Strategies of internationalization: the role of contracts and firm-level productivity. An analysis with Italian data

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Introduction

Statistical sources document the increasing international fragmentation of production processes in the last three decades. Arm's length trade flows in intermediate goods have risen together with (if not more than) intrafirm trade flows, suggesting a new dimension of the phenomenon of *offshoring*, which has been enabled by what we can now call the ITC revolution.

Driven by the increasing relevance of these phenomena, economic literature has developed models which points out to firm-level heterogeneity and asset specificity as possible explanations of the fact that some firms offshore and some do not and that some prefer to buy/build facilities abroad, and other prefer to source goods from abroad from external firms.

Indeed, when firms decide to split up their value chain in various stages, they face, down to the bone, a "two-dimensional decision problem": where to locate production (whether or not to offshore) and how to organize it (whether or not to outsource). This gives rise to four possible strategies: FDI, offshore outsourcing, domestic integration and domestic outsourcing.

Theoretical works give rise to complex predictions in terms of the chosen sourcing strategies depending on contractual completeness of the traded goods and on firm productivity.

While a large body of empirical work has been dedicated to test the differentials in productivity between exporting and non-exporting firms, scant attention was given to these other strategies of internationalization, mainly because of the complexity of the theoretical framework, in terms of data requirements and of predictions.

This work exploits a unique sample of Italian manufacturing firms, which enables me to observe the four possible strategies, together with rich firm-level information on firms' features. Thanks to this detailed information, I am able to empirically test some of the predictions of recent theories on sourcing strategies based on firms' heterogeneity and contract incompleteness in the Italian framework.

Theoretical background

Until Antràs' seminal work (Antràs, 2003), the theory on the geographical boundaries of firms activity had grown parallel to the theory on the dimension of the firm ("Theory of the firm" or "make or buy theory"). While the former (Dunning's *OLI paradigm,* 1997, 1981; the *Knowledge Capital* theory of Markusen, 1984, 1997; Helpman, 1984, 1985; Ethier, 1986; Horstmann and Markusen, 1987a, 1987b; Brainard, 1993; Markusen and Venables, 1998, Markusen and Venables, 2000; the "New new trade theory", Melitz, 2003) was about determining why firms expand abroad, the latter, dating as far back as Coase (1937)[1], wanted to know what are the determinants of the choice to "make or buy".

Antràs builds on the key elements of the property-rights approach of Grossman, Hart and Moore (Grossman and Hart, 1986; Hart and Moore, 1990) in order to endogenize the costs of internalization in an open-economy setting à la Helpman and Krugman (1987). The property-rights approach focuses on the relationship between final good producer and an intermediate good producer. Both need to undertake a specific investment in order to perform production, but due to uncertainty about the future states of the world, contracts cannot be complete, and thus may not be enforceable. If one of the parties decides to deviate from the contract, e.g. the final good producer decides not to buy the intermediate product, the other party, who has customized the good according to the contract (has made a specific investment) is held up: the value of his good in the outside market is lower the greater the degree of specificity. Therefore, in the presence of asset-specificity and contract incompleteness, the parties, foreseeing the possibility of ex post hold-up, have reduced incentives to invest, in that they expect a lower surplus. In this framework, ownership is the key: after a contract has been executed, the owner of the assets has the residual control over them. With residual control comes more bargaining power to the owner ex post: namely, once investments are made and the incomplete contract has been executed, the owner can decide how to use the asset in order to maximize his ex post payoff. Therefore, integration increases the incentives to make the investment with respect to the integrating party, while it reduces them with respect to the integrated party: we should expect that the more important the headquarter investment is, the more integrated the production. In Antràs' framework contractual input intensity, i.e. the relative importance of the input of one of the parties determines the organizational choices of international firms: intrafirm trade is positively related with capital-intensity, a proxy for the importance of the headquarter in the investments, while arm's length trade is positively related with

[1]Coase famously observed that if market were perfect and there were no transaction costs, each task could be performed by a separate entity and there would be no reason for the existence of a firm. On the other side, he reasoned that if transaction costs are centripetal forces towards internalization, there must be other centrifugal forces that limit the size of firms: ""Why is not all production carried on by one big firm?".

His work was picked up by Williamson (1975; 1985), who worked on the theory of external transaction costs, and most importantly for this work, by Grossman, Hart and Moore (Grossman and Hart, 1986; Hart and Moore, 1990).

labor intensity, a proxy for the importance of the supplier. In this very simplified model, each industry is either characterized by intrafirm trade or by arm's length trade depending on it capital intensity and there are no different degrees of inputs' contractibility, i.e. inputs are all non-contractible.

Statistics show that not only even highly disaggregated industries usually present both intrafirm and arm's length trade, but also single firms are often involved in mixed sourcing strategies. Moreover, asset-specifity varies in intensity depending on the produced input. The first incongruence of Antràs (2003) is nicely solved by Antràs and Helpman (2004), who, building on what Melitz (2003) had done for the "New Trade Theory" models, introduce firms' heterogeneity in the framework. Heterogeneity in productivity, combined with the realistic assumption that different fixed organizational costs are associated to the four possible choices of organization (domestic in house sourcing, domestic outsourcing, offshore in house sourcing, offshore outsourcing), leads to equilibria that feature the coexistence of these four structures in the same industry, their relative prevalence depending on the capital intensity of the industry. Antràs and Helpman (2008) refine this result by relaxing Antràs' original assumption of inputs non-contractibility, giving rise to complex and somewhat counterintuitive predictions: intrafirm trade, traditionally viewed as a way to reduce the problem of hold-up in a transaction, may be positively related with input contractibility. More specifically, for certain values of the other parameters of the model (firms' productivity and headquarter intensity), and depending on how it affects the investment of the final-good producer and that of the supplier, an improvement of the contractual environment may have a surprising effect on intrafirm trade. Extending the model to a North-South environment, they are able to predict that an improvement in the quality of contracting institutions in South increases the offshoring of Northern firms (they assume that final good producers are always located in North). This effect can be decomposed in a "standard effect" and a "surprise effect" (as Nunn and Trefler, 2008 call them): the most productive domestic firms will switch to offshore outsourcing and the most productive firms that are already resorting to offshore outsourcing will decide to integrate. If the surprise effect prevails, intrafirm trade, traditionally viewed as a way to reduce the problem of hold-up in a transaction, may be positively related with contractibility.

Empirical analysis

Data I analyze this theory with Italian survey data from Capitalia's *Indagine delle imprese manifatturiere (*VII wave). The dataset provides rich information on firm-level features and it comes along with yearly balance-sheet data. Furthermore, it is the only Italian dataset which allows to classify firms' sourcing activities into four categories: domestic outsourcers, domestic integrated, foreign outsourcers and foreign integrated firms. Finally, these data isolate the subcontracting activity of firms, not simply their sourcing activity (which potentially could not be regulated by a specific contract, but directly by the

law governing purchases and sales) as in the other available datasets. For this reason, this dataset appears unique in fitting with the property-rights framework, which assumes that firms are linked together by a contract that requires them to perform a relationship-specific production, as in the Italian definition of subcontracting.

The first positive feature of the dataset, balance-sheet yearly information, offered the opportunity of estimating the total factor productivity of firms with a three-years panel of data. This has been done in various ways, from the simplest ordinary least squares regression of labor and capital over added value, to the more complex and appropriate Levinsohn and Petrin estimation, which avoids the simultaneity bias in total factor productivity estimation by using information on intermediate inputs demand in order to control for shocks to productivity (observable by the manager, but unobservable by the statistician).

In order to identify stylized facts and evaluate if they corresponded to those observed by other works, with data from other countries, I further integrated the dataset with industrial-level information on capital intensity and I developed an index of complexity (relationship-specificity). My index captures the information on contractibility which is incorporated in the input: the more complex a good is, the less contractible it is. More precisely, the index was developed on the basis of Rauch's (1999) classification of goods (four-digits SITC rev. 2) in goods traded in the open marked, reference priced or without a reference price. The latter are assumed to be differentiated goods, more subject to relationship-specific investment, the former are assumed to be homogenous goods, and, therefore, less subject to relationship-specific investment. With the help of conversion tables, I was able to assign to each ISIC industry (industries disaggregated down to the 4-digits level and thus narrow enough to be identified with their products) in my dataset a continuous measure indicating the level of relationship specificity in the industry.

Firm's performance and sourcing strategies According to Antràs and Helpman (2004), more productive firms are more likely to engage in foreign activities and to internalize, if we assume that fixed costs of sourcing are higher in this cases. This prediction can be tested in mean by estimating the productivity premia which is on average connected with each sourcing strategy with the following model:

$$\theta_f = \beta_0 + \beta_{F,I} int_f^F + \beta_{F,O} out_f^F + \beta_{D,I} {int_f}^D + \beta_{D,O} out_f^D + \boldsymbol{\gamma}' \mathbf{f}_f + \boldsymbol{\alpha}' \mathbf{a}_f + \iota' \mathbf{i}_f + \epsilon_f$$

where θ_f represents the estimated measures of total factor productivity, labor productivity, and two measures of dimension: value added and total number of employees. The explanatory variables are the four mutually exclusive binary variables for sourcing strategies described above. Vector $\mathbf{f}_f$ represents firm-level controls (export-status, size, R&D intensity, age), and $\mathbf{a}_f$ and $\mathbf{i}_f$ are, respectively, vectors of area (North-West, North_East,

Center and South) and industry (4-digits ISIC rev. 3) dummies.

Differentials in productivity between different sourcing strategies are statistically significant at at least the 10% level even when controlling for exporting status and size of the firm: firms that produce abroad internally are 19.5% more productive than the baseline, i.e. domestic outsourcing firms. Domestic internalizing firms follow, with a 13.3% productivity premium, while foreign outsourcing firms perform still better than the baseline with a 4.8% premium. The same ranking is found with respect to labor productivity and size measures, the latters showing much greater premia (foreign internalizing firms are 160% more productive than the baseline), which indicate the importance of the size factor in this context. Firms that offshore are clearly more productive than domestic firms, and internalizing firms are more productive than outsourcing ones. While the reported results refer to a mutually exclusive definition of strategies (where predominance was given to the supposedly more costly strategy, in case a firm followed more than one sourcing strategy), I also produced results for a mutually inclusive definition of strategies, which, although generally less statistically significant, still reproduce the same ranking. The fact that this ranking is more significant when considering mutually exclusive strategies and looses significance when strategies are defined as mutually inclusive seems to indicate that firms are more productive if they follow mixed strategies (consistently with theories introducing multiple suppliers). These results are robust to various specifications of the model.

Although most econometrical models are contented with being able to say something about the mean of the observed variable, it may be sometimes useful to look at the whole distribution of the variable of interest, because the results in mean may not be reflect for all the quantiles of the distribution. In order to test whether the theory holds for the whole distribution of productivity (i.e. for the lowest quantile in terms of productivity for each sourcing strategy, as well as for the median, as well as for the highest quantile) I further employ a non-parametrical (Kolmogorov-Smirnov) estimation of productivity differentials. The Kolmogorov-Smirnov methodology statistically tests the stochastic dominance of one cumulative distribution over another. Comparing pairwise the productivity distribution of strategies, the clear ranking that was found in mean holds: foreign internalizing firms are the most productive, followed by domestic internalizing, foreign outsourcing and domestic outsourcing firms.

Asset-specificity, global value chains and sourcing strategies Antràs and Helpman (2008) model the relevance of asset-specificity in sourcing choices.

Thanks to my index of inputs complexity, I can test their results with with a multinomial logit model and a series of logit models comparing strategies pairwise, in order to test the relationship between input contractibility and sourcing strategies.

While headquarter intensity, measured with several alternative proxies as suggested by the literature, does not appear significant in almost all specifications, the data show

a significant negative relationship between complexity and integration, which mirrors the result of other works and provides support to the property-rights theory. As inputs become more contractible, it becomes more convenient to integrate and less convenient to incentive subcontractors, through outsourcing. Moreover, contractibility appears to matter more in a foreign than in a domestic context. This last piece of evidence is not surprising: asset-specificity is likely to play a more important role in transactions with foreign firms, since it interacts with foreign judicial systems (an interaction that I cannot observe through my data) and less certainty on the rule of law, i.e. in a context of aggravated contracts incompleteness.

The drawback of my measure of contractibility is that it applies to both subcontractor and headquarter, while ideally we would like to be able to observe a level of contractibility for the inputs of both parties. Yet, it should be noted that an improvement in the level of contractibility assigned to a specific industry should affect the input provided by the supplier more than the services (capital) provided by the headquarter, reducing the necessity to incentivize the supplier and therefore leading to more integration than before, as shown by my data.

Finally, I also tested the presence of global linkages. The data show that offshoring firms are also sensibly more involved into producing goods for other, foreign-based firms, than their domestic counterparts. This result is in line with anecdotical evidence that emphasizes the role of complex multi-country and multi-product linkages between firms and encourages toward the development of theoretical works aimed at studying these complex environments.

To my knowledge, this is the first time that the relationship between contractibility, global linkages and sourcing strategies has been tested with Italian data. Given the scant evidence on contractibility provided by the analysis of firm-level datasets, this analysis adds some needed support to the property-rights theory.

My results show some important impacts of globalization on different agents in the Italian industrial framework. Not only internationalization, but also the way it is performed, matter in terms of quite important features of the firms, such as their productivity and their dimension. These implications should be taken into account when designing policies aimed at boosting productivity through globalization, in order to make them as effective as possible.

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