empirical literature reviewed in Section 2.¹⁸

Interestingly, moving from the mutually inclusive to the mutually exclusive definition does not alter the abovementioned results that can be considered typical of the conservative case.

To complete the picture, Tables 7 and 8 display our estimation results when the liberal definition is applied to mutually inclusive (Table 7) and mutually exclusive (Table 8) sourcing strategies.

Compared with the conservative case, the liberal definition makes a more restrictive argument. In terms of core regressors, sourcing premia seem to accrue only to FDI makers because *FI_lib_incl* is positive and statistically significant in every column of Tables 7 and 8, whereas *FO_lib_incl* is not significant, regardless of the parsimonious versus rich specification and the unrestricted versus restricted sample. With regard to control regressors, we find significant effects only of *size* on *sales*, *value added*, and *capital* and a significant effect of *age* on *capital*, but these effects vanish if we restrict attention to true-headquarters firms. On the contrary, *group* affiliation is found to be positive and statistically significant in the *sales*, *value added*, and *capital* equations.

These results are robust to the mutually inclusive versus mutually exclusive definitions; therefore, we retain them as typical of the liberal – as opposed to conservative – case.

As a further robustness check, one might run the same estimation exercise as in Tables 5–8 on the restricted sample of sourcing enterprises. The underlying idea is to restrict attention to firms that are actually making sourcing decisions, according to both the conservative and liberal views, and dispensing with those that do not perform the related tasks. Although we believe this is a proper way of estimating sourcing premia, it comes at the expense of a lower number of observations. Because the (unreported) results are fully consistent with those discussed above, we stick to Tables 5–8.¹⁹

18 Our results (not displayed) do not change if we replace the export dummy with a dummy that captures import or two-way trading. A possible explanation for this puzzling evidence is that the Lombard enterprises are so committed to international trade that being an exporter, an importer, or both makes no difference because this status applies to the vast majority of players. Alternatively, one might blame the data limitations that constrain the analysis and prevent us from making deeper investigations.

19 More results are available upon request.

Table 7: Estimation results under the liberal definition of mutually inclusive sourcing strategies.

	Sales						Value added						Profit			
	OLS estimates						OLS estimates						OLS estimates			
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
<i>DO_lib_incl</i>	-17.677 (0.998)	-1,735.94 (0.736)	2,848.954 (0.539)	5,143.1 (0.229)	3,881.312 (0.165)	2,479.7 (0.308)	-815.393 (0.451)	-448.092 (0.563)	-464.665 (0.528)							
<i>D_lib_incl</i>	2,274.255 (0.778)	13,216.52 (0.363)	7,903.152 (0.553)	1,814.952 (0.409)	4,782.693 (0.236)	4,102.446 (0.321)	1,496.412 (0.191)	2,021.681 (0.216)	2,082.65 (0.232)							
<i>FO_lib_incl</i>	29,753.12 (0.182)	35,047.29 (0.102)	23,221.03 (0.139)	4,517.853 (0.687)	11,053.14 (0.341)	11,763.38 (0.242)	1,901.545 (0.420)	2,674.612 (0.242)	3,380.242 (0.117)							
<i>FL_lib_incl</i>	58,396.24 (0.065)*	21,758.9 (0.068)*	39,479.91 (0.093)*	55,951.73 (0.075)*	31,110.3 (0.96)*	40,068.67 (0.158)	10,024.16 (0.083)*	5,502.756 (0.084)*	6,197.986 (0.086)*							
<i>Size</i>		12.671 (0.265)	60.672 (0.058)*		6.972 (0.018)**	16.261 (0.314)		2.924 (0.001)***	2.784 (0.482)							
<i>Age</i>		114.898 (0.718)	164.699 (0.475)		-5.527 (0.970)	-1.211 (0.992)		1.684 (0.961)	0.654 (0.983)							
<i>Export</i>		4,653.125 (0.410)	2,183.453 (0.644)		1,995.452 (0.473)	1,716.49 (0.516)		-94.242 (0.879)	-96.230 (0.875)							
<i>Group</i>		58,146.34 (0.000)***	42,811.59 (0.003)***		17,705.28 (0.009)***	15,759.56 (0.010)***		472.830 (0.832)	1,176.851 (0.620)							
<i>Province</i>		yes	yes	yes	yes	yes	yes	yes	yes							
<i>Industry</i>		yes	yes	yes	yes	yes	yes	yes	yes							
<i>Obs</i>	202	202	196	199	199	193	202	202	196							
<i>R²</i>	0.096	0.339	0.498	0.195	0.375	0.380	0.127	0.328	0.228							

	Capital			TFP			Skill intensity		
	OLS estimates			OLS estimates			Probit estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_lib_incl</i>	-752,785.4 (0.699)	723,438.1 (0.595)	128,133.4 (0.918)	-0.075 (0.571)	-0.142 (0.323)	-0.130 (0.371)	-0.010 (0.910)	0.009 (0.927)	
<i>DL_lib_incl</i>	89,4475.9 (0.799)	1,733,563 (0.648)	1,766,628 (0.631)	-0.034 (0.874)	0.145 (0.572)	0.172 (0.518)	-0.140 (0.278)	-0.121 (0.383)	
<i>FO_lib_incl</i>	6,263,249 (0.262)	7,365,536 (0.123)	3,994,851 (0.107)	-0.033 (0.395)	-0.004 (0.987)	-0.008 (0.971)	-0.039 (0.796)	-0.106 (0.454)	
<i>FL_lib_incl</i>	1.52e+07 (0.063)*	5,997,621 (0.051)*	1.04e+07 (0.027)**	0.579 (0.010)***	0.577 (0.000)***	0.423 (0.001)***	0.585 (0.000)***	0.565 (0.001)***	
<i>Size</i>	3,633,132 (0.012)**	3,011,644 (0.529)		0.001 (0.502)	0.002 (0.244)		0.001 (0.486)	0.001 (0.563)	
<i>Age</i>	1,18,680.9 (0.035)**	76,150.82 (0.040)**		-0.004 (0.280)	-0.004 (0.288)		0.003 (0.165)	0.003 (0.159)	
<i>Export</i>	56,388.14 (0.965)	667,491.8 (0.574)		-0.008 (0.960)	0.030 (0.851)		0.129 (0.180)	0.125 (0.189)	
<i>Group</i>	1.26e+07 (0.004)***	1.05e+07 (0.003)***		-0.108 (0.357)	-0.174 (0.201)		0.115 (0.419)	0.119 (0.417)	
<i>Province</i>	yes	yes		yes	yes		yes	yes	
<i>Industry</i>	yes	yes		yes	yes		yes	yes	
<i>Obs</i>	202	202	173	173	164	225	225	216	
<i>R²</i>	0.104	0.389	0.036	0.114	0.089	0.032	0.92	0.084	

Note: *** significant at 1%, ** at 5%, * at 10%. Coefficients and *p*-values (in parenthesis) are shown. In the skill intensity equation, marginal effects are shown instead of coefficients.

Table 8: Estimation results under the liberal definition of mutually exclusive sourcing strategies.

	Sales			Value added			Profit		
	OLS estimates			OLS estimates			OLS estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_lib_excl</i>	4,419.089 (0.624)	16,888.66 (0.321)	12,945.98 (0.398)	6,105.649 (0.037)**	7,377.554 (0.172)	6,168.911 (0.253)	1,273.983 (0.338)	2,053.967 (0.304)	2,111.91 (0.308)
<i>DL_lib_excl</i>	3,687.46 (0.652)	21,019.59 (0.201)	11,073.65 (0.426)	3,288.315 (0.001)***	6,938.305 (0.099)*	5,335.04 (0.183)	1,419.872 (0.182)	2,599.517 (0.152)	2,728.337 (0.133)
<i>FO_lib_excl</i>	10,080.72 (0.467)	31,469.54 (0.188)	16,255.25 (0.243)	2,728.127 (0.017)**	8,694.463 (0.071)*	7,423.882 (0.083)*	1,287.482 (0.236)	2,379.189 (0.194)	2,777.888 (0.146)
<i>FL_lib_excl</i>	72,617.72 (0.040)**	54,571.53 (0.090)*	60,038.57 (0.096)*	61,496.36 (0.075)*	43,208.1 (0.072)*	50,479 (0.073)*	11,843.06 (0.057)*	8,654.098 (0.064)*	9,587.295 (0.056)*
<i>Size</i>		11.725 (0.313)	61.500 (0.064)*		6.542 (0.027)**	16.632 (0.321)		2.889 (0.001)***	2.886 (0.485)
<i>Age</i>		88.066 (0.795)	152.198 (0.527)		-10.719 (0.946)	-2.847 (0.982)		-2.743 (0.940)	-1.600 (9.959)
<i>Export</i>		5,455.124 (0.348)	2,851.775 (0.538)		2,118.247 (0.450)	1,764.778 (0.483)		-19.647 (0.975)	-11.017 (0.985)
<i>Group</i>		58,971.76 (0.001)***	41,549.28 (0.003)***		16,997.73 (0.009)***	14,608.44 (0.015)**		473.168 (0.832)	1,051.381 (0.657)
<i>Province</i>		yes	yes		yes	yes		yes	yes
<i>Industry</i>		yes	yes		yes	yes		yes	yes
<i>Obs</i>	202	202	196	199	199	193	202	202	196
<i>R²</i>	0.076	0.313	0.485	0.187	0.358	0.364	0.121	0.319	0.179

	Capital						TFP			Skill intensity		
	OLS estimates			OLS estimates			OLS estimates			Probit estimates		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
<i>DO_lib_excl</i>	663,050.7 (0.862)	2,539,330 (0.549)	2,133,009 (0.604)	-0.087 (0.698)	-0.013 (0.961)	-0.038 (0.891)	-0.114 (0.359)	-0.070 (0.610)	-0.070 (0.612)	-0.114 (0.359)	-0.070 (0.610)	-0.070 (0.612)
<i>DL_lib_excl</i>	68,445.15 (0.985)	1,937,613 (0.640)	1,880,158 (0.633)	-0.025 (0.910)	0.119 (0.664)	0.079 (0.779)	-0.082 (0.523)	-0.054 (0.694)	-0.056 (0.689)	-0.082 (0.523)	-0.054 (0.694)	-0.056 (0.689)
<i>FO_lib_excl</i>	4,543,040 (0.512)	7,584,097 (0.277)	1,804,686 (0.649)	-0.097 (0.762)	0.013 (0.970)	-0.030 (0.930)	-0.110 (0.530)	-0.135 (0.435)	-0.133 (0.435)	-0.110 (0.530)	-0.135 (0.435)	-0.133 (0.435)
<i>FL_lib_excl</i>	1.80e+07 (0.040)**	1.16e+07 (0.085)*	1.38e+07 (0.041)**	0.524 (0.091)*	0.608 (0.031)**	0.435 (0.135)	0.557 (0.001)***	0.533 (0.009)***	0.468 (0.061)*	0.557 (0.001)***	0.533 (0.009)***	0.468 (0.061)*
<i>Size</i>		3,440,675 (0.017)**	3,189,709 (0.521)		0.001 (0.644)	0.002 (0.215)		0.001 (0.580)	0.001 (0.522)		0.001 (0.580)	0.001 (0.522)
<i>Age</i>		1,13,832.1 (0.038)**	74,887.65 (0.046)**		-0.004 (0.276)	-0.004 (0.264)		0.003 (0.169)	0.003 (0.158)		0.003 (0.169)	0.003 (0.158)
<i>Export</i>		131,739.3 (0.924)	856,372.4 (0.496)		0.013 (0.936)	0.033 (0.835)		0.126 (0.190)	0.123 (0.199)		0.126 (0.190)	0.123 (0.199)
<i>Group</i>		1.29e+07 (0.006)***	1.01e+07 (0.004)***		-0.114 (0.338)	-0.186 (0.154)		0.134 (0.344)	0.136 (0.355)		0.134 (0.344)	0.136 (0.355)
<i>Province</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Obs</i>	202	202	196	173	173	164	225	225	216	225	225	216
<i>R²</i>	0.094	0.373	0.289	0.034	0.112	0.123	0.028	0.078	0.070	0.028	0.078	0.070

Note: *** significant at 1%, ** at 5%, * at 10%. Coefficients and *p*-values (in parenthesis) are shown. In the *skill intensity equation*, marginal effects are shown instead of coefficients.

6 Conclusion

In this paper, we estimate sourcing premia using Italian regional data.

Drawing on original information about Lombard enterprises, we find certain performance differences among firms that make different sourcing decisions. Survey estimation methods reveal foreign rather than domestic sourcing and in- rather than outsourcing entail significant sales, value added, capital, productivity, profit, and skill-intensity premia. This result is robust to different specifications, samples, performance measures, and definitions of sourcing strategies.

In the Introduction, we claimed that our approach entails a few novelties in terms of the research question, data and methodology compared with previous studies on related topics.

To see the benefits of asking a relatively new research question, note that our findings are broadly consistent with previous results on *global sourcing under contractual incompleteness* and *internationalization and performance*. Indeed, we document the existence of robust correlations among integration, foreign exposure, and performance. Nonetheless, viewing ownership and location decisions within a unitary framework, we are able to show that firm performance is not only a matter of integration (as postulated by the first strand) or internationalization (as implied by the second one) but is the *joint* effect of in- and foreign sourcing. This is something that the previous studies could not assert because of data limitations, whereas our survey design is sufficiently broad to embrace all factors in a coherent setting in which the previous results still hold, but new findings stand out as well.

To see the benefits of using Italian regional data, our results could be confronted with previous evidence about Lombard enterprises on related issues. Similar to Cusmano, Mancusi, and Morrison (2009, 2010), we observe that outsourcing is a very common phenomenon but that international outsourcing involves only a handful of players. However, by adding ownership to firms' locational choice, we are able to revisit the positive correlation among international outsourcing, skill intensity, and innovation put forth by Cusmano, Mancusi, and Morrison (2009, 2010) and demonstrate that internationalization plus vertical integration – rather than outsourcing – is key to the superior performance of Lombard firms in terms of *sales, value added, profit, capital, TFP* and *skill intensity*. This was not apparent from previous studies because they could not control for in- versus outsourcing below the FO strategy.

Finally, to evaluate our methodological contribution, one should compare the results implied by the four definitions of sourcing strategies to see whether it

was worth introducing our new taxonomy of organizational modes. Our econometric analysis delivers results that hold: (a) across all definitions, (b) only for the conservative case, and (c) only for the liberal case.²⁰ Therefore, moving from the mutually inclusive to the mutually exclusive definition makes no sizeable difference, whereas moving from the conservative to the liberal definition does. Put another way, what matters is not that firms are assigned one or more sourcing modes but rather the number of tasks for which the sourcing modes are computed. This is something that the previous studies could not address because they exclusively followed the conservative view. On the contrary, after disaggregating the firm production processes by task, we have the opportunity to add the liberal perspective and gain certain insights into this issue.

Although we believe that these are quite interesting findings, we are aware of some data limitations that plague the present analysis and constrain its scope.

First, although our sample proves to be representative of the entire population of Lombard enterprises, it is small in size. This might be a problem when selecting the set of regressors for econometric purposes because we cannot include too many variables. Relying on a larger database would allow us, for instance, to build sourcing dummies for every task instead of grouping input manufacturing, R&D, and other services under the same liberal definition. Based on this information, one could compare sourcing premia not only *between* different organizational modes but also *within* the same mode and thus observe the different tasks within the firm production process.

In addition to size, another major concern is the cross-sectional nature of the data. Although we collect performance measures for a five-year period, the sourcing strategies and international experience refer only to 2007. This prevents us from performing a proper causality test that the panel data would instead allow for. Put another way, although the present study finds robust correlations between sourcing and performance, it cannot offer insight into the direction of the causality, i.e., from the former to the latter, in the spirit of the *learning-by-internationalization* argument, or vice versa, according to the *self-selection* mechanism. Addressing causality correctly is important not only

²⁰ The existence of a sizeable FI premium is an example of type (a) results. The positive effect of FO, together with firm age and group affiliation, is an example of type (b) results, whereas the absence of any significant regressor, apart from the foreign integration dummy, is an example of a type (c) result.

for academic purposes but also to derive policy implications. For instance, if the evidence supports the self-selection hypothesis, more successful enterprises self-select into foreign integration. In this case, the policy maker could attempt to promote local growth to foster internationalization. In fact, by helping firms to reach a certain threshold in terms of, e.g., sales, profit, value added, and productivity, one would also make them sufficiently strong to afford the additional cost of operating abroad. On the contrary, if the evidence supports the learning-by-internationalization hypothesis, firms become more successful as a result of their foreign exposure. In this case, the policy maker could instead promote internationalization to enhance local growth because international experience per se would act as a springboard for economic performance. In short, our data cannot offer conclusive evidence in this regard. In this sense, our study should be considered a first step toward the investigation of sourcing premia.

Hopefully, our preliminary evidence will encourage further research on the same topic. From an empirical point of view, our suggestion is to build on the drawbacks identified above and construct a larger dataset with panel information. This would help assess the direction of causality correctly and provide more rigorous econometric estimates. From a theoretical point of view, our suggestion is instead to relax the standard assumptions behind the taxonomy of Antras and Helpman (2004, 2008) and derive testable predictions for what we designated the *liberal* case. This would result in a more realistic treatment of firm boundaries, encompassing the multiple tasks performed in the complex production processes of the real world.

We believe that both extensions to the analysis are worth making to provide a deeper investigation of global sourcing and a better understanding of its relationship with firm performance in a context of heterogeneity.

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Appendix

This Appendix provides the variables description (Table 9) together with some summary statistics (Table 10) and correlations (Table 11) between firm-level regressors.

Table 9: Variables description.

Variable	Description
<i>Sales</i>	Firm's sales (thousands of units).
<i>Value added</i>	Firm's value added (thousands of units).
<i>Profit</i>	Firm's profit (thousands of units).
<i>Capital</i>	Firm's tangible fixed assets.
<i>TFP</i>	Natural logarithm of firm's total factor productivity (Levinsohn-Petrin estimate).
<i>Skill intensity</i>	Dummy variable, 1 if the firm's share of graduates is larger than 10%, 0 otherwise.
<i>Size</i>	Firm's number of employees.
<i>Age</i>	Firm's age, defined as the difference between 2009 and the year of firm's establishment.
<i>Export</i>	Dummy variable, 1 if the firm engages in export operations, 0 otherwise.
<i>Group</i>	Dummy variable, 1 if the firm belongs to a group, 0 otherwise.
<i>DO_con_incl</i>	Dummy variable, 1 if the firm engages in DO, according to the conservative definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>DI_con_incl</i>	Dummy variable, 1 if the firm engages in DI, according to the conservative definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>FO_con_incl</i>	Dummy variable, 1 if the firm engages in FO, according to the conservative definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>FI_con_incl</i>	Dummy variable, 1 if the firm engages in FI, according to the conservative definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>DO_con_excl</i>	Dummy variable, 1 if the firm engages in DO, according to the conservative definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>DI_con_excl</i>	Dummy variable, 1 if the firm engages in DI, according to the conservative definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>FO_con_excl</i>	Dummy variable, 1 if the firm engages in FO, according to the conservative definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>FI_con_excl</i>	Dummy variable, 1 if the firm engages in FI, according to the conservative definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>DO_lib_incl</i>	Dummy variable, 1 if the firm engages in DO, according to the liberal definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>DI_lib_incl</i>	Dummy variable, 1 if the firm engages in DI, according to the liberal definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>FO_lib_incl</i>	Dummy variable, 1 if the firm engages in FO, according to the liberal definition of mutually inclusive sourcing strategies, 0 otherwise.

(continued)

Table 9: (continued)

Variable	Description
<i>FI_lib_incl</i>	Dummy variable, 1 if the firm engages in FI, according to the liberal definition of mutually inclusive sourcing strategies, 0 otherwise.
<i>DO_lib_excl</i>	Dummy variable, 1 if the firm engages in DO, according to the liberal definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>DI_lib_excl</i>	Dummy variable, 1 if the firm engages in DI, according to the liberal definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>FO_lib_excl</i>	Dummy variable, 1 if the firm engages in FO, according to the liberal definition of mutually exclusive sourcing strategies, 0 otherwise.
<i>FI_lib_excl</i>	Dummy variable, 1 if the firm engages in FI, according to the liberal definition of mutually exclusive sourcing strategies, 0 otherwise.

Table 10: Summary statistics of firm-level regressors.

Variable	Obs	Mean	Std. dev.	min	max
<i>DO_con_incl</i>	228	0.422	0.495	0	1
<i>DI_con_incl</i>	228	0.704	0.458	0	1
<i>FO_con_incl</i>	228	0.080	0.272	0	1
<i>FI_con_incl</i>	228	0.027	0.161	0	1
<i>DO_con_excl</i>	228	0.354	0.479	0	1
<i>DI_con_excl</i>	228	0.296	0.458	0	1
<i>FO_con_excl</i>	228	0.076	0.266	0	1
<i>FI_con_excl</i>	228	0.027	0.162	0	1
<i>DO_lib_incl</i>	228	0.575	0.495	0	1
<i>DI_lib_incl</i>	228	0.934	0.248	0	1
<i>FO_lib_incl</i>	228	0.118	0.324	0	1
<i>FI_lib_incl</i>	228	0.075	0.263	0	1
<i>DO_lib_excl</i>	228	0.434	0.497	0	1
<i>DI_lib_excl</i>	228	0.342	0.475	0	1
<i>FO_lib_excl</i>	228	0.092	0.290	0	1
<i>FI_lib_excl</i>	228	0.075	0.263	0	1
<i>Size</i>	228	171.276	920.667	1	12000
<i>Age</i>	228	39.833	26.069	2	159
<i>Export</i>	228	0.803	0.803	0	1
<i>Group</i>	228	0.232	0.423	0	1

Table 11: Correlations between firm-level regressors.

	DO_con_incl_incl	FO_con_incl_incl	FI_con_incl_incl	DO_con_excl_excl	DI_con_excl_excl	FO_con_excl_excl	FI_con_excl_excl	DO_lib_incl_incl	DI_lib_incl_incl	FO_lib_incl_incl	FI_lib_incl_incl	DO_lib_excl_excl	DI_lib_excl_excl	FO_lib_excl_excl	FI_lib_excl_excl	size	Age	export	group	
DO_con_incl	1.00																			
DI_con_incl	0.361	1.00																		
FO_con_incl	0.146	0.051	1.00																	
FI_con_incl	0.083	0.047	0.053	1.00																
DO_con_excl	0.868	0.342	-0.220	-0.123	1.00															
DI_con_excl	-0.554	0.425	-0.192	-0.108	-0.480	1.00														
FO_con_excl	0.131	0.041	0.970	-0.048	-0.213	-0.186	1.00													
FI_con_excl	0.083	0.049	0.053	1.00	-0.123	-0.108	-0.048	1.00												
DO_lib_incl	0.744	0.338	0.191	0.088	0.650	-0.422	0.184	0.090	1.00											
DI_lib_incl	0.229	0.411	0.079	-0.067	0.199	0.174	0.077	-0.066	0.273	1.00										
FO_lib_incl	0.171	0.120	0.853	0.109	-0.136	-0.194	0.827	0.121	0.261	0.097	1.00									
FI_lib_incl	0.009	0.017	0.110	0.619	-0.114	-0.127	0.065	0.643	0.109	0.008	0.206	1.00								
DO_lib_excl	0.584	0.241	-0.261	-0.146	0.735	-0.283	-0.257	-0.149	0.754	0.197	-0.321	-0.249	1.00							
DI_lib_excl	-0.623	-0.120	-0.215	-0.120	-0.543	0.534	-0.211	-0.122	-0.838	.191	-0.264	-0.205	-0.632	1.00						
FO_lib_excl	0.194	0.074	0.794	-0.053	-0.125	-0.163	0.820	-0.051	0.213	0.085	0.869	-0.090	-0.279	-0.230	1.00					
FI_lib_excl	0.009	0.017	0.110	0.619	-0.114	-0.127	0.065	0.643	0.109	0.008	0.206	1.00	-0.249	-0.205	-0.090	1.00				
size	-0.062	-0.047	0.011	0.086	-0.081	0.007	-0.030	0.086	-0.092	0.040	0.008	0.256	-0.098	-0.002	-0.032	0.256	1.00			
age	-0.070	0.131	0.016	-0.029	-0.136	0.176	0.041	-0.029	-0.093	0.076	0.050	0.008	-0.149	0.122	0.111	0.008	0.235	1.00		
export	0.072	0.040	0.102	0.082	0.006	-0.057	0.098	0.081	0.041	0.135	0.079	0.057	-0.010	0.009	0.082	0.057	0.075	0.238	1.00	
group	0.034	0.039	-0.048	0.233	0.027	-0.062	-0.081	0.233	0.012	-0.063	-0.009	0.200	0.000	-0.069	-0.104	0.200	0.238	0.018	0.090	1.00

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