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Corporate hierarchies and international trade: Theory and evidence[☆]

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ABSTRACT

Corporate organization varies within countries and between countries. We develop a theory which explains the variation in levels of decentralization across firms and links it to the trade environment that firms face. We introduce firms with internal hierarchies in a Melitz and Ottaviano (2008) model of international trade. We show that international trade increases the conflict of interest between CEO/owners and middle managers within firms and these eventually lead to decentralized corporate hierarchies. We test the theory with original data on the internal organizations of 2200 Austrian and German firms and find that the empirical evidence is consistent with the model's predictions.

1. Introduction

Corporate organization varies within countries and between countries. Empirical evidence on corporate organization across time, across countries, and across firms has become available only recently. Rajan and Wulf (2006) and Marin and Verdier (2007) document a shift to more decentralized decision making and the removal of hierarchical layers in firms over time. Marin and Verdier (2007) and Marin (2008) show for a cross section of 2200 firms in Austria and Germany that larger firms tend to have more decentralized decision making and that Germany, the larger economy, has corporations with more decentralized hierarchies compared to Austria, the smaller economy. We collected data on the internal organization of 2200 firms in Austria and Germany by asking the CEO in firms "Who decides in your company over the corporate decisions such as the decision over acquisitions, finance, new strategy, R&D, to introduce a new product, to change a supplier, and the decision over hiring and firing of personnel, please rank between 1 taken at headquarters and 5 taken at the divisional level?"[1] Similarly, Bloom et al. (2010) show with a similar measure of decentralization between headquarters and middle managers which they collected for several countries such as the US, UK, Europe, and Asian countries that the US, UK, and Northern European countries have firms which are the most decentralized, while Asian countries tend to have the most centralized corporate organizations.

The empirical evidence on corporate organization described above raises several questions. First, can differences in the trade exposure of firms account for the observed corporate diversity across firms? Second, why are firms changing their mode of organization? Can increased integration into world markets explain this trend towards less hierarchical organizations?

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[1] We use this information on the internal organization of firms in the empirical section of this paper. For a full list of the corporate decisions for which we have information on who takes the decision in the firm, see Tables A1 and A2 of the Data Appendix A.

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In this paper, we offer a model that explains differences in corporate hierarchies across firms. We introduce firms with internal hierarchies (a CEO and a division manager) in a monopolistic competition model of trade. Our model simultaneously determines the organizational choices of firms and heterogeneity across firms in size and productivity. Moreover, in our model, firms choose their organizational structure in response to the trade environment that they face.

We develop an industry equilibrium model with a monopolistic competitive sector with differentiated goods that combines the Aghion and Tirole (1997) (AT) theory of the firm with the Krugman (1980) theory of international trade. Rather than using constant elasticity of substitution (CES) utility as in Krugman (1980), we adopt the Melitz and Ottaviano (2008) structure of preferences with a linear demand across a continuum of varieties. In this way, the price elasticity of demand is no longer exogenously fixed but changes with the toughness of competition in the market. Unlike Melitz and Ottaviano (2008) though, we assume that production of varieties in the monopolistic sector is done by ex ante identical firms with an internal organization that follows AT. A principal hires an agent to monitor projects and workers to produce goods. There are m potential methods of production of which one maximizes profits and another one maximizes a private benefit for the agent. Hence, there is a conflict of interest between the principal/owner and her agent as the payoffs of the parties depend on who's project is implemented. The principal and the agent gather information to understand which of the m ways of running the firm maximizes profits and the private benefit of the agent, respectively. If both parties find out which are their preferred projects, the decision rights reside in the party with *formal power*. If only one of the parties learns which is his/her preferred project, the uninformed party always rubberstamps this project. In this case, the informed party has *real power*. In choosing between retaining formal power or delegating power to the agent, the principal trades off the benefit from control against the manager's loss of initiative.

The first result of the paper states that congruence between the principal and her agent increases with the intensity of competition in the market. When competition becomes tougher (with an increase in the number of firms and/or with an increase in the proportion of low cost firms in the market) relative profits decline between a firm in which the agent has power (an A-firm) and a firm in which the principal decides over the project (a P-firm). Hence, it becomes more costly to delegate power to the agent. It matters more who runs the firm because, as competition increases, the revenues of high-cost A-firms go down by more than those of low-cost P-firms and they try to fight the loss in revenues by lowering markups more than P-firms.

We then solve for industry equilibrium (imposing free entry). We find that congruence between the principal and her agent increases the stakes of firms and thus increases the free entry profit level that firms require to enter the market. We find further, that congruence affects the corporate equilibrium that emerges in the economy. When the conflict of interest between the principal and her agent is small, preferences over projects between the principal and agent are fairly congruent and the principal invests little in information collection. Under these circumstances, the initiative of the agent can be kept alive and there are no costs of control. Hence, principals find it optimal to keep control. On the other hand, when the conflict of interest is large, the principal's investment in information collection will also tend to be large, and the agent's initiative will be killed even when he/she is given formal power. Hence, there is no gain in assigning formal power to the agent and principals keep control. Finally, there may exist intermediate levels of conflict in the firm for which principals find it optimal to delegate formal power to the agent to induce her to invest in information collection.

Next, we open the economy up to trade by examining changes in market size. Interestingly, we find that the size of the market is an important determinant of the equilibrium mode of organizations. In small countries, competition tends to be weak and the conflict of interest between principals and middle managers will also tend to be small and principals tend to monitor little. On the other hand, in large countries, competition and the conflict of interest between principals and agents in firms are both intense and principals tend to monitor a lot. It follows that small and large countries will tend to have firms in which principals keep formal control, while in medium-sized countries organizations of firms may prevail in which decision power is delegated to middle managers.

Finally, we derive predictions from our model and expose them to the data. We predict that in a cross-section of firms, firms will have more decentralized corporate hierarchies when they face tougher competition and more exposure to trade. We test these predictions for a cross-section of firms with the original data of 2200 corporations in Austria and Germany in 1998–1999. We find that these predictions are not rejected by the data. More specifically, we identify a non-monotonic relationship between the level of decentralization in firms and the trade exposure firms face. We also find that for the corporate decisions for which empowerment of middle managers may matter most (such as the decision over R&D or the decision to introduce a new product) trade and competition have the strongest effect on the allocation of authority in the firm.

The paper contributes to a new and fast growing body of literature on organizations in general equilibrium models of international trade.[2] In their theory of the firm, Aghion and Tirole (1997) assume an exogenous degree of conflict between CEOs/owners and middle managers in the firm. We endogenize the degree of conflict between principals and agents inside the firm with the trade environment that firms face. Trade liberalization increases the costs of delegating power to a manager, since it matters more for profits who runs the firm. In earlier work (Marin and Verdier (2008a)) we introduce firms' organizational choices in a Dixit and Stiglitz model of monopolistic competition. However, in this model, market size and trade have no effect on corporate organization. As is typical for a model of monopolistic competition of the Dixit and Stiglitz (1977) type, an increase in market size leads to an increase in the number of varieties produced without affecting the size of firms, markups and firm organization. In this paper, we incorporate endogenous markups using the linear demand system as in Melitz and Ottaviano (2008). Markups across firms respond now to the toughness of competition in a market. In this way, our model exhibits a link between trade liberalization, firm size and the mode of organization that firms choose.

In contrast to the present paper, we examine in Marin and Verdier (2012) how trade between dissimilar countries is affecting the corporate equilibrium organization of the world economy. We introduce organizational choices in a $2 \times 2 \times 2$ Helpman and Krugman model of international trade in which countries differ in factor endowments. We find that relative factor endowments are important determinants of the equilibrium mode of organization. We find further that when two countries with different relative factor endowments open up to trade, their factor prices will tend to converge and this could induce a convergence in corporate cultures leading all principals in both countries to delegate power (even when no principal in any of the two countries was delegating in autarky). Surprisingly, as in Marin and Verdier (2012) with North–South trade between dissimilar countries, we find in the present paper that manager empowerment and the move to flatter corporate hierarchies emerge as an equilibrium when the world economy is governed by North–North trade as well.

In Marin and Verdier (2008b), we develop a theory in which organizational choices determine productivity differences between business firms. Rather than employing the customary assumption of an exogenous distribution of productivity as in Melitz (2003), heterogeneity in productivity arises as a result of the endogenous allocation of power inside the corporation. The model delivers new margins of trade adjustment: the monitoring margin and the organizational margin. Depending on which

[2] For a survey of this literature, see Helpman (2006), Spencer (2005), Helpman et al. (2008), Antras and Rossi-Hansberg (2009), Marin and Verdier (2003), and Marin (2012).