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Supplier-Buyer Proximity and Production to Order Choice

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Abstract

We study the determinants of the firm-level choice to produce following an order placed by a downstream firm (production to order) or to produce in advance. We rationalize this choice through a simple theoretical model and apply it to a firm-level empirical analysis. Relying on a large panel of Italian manufacturing firms, we show that two main variables affect this choice: the distance between the supplier and the buyer and the degree of product differentiation in downstream industries where products are sold. The impact of proximity on the choice of producing to order crucially depends on the degree of product differentiation in downstream markets. We find that, in industries where average product differentiation is high, production to order prevails if the supplier is located close to the buyer. On the contrary, proximity is associated to production in advance in homogeneous sectors. We also find that, if suppliers are located in a different country from that of the buyers, they will tend to produce to order if product differentiation in downstream industries is low, and produce in advance if product differentiation is high. We also narrow the scope of our analysis to analyze the determinants of production to order originating from the same province where the supplier is located.

Keywords: Industrial Districts; Networks; Production to Order; Relationship-Specific Investments; Trade;
JEL Classification: D23; F10; L14; R34

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1 Introduction

The aim of this paper is to study the determinants of the choice concerning production to order. This way of organizing production is the opposite of production for stock (also called production in advance) where products are stored as inventory and shipped as orders arrive.

We consider the transaction that follows a specific order placed by the buyer as a special form of trading network, giving rise to what we call a pairwise connection. While in organized exchange markets the price clears demand and supply and it is taken as given by traders, in these networks the two transacting parties have the possibility to bilaterally negotiate over the price at which the transaction will actually occur. Moreover, while organized exchange markets are anonymous, when this kind of pairwise connection emerges, the buyers know exactly who the seller is, and viceversa. As we will see, orders primarily concern the production of intermediate inputs.

We focus on trade in intermediate inputs that is carried out through pairwise connections for two main reasons. First, trade in intermediates is becoming increasingly more important as international disintegration of production does so. A look at input-output tables is illuminating in this respect. Antràs and Helpman (2004), citing various sources of information, report that the share of imported intermediates in the U.S. increased from 5.3% in 1972 to 11.6 % in 1990. Similar evidence can be found for Canada and the United Kingdom. Moreover, it has been shown that international trade has grown faster in components than in final goods. The second reason deals with the relevance of pairwise connections among firms in the trade of commodities. Keeping in mind that pairwise connections are an alternative to organized exchange markets as a mean to trade goods, one can realize that most of manufacturing goods are traded through networks, and not through organized exchange markets. The reason is that product differentiation is an obstacle to the emergence of markets that are thick enough to satisfy the standard properties of a competitive exchange equilibrium. In differentiated industries, suppliers are connected with specific contracts to buyers. For this reason, a strong correlation exists between the degree of product differentiation of manufactured products and the way these products are traded, either through a direct connection between the buyer and the seller, or through anonymous markets.[1]

Rauch (1999), using data on U.S. General Imports and Exports for the years 1970, 1980, and 1990, computes what share of total trade (imports plus exports) belongs to differentiated commodities. He finds that, in 1990, roughly 65% of U.S. total trade was done in differentiated commodities. This share was lower in 1970 and 1980, but always above 50%.[2] The importance of networks in trade is then the natural by-product of the importance of differentiated commodities.

Summing up, studying the determinants of networks originated by specific orders is a key issue

[1] This is something we will see in some detail from our firm-level data set.

[2] Actually, in the liberal classification employed by Rauch (1999), the share of differentiated commodities in U.S. total trade in 1980 was 48.9%. Rauch explains the temporary fall in 1980 by the huge increase, in that year, in the price of petroleum, an organized exchange product.

because of the composite effect of several facts: the importance of differentiated products in overall trade volumes; the importance of trading networks in differentiated products; the increasing importance of trade in intermediates.

Because trading differentiated products involves a good deal of search costs, it comes as no surprise what Rauch (1999) finds in the world patterns of international trade. The first result is that proximity[3] is more important for differentiated products than for homogeneous products in fostering trade in a gravity model. The second result is that differentiated products tend to be less traded than more homogenous products. We cast Rauch's analysis into the micro level, as we want to assess what is role played by proximity in establishing connections among individual firms according to the degree of product differentiation of the products involved in the transactions. For this purpose, we will concentrate our attention on two polar cases: suppliers that sell their products to nearby buyers, located in the same industrial district, and suppliers that export their products to foreign buyers.

Our empirical results, based on a large sample of Italian manufacturing firms, concern the likelihood that agreements concerning production to order emerge. The existence of an exchange of intermediate inputs between the supplier and the buyer, following a specific order placed by the buyer, signals a pairwise connection among them. Our estimates show that the probability that this connection exists is increased if the supplier is located close to the buyers, when downstream industries are characterized by high product differentiation.[4] For the same type of downstream markets, the probability that the connection exists is decreased if the firm produces for foreign buyers. When downstream industries are homogeneous, it is less likely that the supplier is connected to a buyer in a pairwise fashion if a firm is located in a district. The opposite holds true for exporting suppliers, since the likelihood of production to order is increased if the supplier is engaged in exporting. The picture we get is that pairwise connections concerning production to order among suppliers and buyers are fostered among spatially clustered firms when downstream industries are differentiated. Suppliers connected in a pairwise fashion to foreign buyers are more likely to operate in homogeneous downstream industries.

As already mentioned, the first element to consider to explain our results is that, because of the costliness of the search process involved when product differentiation in downstream industries is high, pairwise connections for the exchange of goods are more easily formed by firms that are spatially clustered together. For the same reason, international pairwise connections are less likely to arise when downstream industries are highly differentiated.

Another thing to consider are the factors that reduce the hold-up risk. Since producing intermediate inputs require investments that are relationship-specific when downstream industries are characterized

[3]Proximity is defined both in a geographical sense and in a cultural sense, the latter being proxied by language or colonial ties.

[4]As we will describe at length below, we measure the degree of product differentiation of the industry to whom the intermediate inputs belong to by the average degree of product differentiation of the downstream industries where the inputs are actually used. Information about the use of intermediate inputs produced by a particular industry are retrieved by Input-Output Use tables.

by high product differentiation, the results' interpretation points to the fact that this type of investment is more efficient (and the hold-up problem is mitigated) when the supplier and the recipient of the good are spatially clustered together. Symmetrically, the hold-up problem is exacerbated when the supplier and the recipient of the good are located in different countries.

The paper is organized as follows. In section 2 we briefly review some relevant literature and place our paper in context. In section 3 we describe the data and variables we use and provide some preliminary statistics. In section 4 we present a simple model that explains the choice of producing to order or producing in advance. Section 5 presents our estimation strategy and our empirical results. Section 6 concludes.

2 Relation with previous literature

We have already described the findings by Rauch (1999). An important technical contribution he gives is the measurement of industries' product differentiation at a very fine level of disaggregation. Nunn (2007) employs Rauch classification to measure product differentiation in upstream industries. He then uses this measure to predict patterns of world trade in the following manner. He tests whether judicial quality (ensuring the enforcement of contracts) can be considered a factor of production on its own. If this is the case, a Heckscher-Ohlin framework predicts that those industries that employ relationship-specific-intensive intermediate inputs, being characterized by strong product differentiation in upstream industries, should be predominantly located in countries abundant in judicial quality. He finds that the data support this prediction. Contrary to Rauch (1999) and Nunn (2007), our approach, more than being focused on the determinants of aggregate volumes of trade or domestic production, concentrates on the determinants of pairwise connections among individual firms for the supply of products to domestic or foreign buyers.

Another strand of the literature linked to our analysis are theoretical papers studying the link between contractual incompleteness, agglomeration, and industrial clusters' formation.

As reviewed by Duranton and Puga (2004), spatial proximity might mitigate hold-up problems between buyers and sellers. If a large number of potential buyers is located around, it is likely that the hold-up problem is less severe for suppliers. This may be precisely the case in big cities as opposed to smaller urban areas, or in spatial clusters of small and medium-sized firms, as in the case of Italian industrial districts. Matouschek and Robert-Nicoud (2005) formally develop this line of reasoning in a slightly different context. They concentrate on relationship-specific investments made by workers. By substituting the term "intermediate inputs' suppliers" to the term "workers" their reasoning can be easily generalized. Interpreted in this manner, their paper proves that co-location of firms can induce more efficient (industry-specific) investments.

Another theoretical paper in this vein is Helsley and Strange (2007). They analyze a linear space

where buyers are equally spaced. If there are transaction costs, they show that proximity between buyers and sellers lowers transaction costs and favors disintegration of production (outsourcing). Moreover, they also show that, as input demanders become closer to each other, their profits go up as well. This happens because agglomeration in space mitigates hold-up risk, thus fostering a more efficient investment by inputs' suppliers. This is named by them a "Williamsonian" agglomeration force.

It is well understood since Hotelling (1929) at least that "distance [...] is only a figurative term for a great congeries of qualities".[5] In other terms, it is just a matter of how one interprets the linear space, since it may stand for the physical space as well as the characteristics' space. So, Helsley and Strange (2007) results also show that product homogeneity in downstream markets (i.e., similarity in the needs of inputs' buyers) favors disintegration of production and the establishment of trade in intermediate inputs between suppliers and buyers. Under this approach, product differentiation in physical space and product differentiation in the characteristics' space are just two alternative (and mutually excluding) ways of interpreting results. Our paper adds to this literature disentangling the role of physical space and characteristics space in the way of organizing inputs' production. We will show that it is crucial to consider the interaction among these dimensions, since product differentiation in downstream markets affects the sign (either positive or negative) of the effect of distance on production decisions.

3 Data and Variables Description

The micro data sets we use for this paper come from the VIII and IX waves of "*Indagine sulle imprese manifatturiere*" (Survey on manufacturing firms), carried out by Unicredit-Capitalia, one of the largest Italian banks. The original data sets contain information for 4,680 Italian firms during 1998-2000 (VIII wave), and for 4,178 firms during 2001-2003 (IX wave). The design of the panel is stratified and rotating, so that about half of firms in the VIII wave are retained in the IX wave. The surveys contain detailed information about firms' labor force composition, investment and innovation activity, internationalization strategies, production choices, financing choices, etc. In addition, the data sets include balance sheet information for each of the years covered in the waves. In our analysis, apart from the productivity estimation procedure, we restrict to the the sample from the IX wave. After standard trimming procedures, the size of the sample is reduced to 3,419 firms.[6]

We analyze what are the variables that drive the change in the likelihood that manufacturing suppliers undertake production to order (*commessa* in Italian) instead of production in advance (also called for stock). Hitomi (1996) sharply differentiates these two ways of production on the ground of *certainty of product specifications*. In production to order, specifications of the product are established only on the receipt of the customer's order, which results in difficulty in production planning and execution. The good produced is unique, or just small batches are made. In production for stock, product specifications

[5] Quotation is from Hotelling original paper.

[6] In Casaburi et al. (2008) the trimming and productivity estimation procedures are described.

are established in advance of order receipt, with a reasonable certainty about the fact that they will meet the requirements of customers, thanks to market research that has been previously conducted. In other terms, market research allows to determine exactly what are the product specifications required by the market, and this substantially reduces uncertainty. Hence, after market research, production planning and execution are smoother. This kind of organization is typical of mass production.

To identify whether a firm produces to order or for the stock we employ questions E2. and E3. in the Unicredit-Capitalia Survey (see Appendix 7.1). The questionnaire gives us some information on where the final recipients of the good are located: in the same province, in other cities in the rest of Italy, or abroad. Unfortunately, we miss explicit information whether the good is actually sold or not to a buyer located in the same industrial district. But an extremely well-documented literature shows that firms located in Italian districts have a very low degree of vertical integration, and most of them act as subcontractors (i.e., they produce to order) for buyers located in the same district. See, just to cite a few papers, an early contribution by Brusco (1982) and a more recent one by Lazerson and Lorenzoni (1999). Therefore, location in a district proxies that fact that the firm sells most of its output to downstream firms located nearby.

Table 1 shows the percentage of firms that produce to order, against three other firm's characteristics: being an intermediate inputs producers, being located in a district and being an exporter.

[Insert Table 1 about here]

The first variable (being an intermediate inputs producer) is a dummy variable which takes a value equal to one if the supplier is selling its product to other firms, except retailers and intermediaries specialized in goods for households. This information is retrieved through the question E1. in the Unicredit-Capitalia survey.[7] A very large amount of firms that produce to order are indeed producing intermediate inputs (1,959 firms out of 2,292 that produce to order, roughly 85%). This means that only 15% of firms that produce to order are producing final goods for retailers, intermediaries, or directly for households. We note, however, that nothing prevents the sale of final goods, under production to order, to retailers or households to be exempted by search costs or hold-up problems. Hence, in what follows, we will not differentiate whether the final recipient of the product is a firm or is a household, and we will just concentrate on the fact that it is produced to order or for stock.

The second variable (location in an industrial district) is a dummy which takes value one if two conditions are met: *i)* the firm is physically located in an industrial district; *ii)* its production belongs to the core sectoral specialization of the district. In this way we want to avoid to classify as being located in a district firms that are physically there, but whose activity belongs to other industries. As

[7]See Appendix 7.1. The firm is revealing to produce an intermediate input if the distribution channel is one of the following: intermediaries specialized in goods for firms (E1.5.); direct sales to firms (through electronic commerce or not, E1.9. and E1.10.).

discussed above, Italian industrial districts are the ideal environment to study how the establishment of pairwise connections to trade goods is affected by proximity.

Through the same reasoning, and here we come to the other variable we employ to argue the distance between the supplier and the buyer, if a firm is an exporter, at least some of its customers will be located abroad. Being an exporter is then the right proxy for the fact that the supplier sells its product to buyers located far away, both in terms of physical distance and in terms of institutional barriers existing between different countries (e.g., different product standards).

Table 1 shows that intermediate inputs' suppliers and firms that are located in a district produce to order more than the universe of firms in the data set. Exporters produce to order roughly in the same share of the universe of firms in the sample. However, we will prove that there exists considerable cross-industry variation in the effect of proximity and national borders, depending on the degree of product differentiation of the downstream industries involved. Hence, aggregate data hide considerable cross-industry variation in the choice of producing to order. Then, we need as a preliminary step to rank industries in terms of the degree of product differentiation of the downstream markets.

Before turning to the classification of industries according to product differentiation, in Table 2, we focus on those firms that are selling most of the product to foreign buyers. This category is computed summing the sales' shares provided in Question E3.3 and E3.6: if the sum is equal or greater than 50%, then the firm is producing to order mainly for foreign customers. Being an exporter turns out to be almost a necessary condition of this, since 678 out of 696 suppliers of foreign customers declare to be also exporters.[8] Turning to firms located in a district, a low share (26.3%) is exporting the output mainly to foreign buyers. This share is considerably lower than the 73.5% of firms, from Table 1, located in a district that are globally producing to order, no matter where the buyer is located.

[Insert Table 2 about here]

3.1 Measuring product differentiation in downstream markets

We suggest that the role of spatial proximity in the choice of producing to order or for stock depends on the specific industry characteristics. In particular, we want to single out is the interaction between spatial proximity and average product differentiation in downstream industries.

We construct a variable, called z_j, that measures at the industry level the degree of average product differentiation in the transactions that suppliers undertake with buyers. In order to construct such a measure, we first use the industry classification developed by Rauch (1999). Based on the nature of the transactions of the goods in the industry, each of the 1,189 sectors of the 4-digit SITC Rev.2 classification

[8]There are very few firms (18 out of 696) that do not declare to export, while they are producing to order mainly for foreign buyers. All these firms are actually selling at least 50% of the product to foreign buyers that *do not* belong to the same parent group of the supplier. Hence, in what follows, we consider them to be exporters even if they do not declare so in their answer to the questionnaire.

is assigned to one of the following three categories: sold on a standardized exchange market; sold with a reference price; neither of the two. Rauch develops two classifications using, respectively, a conservative, and a more liberal criterion for the assignments. Following this distinction, we derive two measures of contractual intensity, a conservative measure, and a liberal measure.

Next, we combine this information with data coming from the UK 2002 Input-Output Use table.[9] The table is based on a specific classification that is aggregated at an intermediate level between 2-digit and 3-digit NACE. From now on we will refer to this classification as IOIC (Input Output Industrial Classification).[10] This classification is made of 77 different industries for manufacturing. We then develop a SITC-IOIC concordance to aggregate the 1,189 SITC industries into the 77 more aggregated industries of IOIC. For each of these 77 industries we build a variable, R_k, that captures the fraction of goods produced in a certain industry k that is neither sold on a standardized exchange nor reference-priced; that is, R_k is the share of products belonging to that industry that are characterized by product differentiation. The higher it is R_k, the higher it is contractual intensity in a particular industry.

We combine the information about industries' contractual intensity with the Input-Output Use table. By reading the IO table by row, we know how the consumption of intermediate inputs from each industry is divided across the whole spectrum of using industries. The procedure is similar to the one followed by Nunn (2007). Differently from Nunn (2007), we employ the Use table by row, since we are interested in the average contractual intensity of the downstream relationships. Nunn (2007) employs the Use table by column, because he is interested in the average contractual intensity of the upstream relationships.

To give an example of the procedure we implemented, let us consider the following intermediate product, glass (belonging to the Glass and glass products industry). The top three industries in terms of the consumption of glass as intermediate input are (in descending order of importance): Motor vehicles; Glass and glass products itself; Alcoholic beverages. Let us concentrate on motor vehicles and alcoholic beverages. These industries contains several more detailed industries in terms of the 4-digit SITC classification. However, there is considerable homogeneity in terms of the characteristics of the industries involved. In the case of motor vehicles, all final products, parts and accessories are classified as differentiated products. Our procedure posits that, if a glass input is sold to an industry characterized by product differentiation, it has to be differentiated itself.[11] In the case of alcoholic beverages, the 4-digit SITC industries as classified as belonging to markets characterized by a reference price. In this case we assume that the glass input, similarly to the product for which it is designed, is not relationship-specific.[12]

[9] We use UK Input-Output tables since Italian tables are not available at a fine industrial classification level.

[10] Further details about UK Input-Output tables and the classification system are available on the website of the UK Office for National Statisticis.

[11] For instance, glass parts of autos are exclusively designed for a particular model (e.g., a Fiat Panda), and cannot be employed for another model (e.g., a Peugeot 206).

[12] The suppliers of glass bottles, even in the case they produced a fancy bottle for some beer brand, may sell those bottles to other buyers in the case the original customer, the one for whom the product was designed, attempts to renegotiate a

Turning from the absolute amount of consumption of a certain product in a certain industry to the share of consumption, we derive the fraction of intermediate inputs produced by industry j that is consumed by industry k, θ_{jk}. For each supplying industry, we can therefore compute a weighted measure of product differentiation that takes into account the characteristics of the markets where the goods produced in that industry are sold, $z_j = \sum_k \theta_{jk} \cdot R_k$. For robustness purposes, we will calculate this share based on Rauch conservative classification, $z_{j,cons}$, and the liberal classification, $z_{j,lib}$.

In Table 3 we show by row the three industries with the least contractual intensive downstream markets, and the three industries with the most contractual intensive downstream markets. The table provides by column three distinct categories of firms: all firms; firms that produce following a specific order placed by the buyer; firms that produce to order mainly for buyers located abroad. The cells in the table are filled with the number of firms satisfying the required characteristics.

[Insert Table 3 about here]

Table 3 shows that pairwise connections are more likely if downstream markets are contractual intensive. Only a small share of firms in the least contractual intensive industries produces following a specific order placed by the buyer. In these industries, the usual way of supplying products is for stock, and these products are likely to be sold through organized exchange markets or through a reference price. On the contrary, the share of firms producing to order is large in the most contractual intensive sector. In this case, the strong degree of product differentiation in parts, components, and final products makes pairwise connections to prevail with respect to organized exchange markets' transactions. The buyers need inputs specifically tailored for them, so that specific pairwise connections are required.

Finally, looking at suppliers whose products are predominantly shipped abroad, we get a similar picture, because these suppliers are concentrated in the most contractual intensive industries.

4 Proximity and product differentiation as determinants of pairwise connections: Theory

We present a simple model about the choice by a supplier of engaging in production to order or production in advance. The framework generates some predictions that we test in our data. The supplier produces for another firm a good whose price is normalized to 1. We also assume that the marginal cost of production is constant at zero. We take as exogenous two key features. First, the distance between the supplier and the buyer is given. Second, we take as given the degree of product differentiation in downstream markets where the intermediate input produced by the supplier is sold. In what follows we show how organization of production is affected by the balance between these two features.

lower price.

The first option for the the supplier is to produce only if it receives a specific order (production to order). Clearly, in this case it does not face the risk of not finding a buyer, because it will produce only after a specific order is received. We assume that the supplier knows with certainty that, in the interval of time under study, a buyer will show up, and he will be willing to pay a price equal to one for the intermediate input produced by the upstream firm.

On the contrary, a firm that produces in advance faces the risk of not selling its product. Specifically, under production for stock, we assume that a supplier will sell the product with probability p. The probability p is a decreasing function of average product differentiation in downstream markets, $z \in [0, 1]$. The higher the degree of product differentiation in downstream industries, the more difficult it will be to carry out a careful market research needed to meet the requirements of customers. In addition, we assume that the probability of producing in advance is an increasing function of the proximity between the seller and the buyer. Again, it is more difficult to perform market research on potential buyers located far away. If the measure of distance between the supplier and potential buyers is d, $d \in [0, \overline{d}]$, we have $p = p(z, d)$, with $p_z(\cdot) < 0$, $p_d(\cdot) < 0$. We also assume $p_{dz}(\cdot) = 0$; that is, the increase in the risk of not finding a buyer due to an increase in d does not depend on z. The explanation we give to this assumption is that the way the difficulty of market research increases in distance is the same (or changes in an amount that can be neglected), irrespective of the degree of product differentiation in downstream industries.

Turning to costs, when the firm accepts an order from another firm it faces an (expected) transaction cost c. We model c as the sum of two terms, a constant term, c_0, and a variable term, h. The term h depends on two elements. The first are ex-ante costs of arranging the details of the contract and meeting the requirements of the buyer (search and matching costs). The second are ex-post costs due to the risk of opportunistic behavior that can be adopted by the buyer (hold-up risk). In both cases we model h as an increasing function of the average level of product differentiation in downstream markets, z, and of the distance between the seller and the buyer, d. Thus, $h = h(z, d)$, with $h_z(\cdot) > 0$ and $h_d(\cdot) > 0$. In addition, we assume that $h_{dz}(\cdot) > 0$; that is, the increase in the transaction costs due to an increase in the distance between the buyer and the supplier is higher the higher it is product differentiation. This seems to be a natural assumption and it is consistent with the empirical findings of Rauch (1999): distance plays a role in hampering trade particularly when products are not homogeneous. Let us assume that, if products are perfectly homogeneous, there are no variable transaction costs; that is, $h(0, d) = 0$ for every d, and $c = c_0$.

4.1 A special case: Product homogeneity in downstream markets

We analyze the choice between production to order and production in advance by looking first at the simple case where the degree of product differentiation is zero. The choice of the firm depends only on d; that is, on the distance between the firm and its potential buyers. The firm chooses to wait for

an explicit order if the profits deriving from it, $\pi_o = 1 - c_0$, are higher than the expected profits of producing in advance $\pi_a = p(0, d)$; that is, if:

$$\pi \equiv \pi_o - \pi_a = 1 - c_0 - p(0, d) > 0 \Rightarrow c_0 < 1 - p(0, d) \tag{1}$$

The continuous variable π is, for the purpose of the estimation strategy, the latent variable. We only observe whether it is positive (in this case the supplier will choose production to order) or negative (in this case the supplier will choose production in advance). To make the model interesting, we assume that $1 - c_0 - p(0, 0) < 0$, and $1 - c_0 - p(0, \overline{d}) > 0$: when products are homogeneous, suppliers located close to buyers choose production in advance, while suppliers located far from buyers wait for an order. This is depicted in Figure 1.

[Insert Figure 1 about here]

Since the probability of finding a customer for intermediates produced in advance is inversely related to distance with the customer, $p_d < 0$, we also get that $\frac{\partial \pi}{\partial d} = -p_d(\cdot) > 0$. We further assume linearity of the latent variable in d, that amounts to assuming that $p_{dd} = 0$. Thus, there exists a threshold level d_0^* such that a firm decides to produce for the market if $d < d_0^*$, and decides to wait for a specific order from a downstream firm if $d > d_0^*$. Therefore, we expect that when product differentiation is zero, firms that are more distant from their potential buyers opt for waiting to receive a specific order from a buyer, while firms close to their buyers opt for production in advance. The intuition is that, in the homogeneous case, when buyers are distant from suppliers, the fixed cost of establishing a pairwise connection between the two parties for a specific order, c_0, is smaller than the risk of not finding a buyer due to a failure in market research. On the contrary, firms that are located close to their buyers face a risk of not selling the products that is not sizable enough to prevent them from producing in advance. This is shown in Figure 1.

4.2 The general case

We now move on to the case in which downstream markets present some degree of differentiation. Similarly to the case with $z = 0$, firms decide to produce only after a specific order is received if $\pi_o - \pi_a > 0$. Now π_o includes the variable transaction costs term $h(z, d)$; that is, $\pi_o = 1 - c_0 - h(z, d)$. Firms choose production to order only if:

$$\pi \equiv \pi_o - \pi_a = 1 - c_0 - h(z, d) - p(z, d) > 0 \tag{2}$$

For all levels of z,

$$\frac{\partial \pi}{\partial d} = -h_d(z, d) - p_d(z, d). \tag{3}$$

An increase in distance has two opposite effects on π: *i)* it causes a reduction in π_a due to a decrease in the probability of finding a buyer for what was produced in advance (second term); *ii)* it causes a

reduction in π_o due to an increase in the transaction costs (search costs and hold-up risk) of contracting (first term). The latter aspect is more relevant the higher it is the level of z, since $h_{dz}(\cdot) > 0$. In this case, $\frac{\partial^2 \pi}{\partial d \partial z} = -h_{dz}(z,d) < 0$.[13] If we consider a case in which $-h_d(0,d) - p_d(0,d) > 0$ and $-h_d(1,d) - p_d(1,d) < 0$ for all d, there is a certain threshold level $\tilde{z}$ such that the expression in equation (3) equals zero.

If $z > \tilde{z}$, an increase in distance reduces the difference in profits of production to order in comparison to production for the market, making production to order less convenient. If $z < \tilde{z}$, the expression in equation (3) is positive. In this case, an increase in distance causes production to order to become more convenient than production in advance.[14] In the rest of the analysis, we consider the simple case in which $h_{dd}(\cdot) = p_{dd}(\cdot) = 0$; that is, both the probability of not finding a buyer due to a market research failure and transaction costs are linear in distance.

Let us suppose that we are in an industry where $z > \tilde{z}$, so that the differential $\pi_a - \pi_m$ is increasing in d. To make the model interesting, we assume that $1 - c_0 - h(z,0) - p(z,0) > 0$ and $1 - c_0 - h(z,\overline{d}) - p(z,\overline{d}) < 0$. In Figure 2 we depict this case.

[Insert Figure 2 about here]

Thus, there exists a threshold level, d_z^*, such that a firm decides to produce for the market if the buyer is located faraway, $d > d_z^*$, and decides to wait for a specific contractual arrangement with a downstream firm only if the buyer is sufficiently close to it, $d < d_z^*$. Figure 2 shows this result. The intuition is that, when product differentiation is high enough, a reduction in distance (i.e., an increase in proximity) mitigates transaction costs in a way that is larger than the corresponding reduction in market research costs, thus making the firm more willing to make a pairwise contractual arrangement. The converse holds true in sectors with low differentiation in downstream markets, $z < \tilde{z}$. In this case, if $d < d_z^*$ it will produce in advance. Finally, there also exists a particular level of product differentiation $z = \tilde{z}$, such that distance does not matter any more in the organization of the modes of production. Industries characterized by this level of product differentiation are neutral, since the option to produce to order gives always the same profits of producing in advance.

To summarize, this simple model rationalizes the following organizational choices. First, when industry's product differentiation is low, firms that are close to their potential buyers are more likely to produce for the market. Second, when sectoral product differentiation is high, firms close to their buyers are more likely to reach a contractual arrangement (i.e., produce to order) before production takes place. The opposite patterns are observed when suppliers and buyers are distant. We test these predictions in the next section.

[13] Remember that we assume $p_{dz}(\cdot) = 0$.

[14] The case in which z=0 is a special case.

5 Proximity and product differentiation as determinants of pairwise connections: Estimation

5.1 Estimation strategy

This section presents our strategy to measure the relation among proximity, downstream product differentiation, and the choice of making a pairwise connection. Our econometric methodology consists in the estimation of marginal effects from a probit model. By estimating marginal effects, we determine the magnitude of the *change* in the probability that a firm opts to produce to order as a function of the set of covariates. Equation (4) illustrates our model:

$$\text{Prob}(\text{ord}_{ijp} = 1) = \Phi\left(\beta_0 + \beta_1 dist_i + \beta_2 exp_i + \beta_3 dist_i * z_j + \beta_4 exp_i * z_j + X_i'\overline{\beta}_5 + \eta_j + \eta_p\right) \quad (4)$$

where i is the firm index, j is the industry index, and p is the spatial index related to the administrative province where the firm is located.[15] X is a set of firm level controls, that includes TFP, size, capital intensity, skill intensity, and dummies for whether or not the firm belongs to a business group, and performed or not product innovation in the period 2001-2003.[16] The β's are the coefficients on covariates.[17] In the econometric model, we also include spatial fixed effects (η_p, one for each of the 103 administrative provinces in Italy) and industry fixed effects (η_j, one for each of the 77 industries from our IOIC classification).

As described in the previous section, *dist* and *exp* are the variables that capture proximity. In a sense, they are two polar cases. As we argued at length above, there exists an overwhelming evidence that suppliers located in a district sell most of their output to firms located nearby. On the contrary, the export status, by definition, signals that a certain firm sells to foreign partners.[18]

Our two measures of sectoral downstream product differentiation, $z_{j,cons}$ and $z_{j,lib}$, are alternatively used in the two interactions terms, $dist_i * z_j$ and $exp_i * z_j$. The coefficients on these two terms measure whether the role of the distance between the supplier and the buyer (captured by *exp* and *dist*) changes according to the level of product differentiation in the downstream industries where the products are sold.

In light of section 4, we expect the interaction term $exp_i * z_j$ to have a negative sign: product differentiation has a negative effect on the choice to produce intermediates after specific orders from

[15] Italy is divided in 103 administrative provinces, that correspond to NUTS3 partitioning.

[16] See Appendix 7.2 for variables' definition.

[17] The vector $\overline{\beta}_5$ groups coefficients on control variables.

[18] From an econometric point of view, the presence of firms that are simultaneously located in a district and are exporters is noisy. In the present version of the paper, we do not tackle this issue in any manner. In ongoing work on this issue, we classify exporters that are located in a district as follows. If they export more than a certain threshold of total revenues, we keep them as exporters and drop them as firms located in a district, because the greatest part of their transactions is with foreign firms. If they export less than a certain threshold they are kept as firms that are located in a district and dropped as exporters.

buyers that are located abroad. In addition, our simple model suggests that the the sign of the coefficient β_2 on the *exp* variable should be positive. Recall that this coefficient measures the impact of a change of the export status (i.e., our proxy for farness between supplier and buyer) on the probability of making downstream connections when the degree of differentiation takes the value of zero.[19] Our hypothesis is that, for highly homogeneous sectors, the risk of hold-up and search costs are low compared to the risk of market research activity for distant customers, and then suppliers wait for an order from foreign firms.

We expect the interaction term $dist_i * z_j$ to be positive. Spatial proximity (that is, agglomeration in an industrial district specialized in a particular sector) raises the probability of producing to order in contract-intensive sectors for the reasons outlined in section 4.[20] The sign of β_1, the coefficient on *dist*, measures the role of proximity in highly homogeneous industries, where hold-up risk and search costs are zero. Our model suggests that, in homogeneous downstream industries, firms located in a district may be more willing to undertake production in advance since they can rely on reliable market research on a wide range of potential buyers. Thus, in the supply of homogeneous industries, firms in a district are more willing to produce in advance. This explanation suggests that we expect the coefficient of *dist* to have a negative sign.

5.2 Empirical Results

Table 4 presents our base results. In the first column, we estimate the change in the probability of producing to order induced by the district and export status variables, in addition to the interactions between the district and export status on the one side, and average product differentiation in downstream industries on the other side. The introduction of the interaction terms with downstream product differentiation provides a major insight on the determinants of production to order. In column [1], we include the measure of downstream differentiation using Rauch's conservative classification. Both $dist_i * z_{j,con}$ and $exp_i * z_{j,con}$ have the expected sign and they are statistically significant at 1% level. For high levels of product differentiation, proximity between buyers and sellers (captured by *dist*) positively affects the likelihood of making pairwise connections to provide products to downstream firms,

[19] When $z_{j,cons}$ or $z_{j,lib}$ are zero, no downstream industry is characterized by product differentiation. Every downstream market for final products and parts and components is an organized exchange market or is characterized by reference prices.

[20] Apart from the balance between market research costs and transaction costs, we can think of other reasons that explain the increase in the likelihood to produce to order in firms are spatially clustered. A wide literature stresses the relevance of communication and information flows among firms located within districts. The literature describing this process is really vast. See, among many other papers, Maskell and Malmberg (1999), Capello and Faggian (2005), Lazerson and Lorenzoni (1999), Giuliani (2007). Firms in a district can take advantage of information and experiences gained by others. In our case, the relevant information concerns other firms' contractual experience with specific buyers. We label this effect as the "spillover" effect of being located in a district (as opposed to the "proximity" effect). The "spillover" effect is more relevant in highly differentiated sectors, because it allows the firm to reduce search costs and the risk of hold-up. Therefore, it provides another reason for expecting a positive sign in the interaction coefficient $dist_i * z_j$.

while farness (captured by *exp*) negatively affects it. For low levels of product differentiation, the role of proximity is reversed; that is, location in a district reduces the probability of making production to order, while export activity increases it. In column [2] we present the same results using Rauch's liberal classification. Our results are robust to this new variable: relevant coefficients are still significant and the magnitude of marginal effects is comparable across the two specifications.

In column [3] we also include a set of firm-level controls. In addition to proximity variables and their interactions, the variables that significantly affect the probability of production to order are: firm's size (negative effect), firm's total factor productivity (negative effect), capital intensity per worker (negative effect), a dummy for product innovation in the period 2001-2003 (positive effect). Since capital per worker and total factor productivity are positively correlated, dropping capital per worker from the probit regression raises the statistical significance of TFP (column [4]). Results tell us that suppliers connected in a pairwise fashion to buyers are smaller and less capital intensive. They are also less productive, but they tend to be more innovative than the rest of firms in the panel. In section 5.3 below, we will show that the latter result depends from a specific set of firms, those that belong to international networks.

In column [5] we interact all the firm-level control variables with the conservative measure of product differentiation, without finding any significant effect.[21] The proximity variables and their interactions are still significant.

Finally, in the last column, we estimate the change in the probability of producing through a pairwise connection after having dropped all the interaction terms with product differentiation. We show that, if we ignore the role played by product differentiation and contractual intensity, export status and location in a district do not explain the change in the probability of producing to order. This means that, as shown by our theoretical section, the role of distance in promoting pairwise connections between buyers and sellers changes according to the level of product differentiation in downstream markets.

Our results provide support, at a micro-economic level, to Rauch's findings at the aggregate level. Proximity boosts networks between suppliers and customers (giving rise to production to order behavior) if product differentiation among downstream firms is high. We motivate the result with the existence of hold-up risk and search costs that are mitigated by proximity and exacerbated by farness. Moreover, our findings show that the same logic equally applies to international trade and domestic trade issues, to the extent that trade within industrial districts is found to enhance production to order behavior in differentiated industries, while farness characterizing international trade markets is found to weaken it.

5.3 Extensions and sensitivity of results

Our data also allow us to test models similar to (4) on a subsample of pairwise connections. In the first five columns, we focus on the change in the likelihood that firms engage in: *a)* pairwise transactions

[21] The same result is obtained with the interactions with the liberal measure, but it is not reported to save on space.

with firms located in the same province; *b)* pairwise transactions with foreign firms. When we consider the choice of production to order for the same province, the international status of the firm should not matter anymore. In Table 4 we used *exp* as a proxy for the fact that a relevant portion of the operations of the suppliers involved foreign partners, and therefore was characterized by a low level of proximity. Clearly, this reasoning no longer applies when we restrict to within-province connections. Table 5 shows that the coefficients of *exp* and $exp_i * z_{j,cons}$ are no longer significant and this supports our hypothesis about the role of export status as a proxy for farness of buyers. The coefficients on *dist* and $dist_i * z_{j,cons}$ are still significant, even if slightly less than in the main regression. This is due to the fact that, restricting to a narrower spatial area, we encounter less variability in terms of the effect of distance on the choice to produce or not to order.[22] So, we expect the advantage of being in a district to be measured less precisely. Turning to the interpretation of results, since the interaction $dist_i * z_j$ is still significant, the estimation indicates that the benefits of proximity between suppliers and buyers are rather localized. We can indirectly infer that the geographical scope of the Williamsonian agglomeration economies we identified is an area smaller than the province, which coincides with the district.[23]

In column [4] and [5] we focus on the case where production to order comes mainly (at least 50% of total production to order) from foreign buyers. When looking at this sub-sample, obviously all the firms choosing to produce to order are exporters, so we only include *dist*, as a proxy for proximity. When the supplier receives an order from abroad, a pairwise connection with foreign buyers is established. As expected, being in a district does not affect the propensity to produce to order for foreign customers.

Apart from the proximity measures, it is interesting to compare the characteristics of the firms making production to order according to the localization of the customer (column [3] and column [5]). If suppliers are connected in a pairwise fashion to buyers located in the same province, they turn out to be smaller, and less capital intensive; they are also less productive and less skill-intensive.[24] Overall, they are performing rather poorly. Turning to firms producing to order mainly for foreign customers, they are bigger and more innovative than the rest of firms. These differences show that firms belonging to local networks are very different from firms primarily engaged in international networks.

In column [6] we focus exclusively on orders coming from a different group. The interest in this kind of estimation lies in the fact that transaction costs that hinder pairwise connections (search costs or hold-up risk) could be alleviated if the supplier and the buyer belong to the same parent group. Conversely, in the case of suppliers receiving orders from outside the parent group, these costs could be larger. A crude comparison of the coefficients on the proximity variables *dist* and *exp* and on their interactions in column [6] from Table 5 and in column [3] from Table 4 show that they are not different.

[22] In terms of the simple model of section 4, this corresponds to a decrease in the maximum distance $\overline{d}$ that is observed in the data.

[23] Notice, however, that, as noted above, in the geographical area delimited by a district other factors could be at work, namely embeddedness in local communities and knowledge spillovers. These features do not mechanically depend on physical distance.

[24] The statistical significance for the latter two negative coefficients is only 5%.

This suggests that the transaction costs do not significantly decrease when the buyer and the supplier belong to the same group.

The sensitivity check concerns firms' dimension. In column [7] we perform the probit regression only for the subsample of firms with less than 250 employees. Results do not change, apart from the coefficient on the product innovation variable. This fact supports the view that those firms where product innovation plays a role in fostering pairwise connections are the bigger firms, that are also those more involved in international trade networks (keep in mind results from column [5]).

5.4 Production to order and transportability

The establishment of networks due to specific orders could be affected by other factors that we are omitting from the probit regression. This would bias our estimation. In particular, an important issue is the one of transportability of commodities. By transportability, we refer to insurance and freight costs. The higher they are, the lower it is transportability. If differentiated commodities are less transportable than other commodities, buyers will generally be located close to suppliers. Hence, the empirical results we described in the previous sections (the prevalence of pairwise connections when buyers and suppliers are spatially close together) could be driven by low transportability.

Rauch (1999) computes measures of transportability for differentiated, organized exchange, and reference priced commodities, based on U.S. imports from Japan or comparably distant countries. He finds that differentiated commodities are roughly twice as transportable as the other two groups. Even if his results should be applied with caution to our framework provided that they concern only international transactions, they show that the bias in the estimation, if any, would be against our results.

6 Conclusions

In this paper we discussed the determinants of an important choice concerning the way production is organized: whether to produce after a specific order is placed by a buyer, or whether to produce in advance for the market. We discussed to what extent production to order is different from production for stock, and how this difference is related to the functioning of markets: while the pairwise connection originating from production to order is associated to a network, products made in advance are generally sold through organized exchange markets, or through transactions carried out with reference prices. This fact implies that the choice of producing to order or in advance depends on the relative efficiency between networks and markets as a mean to carry out transactions.

We singled out two important features that affect the choice to use networks or markets to sell products to customers: the first is proximity between buyers and sellers, and the second is the degree of product differentiation in downstream industries.

We proved that the same logic and the same factors that inhibit trade in international markets are

at work in the much smaller entities constituted by Italian industrial districts. To this purpose, we showed that location in a district reduces the risks for suppliers of being held up by the principal (the buyer), and also reduces search and matching frictions between buyers and suppliers. Therefore, the advantage of being located in a district is larger for firms operating in industries characterized by a high relationship-specificity in downstream markets. Following a similar reasoning, suppliers selling to buyers located in foreign countries, that operate in industries where product differentiation is high, should opt for using exchange markets as a mean to trade goods, and then should produce in advance.

Turning to industries where product differentiation and the associated transaction costs are low, we argued that the difficulties associated to market research, compared to the lower incidence of transaction costs, induce suppliers with distant buyers to opt for production to order. Instead, suppliers located close to their buyers choose production in advance.

7 Appendix

7.1 Questions in the Unicredit-Capitalia Survey about sales' organization

E1. Having normalized to 100 the total revenues in the year 2003, state the percentage share for each type of distribution channel:

- E1.1. Modern national distribution channels (including: hypermarkets, department stores, cash & carry, hard discount, specialized retail stores);
- E1.2. Modern foreign distribution channels (including: hypermarkets, department stores, cash & carry, hard discount, specialized retail stores);
- E1.3. Franchising sales;
- E1.4. Intermediaries specialized in goods for households;
- E1.5. Intermediaries specialized in goods for firms;
- E1.6. Small retailers;
- E1.7. Direct sales to households (not through electronic commerce);
- E1.8. Direct sales to households through electronic commerce;
- E1.9. Direct sales to firms (not through electronic commerce);
- E1.10. Direct sales to firms through electronic commerce;
- E1.11. Other customers.

E2. Having normalized to 100 the total revenues in the year 2003, state the percentage share for each type of selling:

- E2.1. Selling of goods produced under an order placed by the buyer;
- E2.2. Selling of goods produced by the firm on its own.

[If the answer to question E2.1. is greater than zero, answer the following question]:

E3. Having normalized to 100 total revenues in the year 2003 from **production to order**, state the percentage share for each type of buyer:

- E3.1. Firms belonging to the same parent group that are localized in the same province;
- E3.2. Firms belonging to the same parent group that are localized in the rest of Italy;
- E3.3. Firms belonging to the same parent group that are localized abroad;
- E3.4. Other firms that are localized in the same province;
- E3.4. Other firms that are localized in the rest of Italy;
- E3.6. Other firms that that are localized abroad;
- E3.7. Government and public agencies;
- E3.8. Other buyers.

7.2 Description of firm level controls

Size (occu): The size measure we use is the total number of employees, including entrepreneurs and management.
Total factor productivity (TFP): Total factor productivity is estimated following Levinsohn and Petrin (2003) procedure, as in Casaburi et al. (2008).
Capital per worker (capwork): Total assets divided by size (as defined above).
Skill per worker (skillwork): The share of white collars over the total number of employees (size variable). White collars are entrepreneurs, managers, and clerks.
Product innovation (prodinno): Firms were asked to report whether, over the 2001-2003 period, they introduced at least one new product or significantly improved an existing one.
Belonging to a group (group): Dummy variable indicating whether the firm belongs to a business group.

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Table 1: *Number of firms producing to order, and status of firms*

	All firms	Intermediates producers	Located in a district	Exporters
Production to order				
Yes	2,292 *(67.0%)*	1,959 *(72.6%)*	444 *(73.5%)*	1,700 *(66.6%)*
No	1,127 *(33.0%)*	739 *(27.4%)*	160 *(26.5%)*	854 *(33.4%)*
Total number	*3,419*	*2,698*	*604*	*2,554*

Note: The table reports the number of firms, both in absolute terms and percentage terms (in parenthesis), that produce or not to order in the case of three classes of firms: all firms in the IX wave; firms producing intermediate inputs; firms located in a district; exporters.

Table 2: *Number of firms producing to order mainly for foreign buyers (in value terms), and status of firms*

	All firms	Located in a district	Exporters
Production to order mainly from abroad			
Yes	696 *(20.4%)*	159 *(26.3%)*	678 *(26.5%)*
No	2,723 *(79.6%)*	445 *(73.7%)*	1,876 *(76.5%)*
Total number	*3,419*	*604*	*2,554*

Note: The table reports the number of firms, both in absolute terms and percentage terms (in parenthesis), that produce or not an intermediate input following a specific order placed mainly by foreign buyers (in value terms) in the case of three classes of firms: all firms in the IX wave; firms located in a district; exporters.

Table 3: *Production to order by contractual intensity in downstream markets*

	All	Production to order *(%)*	Production to order mainly from abroad *(%)*
Industries			
Least contractual intensive			
Production, processing, preserving of meat (.192)	64	13 *(20.3%)*	0
Alcoholic beverages, alcohol and malt (.260)	53	15 *(28.3%)*	3 *(5.7%)*
Vegetable and animal oils and fats (.287)	15	4 *(26.7%)*	0
Most contractual intensive			
Electronic valves and tubes, other components (.999)	33	26 *(78.8%)*	8 *(24.2%)*
Insulated wire and cable (.997)	15	9 *(60.0%)*	2 *(13.3%)*
TV and radio receivers, recorders (.994)	2	1 *(50.0%)*	1 *(50.0%)*

Note: The table provides by row the three industries with the least contractual intensive downstream markets, and the three industries with the most contractual intensive downstream markets (conservative classification, z_j's are reported after each industry). The table provides by column three distinct categories of firms: all firms; firms that produce to order; firms that produce to order mainly for buyers located abroad. The cells in the table are filled with the number of firms satisfying the required characteristics. The percentages shown in brackets are in terms of the total number of firms in the corresponding industry.

Table 4: *The determinants of production to order: Baseline estimation*

	[1]	[2]	[3]	[4]	[5]	[6]
dist	-.444**	-.412**	-.403**	-.404**	-.413**	.016
	(.127)	(.119)	(.135)	(.134)	(.133)	(.025)
exp	.322**	.287**	.363**	.358**	.307**	-.007
	(.090)	(.085)	(.093)	(.092)	(.100)	(.024)
dist $*$ $z_{j,cons}$	.513**		.467**	.463**	.480**	
	(.153)		(.154)	(.154)	(.153)	
exp $*$ $z_{j,cons}$	-.482**		-.402**	-.461**	-.394**	
	(.108)		(.117)	(.110)	(.117)	
dist $*$ $z_{j,lib}$		.487**				
		(.143)				
exp $*$ $z_{j,lib}$		-.456**				
		(.104)				
ln(occu)			-.050**	-.055**	-.004	-.053**
			(.013)	(.013)	(.052)	(.013)
ln(TFP)			-.055*	-.073**	.067	-.049*
			(.025)	(.024)	(.084)	(.024)
ln(capwork)			-.053**		-.035	-.052**
			(.010)		(.036)	(.010)
ln(skillwork)			-.010	-.011	.011	-.011
			(.009)	(.009)	(.035)	(.009)
prodinno			.053**	.052**	.044	.053**
			(.019)	(.019)	(.079)	(.019)
group			-.020	-.031	-.156	-.022
			(.022)	(.010)	(.101)	(.022)
ln(occu) $*$ $z_{j,cons}$					-.056	
					(.065)	
ln(TFP) $*$ $z_{j,cons}$					-.158	
					(.108)	
ln(capwork) $*$ $z_{j,cons}$					-.022	
					(.046)	
ln(skillwork) $*$ $z_{j,cons}$					-.027	
					(.044)	
prodinno $*$ $z_{j,cons}$					.011	
					(.098)	
group $*$ $z_{j,cons}$					.167	
					(.117)	
Spatial fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	.16	.16	.19	.18	.19	.18
N. obs.	3,343	3,343	3,308	3,308	3,308	3,308

Note: The table reports marginal effects from probit regressions, which include dummies for each province and each industry. Robust standard errors are in parentheses. **, and * denote significance at the 1, and 5 per cent level respectively.

Table 5: *The determinants of production to order: Supplementary regressions and sensitivity of results*

	Order from the same province			Order mainly from abroad		Order from a different group	Less than 250 employees
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
dist	-.284**	-.255**	.023	-.061	.011	-.382**	-.438**
	(.087)	(.093)	(.025)	(.119)	(.021)	(.134)	(.137)
exp	-.024	-.005	-.137**			.281**	.367**
	(.091)	(.091)	(.025)			(.094)	(.096)
dist $*$ $z_{j,cons}$	.449*	.397*		.098		.476**	.502**
	(.178)	(.177)		(.157)		(.162)	(.155)
exp $*$ $z_{j,cons}$	-.192	-.158				-.312**	-.468**
	(.111)	(.112)				(.114)	(.112)
ln(occu)		-.062**	-.063**	.030**	.030**	-.044**	-.021
		(.013)	(.013)	(.011)	(.011)	(.013)	(.016)
ln(TFP)		-.062*	-.060*	.002	.002	-.068**	-.054*
		(.024)	(.024)	(.021)	(.021)	(.025)	(.026)
ln(capwork)		-.031**	-.031**	-.016	-.016	-.044**	-.046**
		(.010)	(.010)	(.009)	(.009)	(.011)	(.011)
ln(skillwork)		-.019*	-.020*	-.001	-.001	-.010	-.006
		(.009)	(.009)	(.008)	(.008)	(.009)	(.009)
prodinno		.031	.031	.106**	.106**	.049*	.028
		(.018)	(.018)	(.016)	(.016)	(.019)	(.019)
group		-.040	-.041	.0	.0	-.127**	-.023
		(.021)	(.021)	(.019)	(.019)	(.023)	(.023)
Spatial fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	.12	.15	.14	.12	.12	.18	.18
N. obs.	3,229	3,196	3,196	2,979	2,979	3,308	2,978

Note: The table reports marginal effects from probit regressions, which include dummies for each province and each industry. In columns from [1] to [6] we consider specific categories of buyers. In columns from [1] to [3] we consider the choice of producing to order for a buyer that is located in the same province. In column [4] and [5] we consider the choice to produce to order mainly for a buyer that is located abroad. In column [6] we consider a buyer that does not belong to the same business group. Finally, in column [7] we keep in the sample only firms with less than 250 employees. Robust standard errors are in parentheses. **, and * denote significance at the 1, and 5 per cent level respectively.

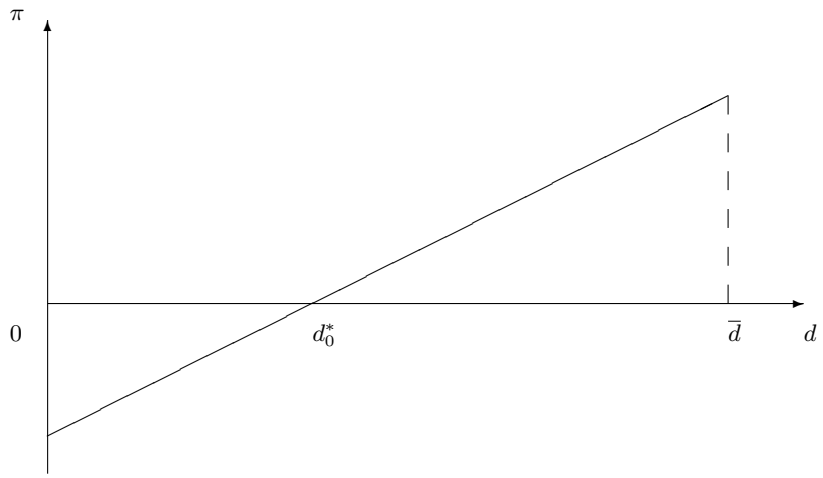

Figure 1: The plot of the latent variable π when $z = 0$

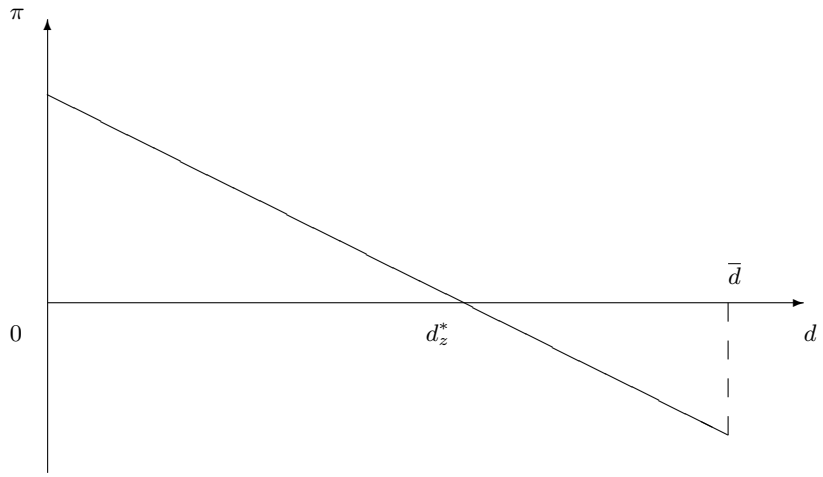

Figure 2: The plot of the latent variable π when $z > \tilde{z}$