

International Second Sourcing: Evidence for French Firms

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Abstract

Using rich data on the international transactions of intermediate inputs by French firms we document the extent of international second sourcing, the simultaneous use of outsourcing and FDI to procure the same input, or using outsourcing or FDI from different locations. We also explore the firm and component characteristics that make procurement of this type more likely. Initial investigations suggest that international second sourcing is important: indeed in terms of both the number and value of transactions of intermediate inputs they represent the dominant pattern of procurement.

Key Words
JEL Codes

*Preliminary and incomplete
(not for citation at this stage)*

Extensions of the transaction-cost and property-rights models of vertical integration to include the costs of offshoring have generated a rich set of predictions regarding the patterns of international trade in intermediate inputs between countries (Antras, 2003; Antras & Helpman, 2004). Firms source inputs from abroad, they offshore, to take advantage of lower production costs, but whether they source those components in-house or at arm's-length depends on the costs of contracting specialised inputs. Key determinates of these procurement modes and their location include, the factor intensities of industries, such as their intensity in capital or in headquarter services (Antras, 2003; Antras and Helpman, 2004), the size of the market (McLaren, 2000; Grossman and Helpman, 2002, 2005), and the production costs and the degree of contractual frictions in foreign locations (Grossman and Helpman, 2005; Antras and Helpman, 2008). The greater are the relationship specific investments involved the more likely the component will be supplied through a vertically integrated affiliate. More recent developments have further allowed for differences in procurement choices across firms within the same industry (Antras and Helpman, 2004, 2008; Grossman et al, 2005). Antras and Helpman (2004) show for example, that the most efficient firms in an industry engage in offshoring activities. They also show that in the industries where vertical integration takes place, the most efficient firms engage in vertical foreign direct investment and the least efficient firms outsource in the domestic market.

A number of the hypotheses generated by these theories have now been tested, albeit largely using industry or country level data: Antras (2003), Yeaple (2006) and Nunn and Treffer (2007) all present evidence from the United States (U.S.), while Marin (2006) analyses the case of Germany and Austria. Using a measure of intra-firm imports they show how this is explained by industry characteristics such as intensity in research and development (R&D) and capital, and country characteristics such as levels of development. The work of Tomiura (2007) is an exception in using micro data, but considers a somewhat different question. Tomiura (2007) compares Japanese firms engaged in international outsourcing, in exports and in foreign direct investment. He shows that globalised firms are larger and more productive than firms that serve just the domestic market; that outsourcers are less capital intensive than globalised firms; and that amongst globalised firms those engaged in foreign direct investment are the most productive and those that export are the least productive.

A separate, and somewhat smaller, branch of the literature on offshoring extends the strategic interactions that take place between firms and their suppliers, allowing firms to simultaneously source the same components from different suppliers. They undertake some form of international second sourcing. Second sourcing might take place within the same mode of supply, outsourcing or FDI, but from different locations, or using outsourcing and FDI from the same, or different, locations (summarised in Table 1). A number of factors have been used to motivate second

sourcing. In a direct extension of the Antras and Helpman (2004) framework Du et al. (2006) for example, show that international second sourcing is used to counter-balance the disadvantages of the hold-up problem and incentives to invest that occur when procurement is from a single supplier, even though second sourcing incurs additional set-up and monitoring costs. In both headquarter and component intensive industries they find that the most productive firms will choose some form of international second sourcing.

Using rich data on the international transactions of intermediate inputs in this paper we document the extent of international second sourcing by French firms and explore the firm and component characteristics that make procurement of this type more likely. Initial investigations suggest that international second sourcing is important: indeed in terms of both the number and value of transactions of intermediate inputs they represent the dominant pattern of procurement. There are some 22,322 international transactions of intermediate inputs by 2,535 firms within the data, with a total value of representing €52.6bn. Of these 43 per cent of the number of transactions and just 11 per cent of their value represent procurement through FDI or outsourcing from single locations considered in much of the theoretical literature on this topic. The most common type of procurement is instead through outsourcing from more than one country (35 per cent of transactions and the value of imports), while that through a mix of FDI and outsourcing has the greatest value (41.3 per cent of the value and 13 of the number of transactions). Imports through affiliates in different locations represent 6 per cent of the number and 12.5 per cent of the value of transactions.

{some more stuff we learn from the paper}

The rest of the paper is organised as follows...

International Second Sourcing

In most models of international outsourcing versus vertical integration (FDI) firms choose between a single supplier/location. Second sourcing occurs when those different procurement modes exist simultaneously, or when firms choose either outsourcing or FDI but use multiple supplier locations.¹ The models differ according to the strategic motives behind firm decisions and are concerned with second sourcing more generally rather than that confined to decisions about overseas procurement.

¹ Second sourcing is also referred to as concurrent sourcing; strategic sourcing; bi-sourcing; partial outsourcing; split award contracts.

Most of the theories of offshoring rely on either the transaction costs or property rights models of firm boundaries of Williamson (1975), Grossman and Hart (1986), Hart and Moore (1990).² Within the property rights theory of the firm, the ownership and control of assets by the supplier provides it an incentive to make investments and improve productivity. Some of these investments are usually thought to be highly specific to the production of a particular input (Helpman, 2006) and broadly capture the idea that the value of some investments have greater value inside than outside the relationship (Lafontaine and Slade, 2007). The best examples of the relationship specific investments being those in specialised tools and specific training programmes for workers. As supply is not fully contractible, the supplier poses as a consequence a hold-up problem to the buyer. Vertical integration minimises this hold-up problem but with reduced incentives to the upstream affiliate to maintain product quality and efficiency. Second sourcing through the simultaneous use of outsourcing and FDI occurs as a means to access the advantages of each procurement method and minimise the disadvantages were they used alone. The ability to source in-house the input reduces the hold-up threat of the external firm, but leaves an element of competition to the integrated firm.

Sectoral differences in contract dependency interact with the differences in the location specific costs. While both outsourced and integrated production have the ability to take advantage of lower production costs across locations, most obviously lower wage costs, they are also assumed to differ in the fixed costs of establishing such relationships. Fixed costs associated with vertical integration refer to the governance costs need to manage a larger hierarchical structure. Moreover, vertically integrated firms are considered to be less efficient (higher variable costs) in the production of intermediate inputs in comparison with specialised suppliers. The fixed costs associated with outsourcing refer to the costs needed to search and match with a suitable partner (Grossman and Helpman, 2002) and to write and enforce contracts (Antras and Helpman, 2008). However, because of contract incompleteness and of asset specificity, transaction costs are higher in the case of outsourcing (Williamson, 1975; Grossman and Hart, 1986). The literature on firms boundaries does not agree on the hierarchy of fixed costs between vertical integration and outsourcing; for example Antras and Helpman (2004, 2008) assume that these fixed costs are higher in the case of vertical integration while Grossman Helpman and Szeidl (2005) assume the opposite structure of fixed costs. There may be differences across countries because locations have characteristics that makes one procurement modes more likely, for example higher quality legal systems (Nunn, 2007).

Within ~~~, firms within the same industry make different choices about the mode of supply because they have different abilities (productivity) to cover the costs associated with those different

² Leahy and Montagna (2008) show how outsourcing and vertical integration choices might differ amongst otherwise identical firms according to cost and strategic interactions.

organisational forms. In Antras and Helpman (2004) it is the most efficient firms in an industry that engage in offshoring. They also show that in the industries where vertical integration takes place, the most efficient firms engage in vertical foreign direct investment and the least efficient firms outsource in the domestic market.

Given that second sourcing incurs additional fixed costs why would firms choose second sourcing as the optimal strategy. The main factors identified in the literature include complementary inputs, capacity constraints, relative bargaining position of the downstream agents and the presence of information networks (references).

The most direct extension of the offshoring literature to consider international second sourcing is offered by Du, Lu and Tao (2006). Using Antras and Helpman (2004) as their starting point they show that in the headquarter intensive industry second sourcing is more efficient than vertical integration which in turn is more efficient than outsourcing. However the need to set up and monitor two types of supplier relationship makes second sourcing the most costly, followed by FDI and then outsourcing. They find as a consequence that the most productive firms in the headquarter intensive industry use second sourcing, those with intermediate productivity choose FDI and those with the lowest productivity outsource internationally. In component intensive industries the most productive firms second source, whereas those with lower productivity choose outsourcing. In industries of this type the incentive to make relationship specific investments is high, but an element of vertical integration is useful to reduce the hold-up problem. They further derive results on the mix of outsourcing and FDI in the high-wage North and the low-wage South. The South has the obvious advantage of cost, but the buyer also tries to use what the authors label the balancing effect. For second sourcing to work neither supplier can be too strong. The firm can manage this risk by locating the overly strong (weak) supplier in the high cost North (low cost South).

Of the other mechanisms that might generate second sourcing most follow that of informational rents in a dynamic model. See for example Anton and Yao (1987), Demski, Sappington and Spiller (1987), Laffont and Tirolle (1988), Farrell and Gallini (1988) and Riordan and Sappington (1989). Alvarez and Stenbacka (2007) use a real options approach allowing firms to manage the supply of inputs in the presence of demand uncertainty. They find that increased uncertainty increases the threshold beyond which firms start to outsource input supply. However once the firm has crossed this threshold and starts to outsource increased uncertainty means this mode of supply is used more intensively. Lin and Mukherjee (2008) show that in the presence of knowledge transfer the firm uses second sourcing to eliminate the incentive for the supplier to enter the final goods market. Finally, Creane and Davidson (2004) consider the motivation for horizontal mergers rather than vertical integration, although it seems likely the specific mechanisms at work could be

generalised to the case of intermediate inputs. In their quantity setting model firms merge but leave multi-divisions in order to take advantage available to multi versus single division firms. The merged firm affects the type of competition that exists between affiliates in such a way as to harm firms outside of the merger.³

Data Description:

Our analysis is based on data extracted from the "International Intra-group exchanges" survey conducted by the French Ministry of Economy via the SESSI (Service Des Etudes Statistiques Industrielles).⁴ This survey includes all firms that have at least one affiliate in the manufacturing sector and has at least one affiliate located outside of France (so called international industrial groups).⁵ We provide further information on the method through which the sample was collected within the Appendix. In this paper we have focused on firms in the manufacturing sector and on imports transactions for 2535 affiliates. Owing largely to the fact that importing firms are relatively rare, these affiliates represent 12% of the number of firms active in the French manufacturing industries.⁶ This coverage ratio varies across industries; from 3.9% in the leather and wearing apparel industry to 30% in the pharmaceutical industry. Table 2 presents the coverage ratio for each 2-digit industry.

The data are rich in detail. For each firm within French manufacturing we have information on whether the firm imported an intermediate input, the HS classification of that input, whether the transaction was with an affiliate in the same group or a third-party and the country from which it was imported. This transaction relates to the origin country of the import and the (4 digit) Harmonised System industry. Unfortunately while there are multiple transactions within a 4-digit code from a given destination within the data, relating to different intermediate inputs, the industry classification is not available at a more disaggregated level. Examples of 4-digit HS codes include 'spark-ignition reciprocal or rotary internal comb piston engines' (4707) and 'compression-ignition internal combustion piston engines' (4708). We discuss the implications of this for our definition of second sourcing below.

³ After the merger the game is structured such that there is staggered competition between the affiliates and Cournot competition between the merger firm and those outside of the merger.

⁴This survey was conducted in order to have a clear picture of the organization and of the structure of international trade by French firms. One of the main objectives of the survey was to analyze the strategy of French firms, and especially French groups, toward globalization and how this strategy is affecting the organization of their international trade transactions.

⁵ Control rate at least equal to 50 %.

⁶ We measure the total number of firms on the basis of the firm annual survey for the year 1999. The firm annual survey covers only the firms with more than twenty employees. Small firms are not accounted for in the survey and in our calculations.

In Table 1 we summarise how we categorise import transactions into 6 broad groups. All transactions involving a single country of origin are given the pre-fix *mono*, while those involving multiple locations are given the pre-fix *multi*. FDI and Outsourcing refer to whether the supplier was an affiliate within the same firm or not, while *mixed* refers to occasions where both types of supplier were present. We refer to international second sourcing as those transactions that are not mono-FDI or mono-outsourced. Some of these might involve second sourcing, but where one of the suppliers is another French firm. We cannot observe such transactions within our dataset.

Restricting the sample to firms that imported at least one input, and defining the range of intermediate inputs that a firm within a given industry might source according to the number of intermediate inputs (HS 4-digit codes) within an industry for which we have import data⁷, and ignoring the different modes through which importing takes place and the country of origin, gives 749,506 potential observations. Just under 3 per cent per cent (22,322) of the possible combinations of import transactions are non-zero. Importing an intermediate input is a rare event.

In Figure 1 provides some initial evidence of the importance of international second sourcing. As this figure shows show the majority of intermediate inputs are not single sourced by a firm. They are instead multiple sourced using either FDI or outsourcing, and on some occasions both, from a single location (country) or multiple locations.⁸ There are 22,322 international transactions of intermediate inputs by 2,535 firms within the data, with a total value of representing €52.6bn. Of these transactions 70 per cent of components purchased solely from unaffiliated firms, labelled as outsourcing in the figure, and 14 per cent solely from affiliates within the same group, labelled as FDI. Of those outsourcing transactions half are secured from a single location and half from multiple countries however. Of the inputs traded between affiliates 42 per cent are from a single location and 58 per cent from affiliates in multiple locations. Perhaps most surprisingly however, 16 per cent of the transactions within the data include both affiliates and non-affiliates, 3 per cent from a single location and 13 per cent involve multiple locations.

Second sourcing also dominates in terms of the value of the transactions. FDI and outsourcing involving multiple locations accounts for 12.5 and 34.7 per cent of the value of imports and the mixed FDI-outsourcing choice 42 per cent. Just under 11 per cent of the total value of imports are therefore using the procurement modes of FDI and outsourcing from single locations considered much of the theoretical literature on this topic.

⁷ We assume that every firm within each industry uses the same range of inputs, some of which are sourced domestically and some are imported, but do not restrict the quantities it combines these within the production function.

⁸ The ability to observe only international purchases on intermediate inputs makes it likely we are underestimating the true extent of second sourcing within the data.

In Table 3 we consider whether second sourcing is a peculiarity of a small number of industries, by presenting the same information for the (2-digit) industry in which the firm operates. It would appear that it is not. The table shows for example that there are 370 firms that import at least one input in the food and beverage sector. Across these 370 firms a total of 295 different inputs are imported (4-digit codes), although no single firm imports all of these. The average firm imports just 6.6 inputs. There is some, but not dramatic variation across industries in the share of imported intermediates in total inputs. At its highest about 9 per cent of all inputs are imported in the leather and wearing apparel sector and 7 per cent in Other Transport. The remaining industries are all in the range 2.2 per cent (Food and Chemicals industries) to 4.8 per cent (Printing and Motor industries).

We also present in the table information on the percentage of transactions of imported intermediates that are sourced from a single foreign country, further disaggregated according to whether this is using outsourcing, FDI or a mixture of these two, or for which the same input is imported from multiple countries, again also broken down according whether it is using outsourcing, FDI or a mixed strategy. As can be seen from the table, the majority of imported intermediate inputs are second sourced. Indeed international second sourcing is the norm within our data. Again this is also a feature of all of the industries in our data. International second sourcing, whether through using multiple countries or different suppliers, ranges between 79 per cent in Pharmaceuticals and 88 per cent in Leather and Wearing Apparel. The most common methods of second sourcing are using outsourcing from more than one country, which accounts for over 72 per cent of all import transactions in Leather and Wearing Apparel, and using FDI and outsourcing together, in Electric and Electronic Products this accounts for over 50 per cent of all import transactions. Where FDI and outsourcing are used simultaneously, it is by far more common to use different countries of origin, indeed the mono-location mixed strategy is the least commonly used within our data. Finally, we also find that a non-negligible proportion of imported intermediates come from affiliates within the same group that are in different countries. In Electronic Components this is as high as 14 per cent of the transactions in our data.

In Table 4 we present information on whether international second sourcing is a characteristic of the type of products that are being imported. In this table we organise products according to the industry in which the input originates. This does not appear to be the case, all of the sourcing modes are frequently observed. There exists cross-industry variation however. Of inputs in the printing and publishing sector 76 per cent are second sourced, while in Motor industry the figure is close to 93 per cent.

Combining this with the country of origin of that input gives ~~~~ potential observations, ~~ per cent of which are non-zero. In the final column of the table we report for those inputs that are

sourced from more than country of origin the average number of countries. As can be seen the average is between two and three. Some import from many more. For example in the Electric and Electronic Products industry, one firm imports one input (classified within the Electric and Electronic Products industry) from 51 different locations, while another imports two of its inputs (also classified within the Electric and Electronic Products industry) from 36 different locations.

{this section is incomplete}

Share in total costs: measured as the ratio of the imported value of the input over the firm's total costs. Total costs are measured as the sum of the wage bill, the taxes and input purchases.

Share in total costs <5%: a dummy indicating if the value of the input's imports represents less than 5% of the firm's costs.

Share in total costs (5%-10%): a dummy indicating if the value of the input's imports represents less than 10%, but more than 5%, of the firm's costs.

Share in total costs (10%-20%): a dummy indicating if the value of the input's imports represents between 10 and 20% of the firm's costs.

Share in total costs (20%-50%): a dummy indicating if the value of the input's imports represents between 20 and 50% of the firm's costs.

Share in total costs (>50%): a dummy indicating if the value of the input's imports represents more than 50% of the firm's costs.

Firms and International Second Sourcing

In order to provide information on the characteristics of the firm and its industry the survey of international transactions is merged with annual firm survey "Enquête Annuelle d'Entreprise (EAE)" conducted by the French Ministry of Industry. This survey is exhaustive, obligatory and concerns all firms with more than twenty employees in the French manufacturing industries. The "EAE" survey provides data on the productive activity of firms such as output, sales, value-added, number of employees, stock of capital, investment and use of intermediates. This data allows us to estimate the total factor productivity (TFP) of firms and to construct several control variables such as the scale and capital intensity and to identify the sector of main activity. We also use the EAE survey to compare firms that conduct international trade with the general population of firms that do not.

{this section is incomplete} In Table 5 we display information on output, sales, value-added, number of employees, TFP⁹, stock of capital, average wage investment and use of intermediates by firms within our sample separated in to various groupings. Columns 1 and 2 compare the mean

⁹ Total factor productivity is estimated using the Olley and Pakes (1996) semi-parametric methodology. We estimate TFP industry by industry on the basis of the "EAE" survey.

values for those firms that source internationally, through either outsourcing or FDI, one or more of their intermediate inputs, and those that do not.

Columns 3 and 5 further separate the firms that conduct international trade according to whether the firm imports at least one of its inputs through FDI, column 3, and in column 5 whether it outsources. There is an overlap between the firms listed within the two groups according to the mix of offshoring through FDI or outsourcing amongst their full range of intermediate inputs. Column 4 further separates firms according to whether they import the same intermediate input through FDI in multiple locations, while column 6 does the same for outsourcing. The final two columns consider the characteristics of firms choosing a mix of outsourcing and FDI, from a single origin country (column 7) and multiple countries (column 8).

{some discussion of this table}

Products and International Second Sourcing

{this section is incomplete}

R&D stock: This variable measures the R&D stock at the 2-digits product level. The R&D stock is calculated using the perpetual inventory method on the basis of R&D expenditures for the OECD countries.¹⁰ The data is extracted from the OECD Science and Technology data base for the period 1990-1999. This variable reflects the degree of inputs' specificity. Input specificity has several aspects ranging from location or site specificity, physical asset specificity (specific investment in machinery), or human capital specificity (Williamson, 1988). The literature does not present a single measure of asset specificity but usually the R&D activity is considered as a good proxy for relation specific investments and of headquarter services (Antras and Helpman, 2004).

Market Thickness: This variable is measured as the total number of active establishments at the 2-digits product level. It is calculated as the sum of establishments within the OECD countries. The data is extracted from the OECD Industry Indicators data base. This variable represents the the availability of specialized suppliers. In thicker markets, the probability of finding a suitable partner increases and the viability of outsourcing is higher (Grossman and Helpman, 2005).

Econometric Evidence

We consider further a number of the relationships suggests by the summary analysis above using more formal statistical techniques, focusing on both firm and product characteristics. In these regressions we use as the dependent variable a dichotomous variable that varies for every product

¹⁰ We assume a 15% annual discount rate and a 5% pre-sample growth rate.

according to whether the firm imports that input, the relationship with the supplier and the number of countries of origin of the input.

{estimated equation}

In regression 1 (Table 8) we consider first the firm and product characteristics that determine whether an intermediate input is imported or not. We find from this analysis that an input is more likely to be imported when the firm is large, capital intensive and skill intensive (proxied by the average wage of the firm) and interestingly is less likely if the firm is foreign owned. We report in the table marginal effects. These suggest that of these firm characteristics the scale of the firm has the strongest quantitative effect. We also find some role for product characteristics. An input is more likely to be imported the greater is the R&D intensity of the product, measured by the stock of R&D amongst OECD countries, and the greater is the market thickness of the industry of the product, measured as the number of establishments within the 2-digit industry of the product.¹¹

Altogether it would seem that intermediate inputs are more likely to be imported by the best firms in the industry and that these are more likely to be the most technologically intensive products in which there are a large number of external suppliers. This accords with the evidence from ~~~ that firms which import are more likely to be...{evidence from the literature}.

In regression 2 we also confirm evidence from {citations} that the firms that import through FDI are different from those that outsource inputs. Firms that outsource internationally are more likely to be bigger and more productive, but less likely to be skill intensive than firms that source intermediates from foreign affiliates. In contrast to the results found for whether the product is more likely to be sourced from abroad or not in regression 1, we find no role in these regressions for product characteristics. The characteristics of the product does not appear to influence the mode of procurement, which is instead determined by the characteristics of the firm.

Regressions 3 and 4 and 5 provide the first evidence on the probability of international second sourcing. Regression 3 compares firm and industry characteristics between those products that are sourced from a single foreign affiliate versus multiple foreign affiliates and regression considers the same question but for outsourcing. It would appear from the evidence in these two regressions that international second sourcing is a distinct procurement strategy compared to single sourced products, even when the relationship with the supplier is identical. Firms are more likely to use multiple foreign affiliates when the affiliate in France is large, more skill intensive, but less capital intensive. Firms that outsource to suppliers in multiple countries are also more likely to be large, but the relationship with capital intensity is reversed and there is no effect from skill intensity. Of the product characteristics we find that market thickness plays an important role in the

¹¹ The results for firm characteristics are robust to the inclusion of 4-digit product fixed effects.

procurement decision of French affiliates. Second sourcing is more likely when the number of foreign firms that supply that input is large.

In the final column in Table 8 (regression 5) we report the results of a regression of the probability of procuring the same input using a mixed strategy of outsourcing and FDI the same intermediate input, again from a single versus multiple locations. Even for this the comparison of mixed procurement strategies we find a role for firms and product characteristics. Firms that choose a multi location mixed strategy are more likely to be productive and skill intensive firms, although now we find no role for scale or capital intensity. The products that are multi-country sourced are less likely to be technologically intensive products, suggesting perhaps that competition between suppliers might be a motivating factor.

Table 9 extends the specification in Table 8 to include the share of the firms' total costs that the intermediate input accounts for. It is possible to create such a measure only for those observations that are sourced internally and so we drop the equivalent of regression 1 from the table. We develop five categories of costs: below 5%, 5-10%, 10-20%, 20-50% and above 50%. We use below 5% as the reference group in the regression. Again we report the estimated marginal effects, calculated at the mean of the right hand side variables. The firm and product characteristics already discussed remain in the main robust to the inclusion of these additional regressors. Of the changes that occur these are confined to regression 9, the choice between multi or single sourcing using a mixed strategy of outsourcing and FDI. In this regression we find that the TFP of the firm is no longer statistically significant, but the firm size is and that the R&D of the product is no longer significant.

The share in total costs would appear to be a significant determinant of all of the choices made. An input is more likely to be internally sourced through FDI the greater is its share in total costs. Similarly firms are more likely to choose second sourcing, irrespective of whether the supplier relationship is of FDI, outsourcing or a mixed strategy, when these conditions exist. The marginal effects point to some non-linearity in this relationship. While in general the marginal effects increase with the share in costs, there is a suggestion from both regression 7 and 9 that this is not a simple relationship. We find for example in regression 9 that a product with a share in costs above 5% is more likely to be sourced from more than one country in a mixed strategy of outsourcing and FDI, but where this probability is highest when the share in costs is between 10-20%. The relationship in regression 7 is more complicated, the estimated marginal effect is smaller in the cost range 20-50% compared to the surrounding cost shares. {how many obs is this being identified off}

Multinomial logit Models

{this section is incomplete}

Thus far we have restricted the analysis to pairs of choices, the decision to outsource or use FDI for example. In the remaining regressions we consider the full array of choices available to firms. In so do we hope to provide a stronger sense of the {what are we trying to do}.

In Table 10 we report the results from a multinomial logit model of the choice by a French firm to import an intermediate input from a single foreign country, or from multiple foreign countries. Importing from multiple foreign countries are chosen as the reference group. The results confirm the evidence found using the probit analysis that firms that source internationally are exceptional compared to those that source the same input domestically and those that source from a single foreign location. Firms that procure inputs through these methods are significantly smaller and in the case of using only domestic suppliers they are also more likely to be less capital and skill intensive than firms that source internationally.

In Figure 4 we provide a visual perspective on the difference between the intermediate inputs that are imported using single or second sourcing compared to those that are not. As can be seen from the figure firm scale has the largest effect on the probability that a particular mode of transaction is chosen, with strong effects also found for skill intensity, capital intensity and the product level variables, R&D and market thickness. The figure also makes clear that the firms and products that are not imported are much more distinct than the firms and product combinations that determine second over single sourced intermediate inputs.

Table 11 further extends the choices on procurement choices on offer to firms by separating the mono and multi-location options in Table 10 according to the relationship with the supplier, FDI, outsourcing or a mixture of the two.

References

{to be completed}

Figures

Figure 1: Percentage of Transactions Through Different Procurement Modes

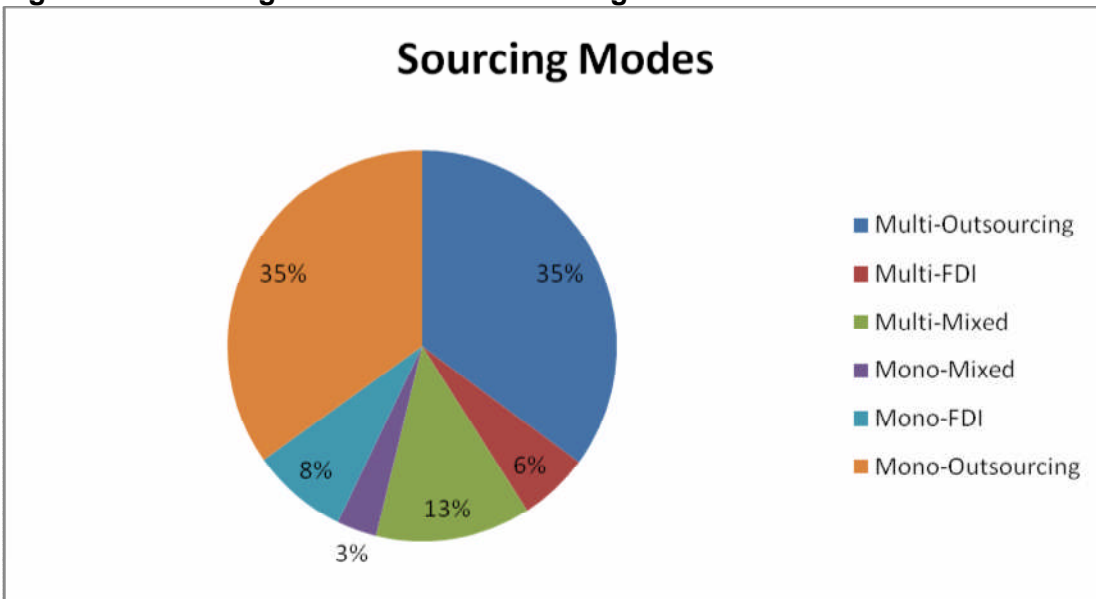


Figure 2: Ten Most Importers and their Percentage of Transactions

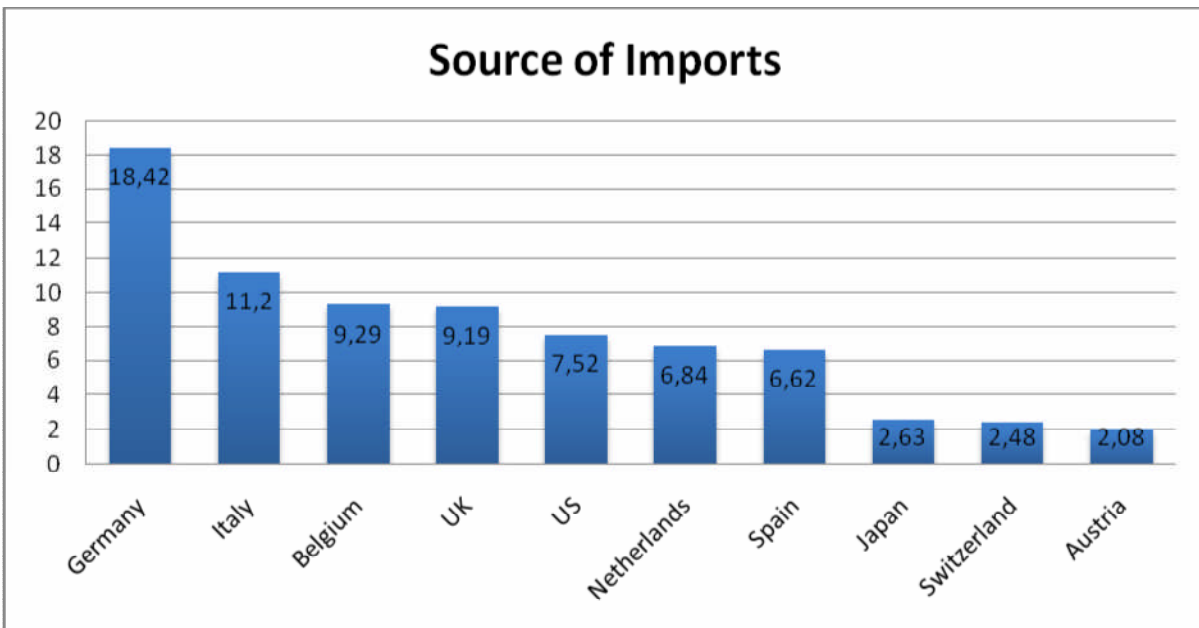


Figure 3: Ten Most Importers and their Percentage of Transactions

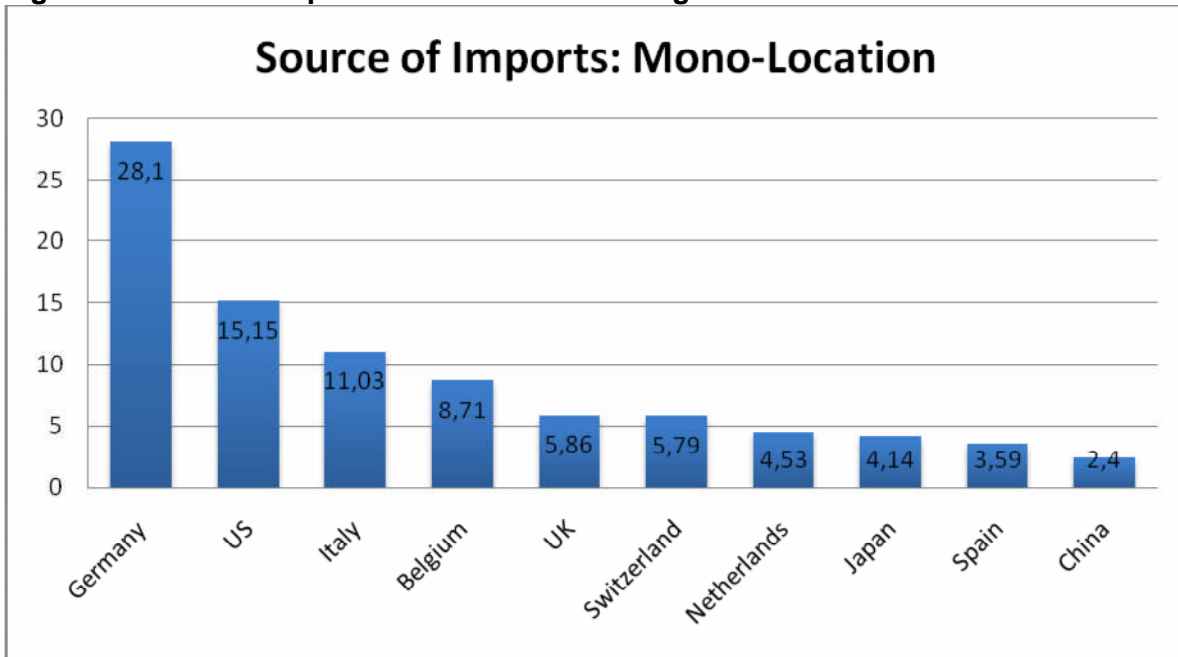


Figure 4: Relative odds from Multinomial Logit Model: Table

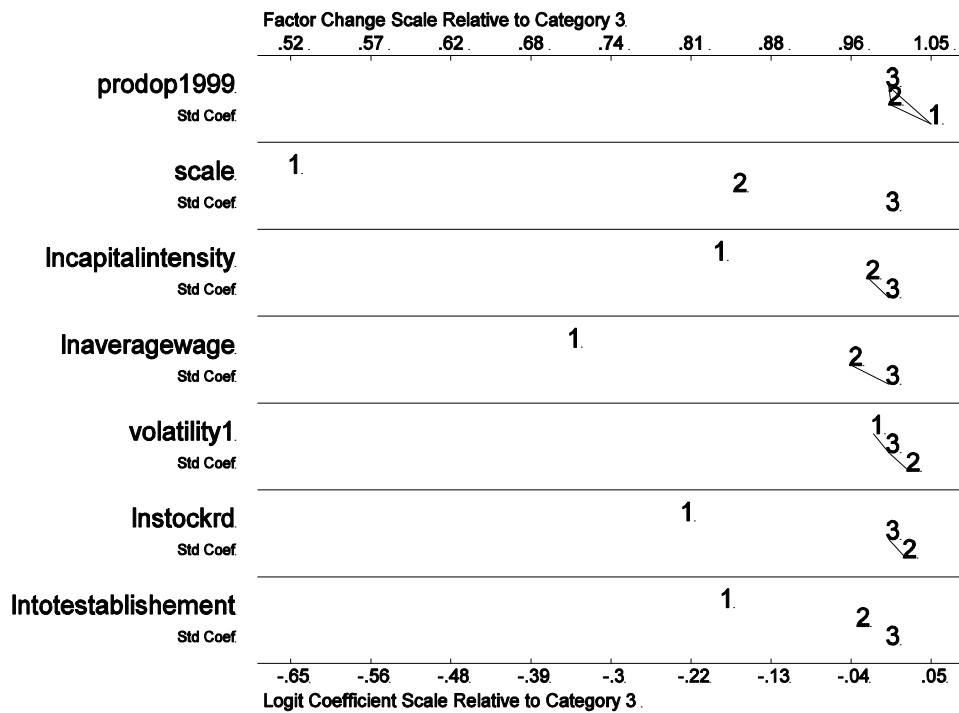


Figure 5: Relative odds from Multinomial Logit Model: Table

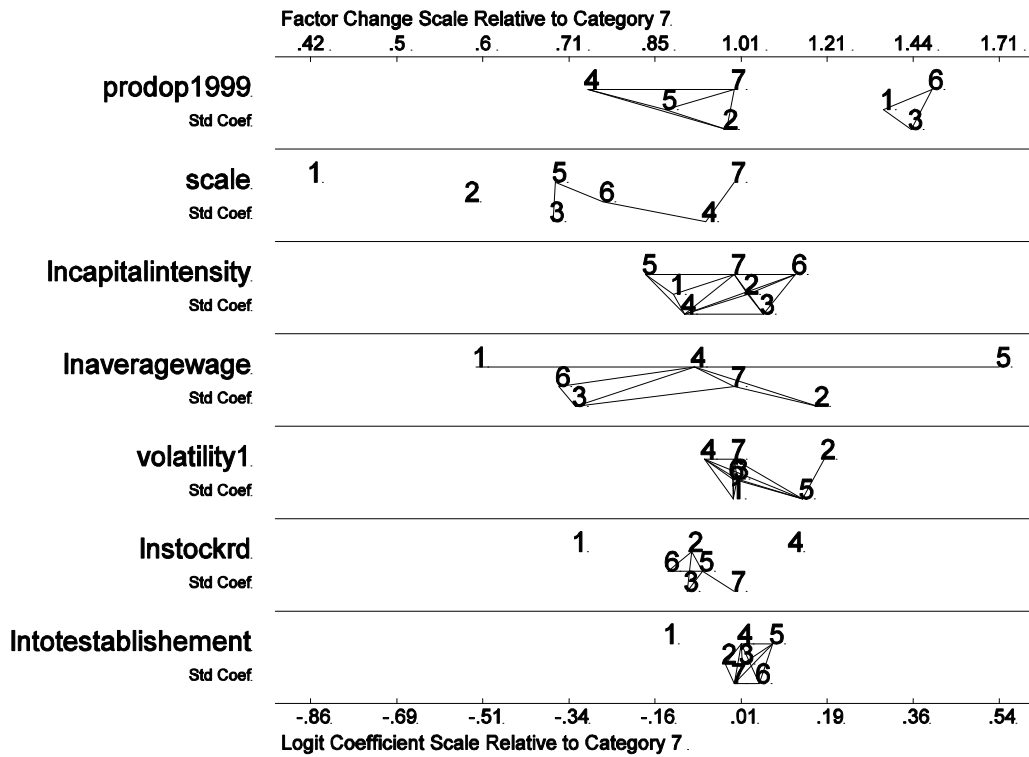


Figure 6: Relative odds from Multinomial Logit Model: Table

	2	1	3	4	5	6
ire in total costs(5-10%)-0/1.	2	1	3	4	5	6
e in total costs(10-20%)-0/1.	2	1	3	4	5	6
e in total costs(20-50%)-0/1.	2	1	3	4	5	6
are in total costs(>50%)-0/1.	2	5	1	3	4	6
	-.33	-.24	-.14	-.04	.05	.15
	.25	.34	.44			

Change in Predicted Probability for sourcing2

Tables

Table 1: Definitions of Single and Second Sourcing

<i>label</i>	<i>Outsourced</i>	<i>FDI</i>	<i>Single country of origin</i>	<i>Multiple countries of origin</i>
Mono-FDI		√	√	
Mono-Outsourced	√		√	
Mono-Mixed	√	√	√	
Multiple-FDI		√		√
Multiple-Outsourced	√			√
Multiple-Mixed	√	√		√

Table 2: Sample Coverage by Industry

Industry	Total Nb of Firms	Nb of Affiliates in the Sample	Coverage Ratio
Food Industry	3110	370	11.9%
Leather and Wearing Apparel	1689	66	3.9%
Printing and Publishing	1823	77	4.22%
Pharmaceutical	554	169	30.5%
Home Equipment	1378	169	12.26%
Motor Industry	554	122	22.02%
Other Transport Industry	305	54	17.7%
Mechanical Products	3639	391	10.7%
Electric and Electronic Products	1205	208	17.26%
Textile	1378	103	7.47%
Wood and Paper	1252	165	13.2%
Chemical, Rubber and Plastic Products	2116	484	22.8%
Electronic Components	876	157	17.9%
Total	19879	2535	12.75%

Table 3: Single and Second Sourcing Transaction by Industry of the Firm

<i>Industry</i>	<i>No. of Firms</i>	<i>Set of Inputs</i>	<i>Ave. No. of Inputs per Firm</i>	<i>% of all Obs.</i>	<i>Mono-Location</i>	<i>Of which</i>			<i>Multi-Location</i>	<i>Of which</i>			<i>Ave. No. of Countries</i>
						<i>Outsourced</i>	<i>FDI</i>	<i>Mixed</i>		<i>Outsourced</i>	<i>FDI</i>	<i>Mixed</i>	
Food industry	370	295	6.63	9.29	19.03	16.63	2.40	0.51	80.46	61.12	5.21	14.13	2.30
Leather & wearing apparel	66	169	15.91	5.64	11.72	10.58	1.14	0.08	88.20	72.77	4.65	10.77	3.04
Printing and Publishing	77	80	3.83	1.20	19.42	16.67	2.76	0.39	80.18	64.17	7.61	8.40	2.42
Pharmaceutical	169	304	10.85	6.80	20.60	15.63	4.96	0.99	78.41	53.96	9.35	15.10	2.17
Home equipment	169	356	8.91	6.61	16.33	12.03	4.30	1.45	82.22	41.73	7.47	33.02	2.55
Motor industry	122	219	10.33	6.50	11.81	9.54	2.27	1.57	86.62	42.47	3.43	40.71	2.97
Other transport industry	54	189	13.20	3.47	19.74	18.42	1.31	3.62	76.64	54.46	3.12	19.06	2.26
Mechanical products	391	259	6.27	11.45	17.58	14.45	3.13	1.11	81.31	41.69	9.33	30.29	2.57
Electric & electronic products	208	230	9.06	11.88	12.44	8.45	3.99	1.41	86.14	26.55	7.58	52.02	3.18
Textile	103	228	8.14	3.80	14.09	11.53	2.56	1.16	84.75	58.14	5.70	20.91	2.60
Wood & paper	165	217	8.12	5.51	17.64	15.58	2.05	0.63	81.74	60.17	6.35	15.21	2.48
Chemicals, rubber & plastic products	484	476	10.62	19.31	18.84	15.49	3.35	1.80	79.36	46.10	7.74	25.52	2.22
Electronic components	157	228	9.92	8.54	13.29	9.63	3.66	1.18	85.53	28.64	14.28	42.61	3.04

Table 4: Single and Second Sourcing Transaction by Industry of the Intermediate Input

<i>Product (2 digits)</i>	<i>Set of Inputs</i>	<i>% of Obs.</i>	<i>Mono-Location</i>	<i>Of which</i>			<i>Multi-Location</i>	<i>Of which</i>			<i>Average Number of Countries</i>
				<i>Outsourced</i>	<i>FDI</i>	<i>Mixed</i>		<i>Outsourced</i>	<i>FDI</i>	<i>Mixed</i>	
Food industry	120	6.02	17.93	14.51	3.42	0.91	81.16	52.45	7.18	21.53	2.41
Leather & wearing apparel	56	4.39	12.95	11.13	1.82	0.25	86.80	63.97	4.79	18.03	2.99
Printing and Publishing	12	0.83	23.02	18.11	4.91	1.32	75.66	50.75	8.87	16.04	2.18
Pharmaceutical	31	3.19	18.04	12.12	5.91	0.89	81.07	46.87	11.93	22.28	2.50
Home equipment	92	5.06	15.76	12.47	3.29	1.43	82.81	36.46	6.73	39.62	2.80
Motor industry	13	2.51	7.33	5.76	1.57	0.44	92.24	37.70	7.08	47.46	4.04
Other transport industry	18	1.05	6.11	4.92	1.19	0.75	93.14	56.04	4.62	32.49	4.55
Mechanical products	95	18.67	17.79	14.68	3.11	1.59	80.62	46.85	8.04	25.73	2.44
Electric & electronic products	35	9.72	15.42	11.70	3.72	1.50	83.08	30.60	10.12	42.36	2.84
Textile	90	5.61	15.07	12.92	2.16	0.42	84.51	68.11	5.52	10.87	2.58
Wood & paper	51	5.32	18.16	15.29	2.86	0.83	81.02	56.24	5.88	18.90	2.36
Chemicals, rubber & plastic products	205	26.15	19.08	15.66	3.42	1.67	79.25	50.55	7.11	21.59	2.19
Electronic components	26	11.47	11.20	8.63	2.57	1.10	87.70	29.75	8.01	49.95	3.31

Table 5: Firm Characteristics by Single and Second Sourcing

Variable	Total Sample	FDI	Mono-FDI	Multi-FDI	Outsourcing	Mono-Outsourcing	Multi-Outsourcing	Mixed	Mono-Mixed	Multi-Mixed
TFP	4.21	4.15	4.14	4.13	4.21	4.21	4.20	4.32	4.37	4.32
Output	114003.20	106482.2	114289.30	123534.10	122677.50	134976.40	138545.60	207092.40	249617.60	212777.00
Sales	127271.40	128576.9	139154.40	150882.90	134843.50	148303.80	150935.30	232100	300128.20	239378.10
Value Added	31842.95	36757.84	38716.62	43258.43	33395.95	36246.43	37314.45	53893.40	76496.56	55060.50
Scale	521.48	592.85	616.64	697.11	552.19	590.75	612.88	821.98	1211.78	842.59
Average Wage	22.80	24.38	24.90	24.95	22.51	22.70	22.47	24.03	25.52	24.11
Investment	12622.66	6893.50	7107.22	9056.21	14290.03	16042.11	16828.16	26880.92	17236.53	28171.72
Capital Stock	51789.48	56518.54	59182.99	69671.64	55458.02	61123.78	63375.08	90369.72	111942.00	93087.03
Material Inputs	64252.17	62460.17	68765.61	74867.77	68075.34	75494.53	76102.13	125623.90	147752.90	131068.60

Note: All monetary figures are expressed in thousands of Euros.

Table 6: Firm Characteristic, Product and Industry Summary Statistics

Variable	Level	Nb of Observations	Average	St. Deviation
TFP	Firm Level	2469	4.21	0.98
Output	Firm Level	2535	114003.20	736412.30
Sales	Firm Level	2535	127271.40	771505.80
Value Added	Firm Level	2535	31842.95	127888.40
Scale	Firm Level	2535	521.48	1315.79
Average Wage	Firm Level	2535	22.80	14.05
Investment	Firm Level	2535	12622.66	342222.30
Capital Stock	Firm Level	2535	51789.48	366553.70
Material Inputs	Firm Level	2535	64252.17	554162.70
Volatility	Firm Level	2535	0.27	0.18
Share in total costs	Firm-Product Level	22124	0.028	0.078
Share in total costs (<5%)			0.86	0.33
Share in total costs(5-10%)	Firm-Product Level	22124	0.062	0.24
Share in total costs(10-20%)	Firm-Product Level	22124	0.038	0.19
Share in total costs(20-50%)	Firm-Product Level	22124	0.025	0.15
Share in total costs(>50%)	Firm-Product Level	22124	0.006	0.08
Stock R&D	Product Level	13	168596.8	222373.4
Market Thickness	Product Level	13	36454.7	54084.37

Note: All monetary figures are expressed in thousands of Euros except for the Stock R&D variable which is expressed in millions of euros.

Table 7: Share in Total Costs by Single and Second Sourcing

Share in total costs	Percentage share in positive transactions	Mono-FDI	Mono-Outsourcing	Mono-Mixed	Multi-FDI	Multi-Outsourcing	Multi-Mixed
Share in total costs (<5%)	86.76%	8.42%	38.53%	3.62%	5.54%	32.88%	10.98%
Share in total costs(5-10%)	6.24%	5.2%	15.48%	1.59%	6.94%	50.07%	20.69%
Share in total costs(10-20%)	3.82%	3.78%	15.13%	0.82%	6.5%	49.3%	24.46%
Share in total costs(20-50%)	2.51%	8.3%	10.43%	1.62%	8.8%	44.78%	26.07%
Share in total costs(>50%)	0.65%	4.82%	11.72%	3.44%	12.41%	42.06%	25.5%
<i>Share in Total Sample</i>		8%	35%	3%	6%	35%	13%

This table presents the share of each threshold in the total number of positive transactions, and the share of each mode of sourcing in the total number of transactions within a certain threshold. For example, the second line of the table show that 86.7% of the transactions represent less than 5% of the total cost of the affiliate and that 38.53% of the transactions, where the value is less than 5% of the cost, are imported through mono-outsourcing.

Table 8: Probit Estimation with industry dummies. Marginal Fixed effects.

Regression No.	1	2	3	4	5
	Import vs. not import	FDI vs Outsourcing	Multi vs. Mono FDI	Multi vs. Mono Outsourcing	Multi vs. Mono Mixed
VARIABLES					
<i>Firm Characteristics</i>					
TFP	-0.0128 (0.0192)	-0.316*** (0.0789)	-0.0583 (0.0705)	0.0161 (0.0383)	0.254** (0.107)
Scale	0.215*** (0.00763)	-0.0722** (0.0324)	0.0840*** (0.0249)	0.0618*** (0.0139)	0.0323 (0.0405)
Capital Intensity	0.0498*** (0.00931)	-0.0613 (0.0378)	-0.0808*** (0.0288)	0.0305* (0.0171)	0.0725 (0.0635)
Average Wage	0.190*** (0.0287)	0.576*** (0.136)	0.312*** (0.113)	-0.0357 (0.0533)	0.136* (0.0788)
Volatility	0.0581 (0.0431)	0.512** (0.217)	-0.188 (0.138)	-0.0241 (0.0837)	0.188 (0.220)
Foreign	-0.182** (0.0880)			0.0496 (0.104)	
<i>Product Characteristics</i>					
Stock R&D	0.0518*** (0.00342)	-0.00384 (0.0119)	0.0224 (0.0187)	-0.00846 (0.00779)	-0.0573** (0.0289)
Nb of Establishment	0.0730*** (0.00426)	0.00214 (0.0158)	0.0624** (0.0296)	0.0322*** (0.0124)	-0.00852 (0.0339)
Constant	-5.142*** (0.203)	-1.761** (0.699)	-2.360*** (0.705)	-0.621* (0.359)	-1.055 (0.991)
Observations	724217	18222	3000	15270	3401

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table9: Probit with product share. Marginal fixed effects.

Regression No.	6	7	8	9
	FDI vs Outsourcing	Multi vs. Mono FDI	Multi vs. Mono Outsourcing	Multi vs. Mono Mixed
VARIABLES				
<i>Firm Characteristics</i>				
TFP	-0.320*** (0.0791)	-0.0868 (0.0706)	-0.0206 (0.0386)	0.202* (0.110)
Scale	-0.0648** (0.0330)	0.114*** (0.0252)	0.115*** (0.0135)	0.105** (0.0411)
Capital Intensity	-0.0624* (0.0379)	-0.0825*** (0.0294)	0.0312* (0.0176)	0.0872 (0.0639)
Average Wage	0.585*** (0.137)	0.364*** (0.114)	0.0450 (0.0539)	0.185** (0.0794)
Volatility	0.512** (0.217)	-0.179 (0.139)	-0.0327 (0.0862)	0.106 (0.224)
Foreign			0.0880 (0.124)	
<i>Product Characteristics</i>				
Share in total costs(5-10%)	0.0426 (0.0524)	0.552*** (0.103)	0.963*** (0.0496)	1.002*** (0.132)
Share in total costs(10-20%)	-0.0309 (0.0756)	0.728*** (0.149)	1.032*** (0.0657)	1.445*** (0.202)
Share in total costs(20-50%)	0.377*** (0.0893)	0.445*** (0.134)	1.202*** (0.0919)	1.190*** (0.203)
Share in total costs(>50%)	0.476*** (0.145)	1.098*** (0.295)	1.246*** (0.174)	0.825*** (0.298)
Stock R&D	-0.00225 (0.0120)	0.0253 (0.0187)	0.000505 (0.00790)	-0.0463 (0.0291)
Nb of Establishments	0.00248 (0.0158)	0.0687** (0.0296)	0.0368*** (0.0126)	-0.0120 (0.0347)
Constant	-1.864*** (0.708)	-2.760*** (0.712)	-1.585*** (0.367)	-1.724* (1.003)
Observations	18222	3000	15270	3401

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 10: Multinomial Logit with industry dummies. Base category: Multi-Location

	(Sourcing)	(Mono-Location)
VARIABLES		
TFP	0.0512 (0.0558)	0.00286 (0.0514)
Scale	-0.553*** (0.0198)	-0.141*** (0.0180)
Capital Intensity	-0.128*** (0.0265)	-0.0147 (0.0238)
Average Wage	-0.429*** (0.0790)	-0.0500 (0.0692)
Volatility	-0.0906 (0.118)	0.119 (0.111)
Foreign	0.203 (0.150)	-0.304*** (0.0953)
Stock R&D	-0.114*** (0.00957)	0.00929 (0.00815)
Nb of Establishments	-0.175*** (0.0133)	-0.0313** (0.0156)
Constant	12.14*** (0.521)	1.485*** (0.468)
Observations	723745	723745

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Multinomial Logit with industries dummies. Base category: Multi-Mixed.

	(Sourcing)	(Mono-FDI)	(Mono- Outsourcing)	(Mono- Mixed)	(Multi-FDI)	(Multi- Outsourcing)
VARIABLES						
TFP	0.339** (0.145)	-0.0169 (0.163)	0.403*** (0.152)	-0.332 (0.216)	-0.156 (0.194)	0.449*** (0.169)
Scale	-0.732*** (0.0469)	-0.460*** (0.0664)	-0.313*** (0.0479)	-0.0490 (0.0858)	-0.309*** (0.0676)	-0.227*** (0.0555)
Capital Intensity	-0.0840 (0.0607)	0.0189 (0.0787)	0.0403 (0.0630)	-0.0689 (0.0999)	-0.123 (0.101)	0.0851 (0.0712)
Average Wage	-0.650*** (0.252)	0.210 (0.250)	-0.400 (0.254)	-0.0998 (0.359)	0.668** (0.304)	-0.442* (0.266)
Volatility	-0.0113 (0.301)	0.984** (0.493)	0.0324 (0.298)	-0.322 (0.447)	0.748 (0.548)	-0.0187 (0.325)
Foreign	-15.37*** (1.491)	-0.358 (1.374)	-16.13*** (1.470)	-0.00115 (1.906)	-0.671 (1.646)	-16.06*** (1.422)
Stock R&D	-0.165*** (0.0171)	-0.0443** (0.0219)	-0.0487*** (0.0179)	0.0602** (0.0294)	-0.0330 (0.0266)	-0.0687*** (0.0183)
Nb of Establishments	-0.133*** (0.0264)	-0.0177 (0.0382)	0.0159 (0.0292)	0.0141 (0.0441)	0.0764 (0.0467)	0.0489 (0.0304)
Constant	30.52*** (0.708)	2.612 (0)	19.94*** (0.622)	0.333 (0)	-0.0374 (0)	19.08 (0)
Observations	723745	723745	723745	723745	723745	723745

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Multinomial Logit with industries dummies. Base category: Multi-Mixed. Only positive transactions

	(Mono-FDI)	(Mono- Outsourcing)	(Mono-Mixed)	(Multi-FDI)	(Multi- Outsourcing)
VARIABLES					
TFP	0.0312 (0.178)	0.556*** (0.173)	-0.228 (0.226)	-0.168 (0.205)	0.555*** (0.188)
Scale	-0.609*** (0.0717)	-0.486*** (0.0537)	-0.181** (0.0890)	-0.395*** (0.0702)	-0.315*** (0.0609)
Capital Intensity	0.0466 (0.0802)	0.0913 (0.0651)	-0.0666 (0.0939)	-0.0777 (0.0919)	0.140** (0.0708)
Average Wage	0.0350 (0.268)	-0.789*** (0.297)	-0.381 (0.373)	0.640** (0.318)	-0.731** (0.306)
Volatility	1.232** (0.500)	0.264 (0.325)	-0.234 (0.455)	0.981* (0.529)	0.206 (0.347)
Foreign	-1.157 (1.534)	-16.13*** (1.479)	-0.0772 (2.024)	-1.435 (1.770)	-16.00*** (1.470)
Share in total costs(5-10%)	-1.768*** (0.150)	-2.352*** (0.109)	-1.911*** (0.273)	-0.854*** (0.141)	-0.813*** (0.0942)
Share in total costs(10-20%)	-2.381*** (0.214)	-2.796*** (0.139)	-2.838*** (0.468)	-1.199*** (0.195)	-1.146*** (0.116)
Share in total costs(20-50%)	-1.856*** (0.206)	-3.415*** (0.185)	-2.347*** (0.442)	-1.112*** (0.210)	-1.471*** (0.138)
Share in total costs(>50%)	-2.854*** (0.445)	-4.079*** (0.352)	-1.564*** (0.587)	-0.985*** (0.347)	-2.023*** (0.259)
Stock R&D	-0.0371 (0.0280)	-0.0207 (0.0240)	0.0679* (0.0395)	-0.00480 (0.0336)	-0.0148 (0.0241)
Nb of Establishments	-0.0346 (0.0422)	-0.0334 (0.0335)	-0.0132 (0.0507)	0.0706 (0.0479)	0.0167 (0.0332)
Constant	5.328 (0)	22.70 (0)	2.935 (0)	1.257 (0)	20.26*** (0.628)
Observations	21671	21671	21671	21671	21671

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix

The sample to be used in the "International Intra-group exchanges" survey was determined as follows. The identification of international industrial groups is based on the Financial Liaisons survey (LIFI). The LIFI survey provides information on the financial relations between affiliates: it identifies the parent firm as well as the country of origin. The survey was further restricted to affiliates for which the firm has majority control as well as to those belonging to a joint-venture. This generated a sample of 38414 affiliates controlled by 4826 firms. However, only 15 205 affiliates (belonging to 4661 firms) were active in international trade. The framework was then further narrowed to affiliates having an industrial or a commercial activity since they represent 96% of the international trade of the international industrial groups. This limited the sample to 12055 affiliates (belonging to 4582 firms). Finally, the survey was addressed only to commercial or industrial affiliates with more than one million Euros of trade flows or more than 500 thousands Euros of trade flows toward the emerging countries. This limitation reduced sharply the number of affiliates to 8239 (controlled by 4032 firms) while providing a significant coverage of the trade flows. Among these 8239 affiliates, only 4367 answered the survey. This rate of answer covers 53% of the affiliates but 82% of the trade flows of firms. The surveyed firms account for on average 55% of French imports and 61% of exports.

Within this survey each affiliate was asked to provide for every international trade transaction it conducted, the precise relationship between itself and the supplier; the share of the total value of the transaction conducted with an affiliate located abroad, the share traded with partners and the share traded with third parties or independent suppliers. The survey considers as partnership: technological alliances, licensing agreements, franchise and subcontracting agreements.¹² In this paper we consider trade with partners and trade with independent suppliers as "Outsourcing" and that with affiliates located abroad as FDI. This transaction relates to the origin country of the import and the (4 digit) Harmonised System industry. Unfortunately while there are multiple transactions within a 4-digit code from a given destination within the data, relating to different intermediate inputs, the industry classification is not available at a more disaggregated level. Examples of 4-digit HS codes include 'spark-ignition reciprocal or rotary internal comb piston engines' (4707) and 'compression-ignition internal combustion piston engines' (4708). We discuss the implications of this for our definition of second sourcing below.

¹² Since each firm reports separately each of its transactions, there are several observations per firm.

Table A1: Multinomial Logit with industries dummies. Base category: Multi-Mixed. Only positive transactions

	(Mono-FDI)	(Mono-Outsourcing)	(Mono-Mixed)	(Multi-FDI)	(Multi-Outsourcing)
VARIABLES					
TFP	-0.000177 (0.175)	0.535*** (0.170)	-0.255 (0.227)	-0.195 (0.203)	0.531*** (0.185)
Scale	-0.584*** (0.0705)	-0.490*** (0.0538)	-0.166* (0.0913)	-0.363*** (0.0691)	-0.292*** (0.0605)
Capital Intensity	0.0578 (0.0795)	0.100 (0.0644)	-0.0564 (0.0934)	-0.0701 (0.0909)	0.145** (0.0701)
Average Wage	0.0923 (0.266)	-0.781*** (0.292)	-0.347 (0.376)	0.697** (0.315)	-0.692** (0.300)
Volatility	1.238** (0.499)	0.263 (0.322)	-0.233 (0.455)	0.982* (0.529)	0.204 (0.344)
Foreign	-1.125 (1.510)	-16.10*** (1.450)	-0.0487 (2.051)	-1.434 (1.749)	-16.01*** (1.439)
Share in total costs	-8.039*** (1.000)	-17.81*** (1.318)	-10.40*** (3.548)	-2.713*** (0.473)	-3.853*** (0.318)
Stock R&D	-0.0360 (0.0277)	-0.0195 (0.0235)	0.0701* (0.0395)	-0.00182 (0.0336)	-0.0110 (0.0239)
Nb of Establishments	-0.0266 (0.0421)	-0.0302 (0.0330)	-0.00830 (0.0506)	0.0777 (0.0476)	0.0219 (0.0331)
Constant	4.631 (0)	22.57 (0)	2.457 (0)	0.551 (0)	19.76*** (0.632)
Observations	21671	21671	21671	21671	21671

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1