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**Article**

## International organization of production and distribution

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tle enthusiasm for high deductible policies, although certain attractive features of HSAs combined with steady increases in premiums for other types of health insurance may change this. Some worry that these plans will be most attractive to low risk consumers who do not anticipate a great need for medical care, thus causing more comprehensive plans to experience adverse selection. If this occurs, it may be HMOs, which benefited in the 1990s from risk-based sorting in the small group market and within employer-sponsored programs like those of Harvard and the UC, that are adversely affected. How the introduction of HSAs affects consumer health insurance decisions and what these new products mean for the stability of insurance markets are interesting areas for future research.

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<sup>5</sup> T.C. Buchmueller and S. Ohri, "Health Insurance Take-up by the Near Elderly," *NBER Working Paper No. 11951, January 2006*, and *Health Services Research*, forthcoming.

<sup>6</sup> M. Cherner, K. Frick, and C. McLaughlin, "The Demand for Health Insurance Coverage by Low-Income

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<sup>7</sup> T. Buchmueller and J. DiNardo, "Did Community Rating Induce an Adverse Selection Death Spiral? Evidence from New York, Pennsylvania and Connecticut," *NBER Working Paper No. 6782, January 1999*, and *American Economic Review*, 92(1) (2002), pp. 280–294.

<sup>8</sup> T.C. Buchmueller and S. Liu, "Health Insurance Reform and HMO Penetration in the Small Group Market," *NBER Working Paper No. 11446, June 2005* and *Inquiry*, 42(4) (2005/2006).

## International Organization of Production and Distribution

Elhanan Helpman\*

International trade has grown rapidly since World War II, and in the last two decades the acquisition of subsidiaries in foreign countries (that is, foreign direct investment, or FDI) has grown even faster. Not only have foreign trade

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and FDI expanded rapidly, but their nature also has changed as production has become more fragmented and its individual stages have been dispersed across many countries. These trends have been accompanied by growing domestic and international outsourcing.<sup>1</sup> As a result, we now have a more complex web of international trade and FDI than ever before, which cannot be explained by traditional trade theory. In response, theorists have developed new analytical tools for thinking about these issues. I will describe some

of this research in which I was involved.

In order to understand the new organizational forms, it is useful to think about a simple two-dimensional choice that a business firm has to make concerning an intermediate input: it has to decide whether to produce it in-house or to outsource its production to another firm, and in either case it has to decide whether to make it offshore or not. This yields four possibilities. First, an input can be produced in-house in the home country of the firm, in which case there is neither

foreign trade nor FDI. Second, an input can be outsourced in the home country, in which case there is also neither foreign trade nor FDI. Third, an input can be produced in-house in a foreign subsidiary, in which case there is foreign direct investment. If the input is imported back to the home country for further processing or assembly, there is also intra-firm trade. Finally, an input can be outsourced to a foreign supplier, in which case there is no FDI, but if the input is imported to the home country for further processing or assembly there is arm's-length trade. An understanding of what drives these choices is essential for an understanding of the recent trends in the world economy.

## Incomplete Contracts

Grossman and I started to study these issues in the late 1990s, focusing first on the internalization decision (that is, a firm's decision to produce in-house or to outsource). We took an incomplete contracts approach to the theory of the firm. Having in mind dealing with trade and FDI, we first developed an analytical framework suitable for general equilibrium applications.<sup>2</sup> In this framework, final goods producers need specialized intermediate inputs, and they enter an industry as either integrated or outsourcing enterprises, while suppliers of intermediate inputs enter as independent entities. An outsourcing final goods producer has to find an input supplier, and a supplier has to find a buyer. An outsourcing firm pairs up with only one supplier, and vice versa. The probability of each side finding a match depends on the number of producers and suppliers seeking partners. Once a match has formed, the supplier decides on how much to invest in the buyer's specialized input. This is the point at which the incompleteness of contracts kicks in. This model implies that trade has no effect on the organization of industries when matching is subject to constant returns to scale. But when matching leads to increasing returns to scale, the model predicts more outsourcing the more countries engage in foreign trade.<sup>3</sup>

Grossman and I explored related issues in two additional papers, in which the quality of a match is explicitly modeled and it varies endogenously across countries.<sup>4</sup> The first paper focuses on the offshoring decision, the second on the decision to internalize abroad (that is, foreign outsourcing versus FDI). In both, we introduced variations in the degree of contract incompleteness which allow us to examine how differences in the quality of legal institutions across countries, or changes in these institutions in one country, affect firm structure. To illustrate, consider the outsourcing decisions of firms in a country called North, which can buy inputs in North or South, where wages are lower in South and so is the quality of its legal system. In this case, the model finds that improvements in North's legal institutions shift outsourcing from South to North, as we would expect. Yet improvements in South's legal institutions shift outsourcing from North to South only when the gap in the quality of the legal systems is large. The last result shows how labor and product markets interact with institutions to produce unexpected outcomes.

The impact of legal-system quality on trade, via the endogenous formation of Ricardian-type comparative advantage, is explored in a joint paper with Acemoglu and Antràs.<sup>5</sup> We develop a simple framework in which final good producers choose a technology from a set that features a tradeoff between costs and efficiency, and find that the optimal choice depends on the degree of contract incompleteness. In our model, firms want to adopt more efficient technologies, except that their demand for better technologies bids up the acquisition costs of those technologies. As a result, in countries with better legal institutions, firms upgrade their technology only in industries that are relatively vulnerable to contract incompleteness. These happen to be the sectors with relatively low elasticities of substitution across intermediate inputs. In sectors with relatively high elasticities of substitution, the higher cost of technology adoption induces technological

downgrading. As a result, countries with better legal systems gain comparative advantage in sectors with low elasticities of substitution, which are particularly sensitive to the incompleteness of contracts. Thus the quality of a country's legal system differentially affects its export performance in sectors that vary by the degree to which they use contract-sensitive inputs.<sup>6</sup>

## Sorting into Organizational Forms

Scholars have also developed models of international trade in which firms choose which markets to serve and how to serve them. This work has responded to the accumulated evidence that only a small fraction of firms engage in either foreign trade or FDI, that exporting firms are more productive than non-exporters, multinationals are more productive than exporters, and firm productivity dispersion varies widely across sectors. Melitz developed the most useful model.<sup>7</sup> In his model, firms within an industry differ by productivity and they face fixed costs of exporting. As a result, only the most productive firms export while the less productive firms serve only the domestic market. This sorting pattern is consistent with the evidence, and it has important implications for trade structure and the impact of trade liberalization on the reorganization of industries.

Melitz, Yeaple, and I extended this model to allow firms to serve foreign markets either by exporting or by establishing subsidiaries in foreign countries that sell directly to the host country (horizontal FDI).<sup>8</sup> In this case, only the most productive firms engage in horizontal FDI, low productivity firms serve only the domestic market, and firms with intermediate productivity export. Moreover, the variation across sectors in the ratio of subsidiary sales to export sales is positively correlated with the variation across sectors in the productivity dispersion of firms. The U.S. data support this prediction: productivity dispersion affects trade and FDI. Importantly, the economic size of this effect is large; it is of the same order of magnitude as the impact of fixed costs

or freight charges, which are traditional determinants of the proximity-concentration tradeoff in the theory of horizontal FDI.

While the last model focuses attention on horizontal FDI (that is, FDI designed to serve the host market only) and the model from the previous section focuses attention on vertical FDI (that is, FDI designed to reduce manufacturing costs), this neat distinction between two extreme forms of FDI has become less appealing over time, simply because the data show that multinationals are engaged in “complex” integration strategies, which are neither purely horizontal nor purely vertical.<sup>9</sup> Grossman, Szeidl, and I studied such complex integration strategies for industries with productivity dispersion across firms.<sup>10</sup> In our model, firms assemble intermediate inputs to manufacture final goods, and a firm can locate the assembly or the production of intermediates in a combination of countries: home in North, or foreign in North or South. The model predicts a strong complementarity between the two forms of FDI. For example, a low production cost of components in South encourages FDI in components in South as well as FDI in assembly there. This model produces rich patterns of trade and FDI.

## Heterogeneity and Incomplete Contracts

Combining heterogeneity in the productivity of firms with incomplete contracts produces predictions about all four organizational forms mentioned at the beginning of this review: integration at home, outsourcing at home, integration in a foreign country, and outsourcing to a foreign country. I study this combination in a joint paper with Antràs.<sup>11</sup> In this model, the tradeoff between integration and outsourcing is driven by the tradeoff between agency costs and the costs of organization. When integration has higher fixed costs than outsourcing and offshoring has higher fixed costs than home sourcing, the model predicts variation in the prevalence of the four organizational forms as a function of industry characteristics. For example, in sectors in

which final good producers provide few headquarter services, outsourcing dominates integration. Low-productivity firms in these industries outsource at home, while high-productivity firms outsource to a low-wage foreign country, say South. More productivity dispersion in such industries raises foreign relative to domestic outsourcing. On the other hand, in sectors with a high intensity of headquarter services, all four organizational forms can coexist: the most productive firms engage in FDI, the least productive firms outsource at home, and in between the more productive firms outsource to South while the less productive firms integrate at home. More productivity dispersion raises offshoring relative to domestic supplying of intermediates, and it raises integration relative to outsourcing. Higher headquarter intensity also makes integration more prevalent.

## Managerial Incentives

Grossman and I have also studied the sorting pattern of heterogeneous firms when the agency problem arises from managerial incentives rather than incomplete contracts.<sup>12</sup> In this model, outsourcing provides the supplier with better incentives, but integration gives the final good producer better monitoring opportunities. As a result, the least and the most productive firms outsource while firms with intermediate productivity integrate. Among those who integrate, the more productive integrate at home and the less productive engage in FDI. This sorting pattern is quite different from the sorting pattern discussed above, where incomplete contracts were the source of the agency problem. Yet there is evidence for both patterns.<sup>13</sup>

I have reviewed a number of studies that can be used to explain rich patterns of trade and FDI, and the relationship between them. Much of this theory has been motivated by new evidence, and some new implications of the various models have been tested. There remains, however, much more that needs to be done, and new data are needed for this purpose.<sup>14</sup>

<sup>1</sup> The term “outsourcing” has been used in more than one way. I use it in the traditional sense, as the acquisition of an input or service from an unaffiliated firm. In this case domestic outsourcing refers to the acquisition of an input from a domestic unaffiliated firm while international outsourcing refers to the acquisition of an input from a foreign unaffiliated firm.

<sup>2</sup> See G.M. Grossman and E. Helpman, “Incomplete Contracts and Industrial Organization,” NBER Working Paper No. 7303, August 1999, published as “Integration versus Outsourcing in Industry Equilibrium,” *Quarterly Journal of Economics* 117(1), February 2002, pp. 85–120.

<sup>3</sup> See also J. McLaren, “Globalization’ and Vertical Structure,” *American Economic Review* 90(5), December 2000, pp. 1239–54 on this point.

<sup>4</sup> See G.M. Grossman and E. Helpman, “Outsourcing in a Global Economy,” NBER Working Paper No. 8728, January 2002, published in the *Review of Economic Studies* 72(1), January 2005, pp. 135–59, and G.M. Grossman and E. Helpman, “Outsourcing versus FDI in Industry Equilibrium,” NBER Working Paper No. 9300, November 2002, published in the *Journal of the European Economic Association* 1(2-3), April-May 2003, pp. 317–27.

<sup>5</sup> See D. Acemoglu, P. Antràs, and E. Helpman, “Contracts and the Division of Labor,” NBER Working Paper No. 11356, May 2005.

<sup>6</sup> See A.A. Levchenko, “Institutional Quality and International Trade,” IMF Working Paper WP/04/231, 2004, and N. Nunn, “Relationship Specificity, Incomplete Contracts, and the Pattern of Trade,” mimeo, University of Toronto, 2005 for empirical evidence.

<sup>7</sup> See M.J. Melitz, “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity,” NBER Working Paper No. 8881, April 2002, published in *Econometrica* 71(6), November 2003, pp. 1695–725.

<sup>8</sup> See E. Helpman, M.J. Melitz, and S.R. Yeaple, “Export versus FDI,” NBER Working Paper No. 9439, January 2003, published as “Export versus FDI with Heterogeneous Firms,” *American*

Economic Review 94(1), March 2004, pp. 300–16.

<sup>9</sup> See World Trade Organization, Annual Report 1998 (Geneva: World Trade Organization Conference on Trade and Development), 1998, and S.R. Yeaple, “The Complex Integration Strategies of Multinationals and Cross Country Dependencies in the Structure of Foreign Direct Investment,” *Journal of International Economics* 60(2), August 2003, pp. 293–314.

<sup>10</sup> See G.M. Grossman, E. Helpman, and A. Szeidl, “Optimal Integration

Strategies for the Multinational Firm,” NBER Working Paper No. 10189, December 2003, forthcoming in the *Journal of International Economics*.

<sup>11</sup> See P. Antràs and E. Helpman, “Global Sourcing,” NBER Working Paper No. 10082, November 2003, published in the *Journal of Political Economy* 112(3), June 2004, pp. 552–80.

<sup>12</sup> See G.M. Grossman and E. Helpman, “Managerial Incentives and the International Organization of Production,” NBER Working Paper No. 9403, December 2002, published in the

*Journal of International Economics* 63(2), July 2004, pp. 237–62.

<sup>13</sup> See S.F. Lin and C. Thomas, “When Do Multinational Firms Outsource? Evidence From the Hotel Industry,” mimeo, Harvard University, 2005

<sup>14</sup> See E. Helpman, “Trade, FDI, and the Organization of Firms,” mimeo, Harvard University, February 2006, forthcoming in the *Journal of Economic Literature*, for a detailed review of the literature on these topics.

## Historical Aspects of U.S. Trade Policy

Douglas A. Irwin\*

While international trade and trade policy continue to be as controversial as ever, the United States has been committed for more than half a century to maintaining an open market. It was not always that way. For most of U.S. history, the United States imposed fairly substantial barriers to imports in an effort to protect domestic producers from foreign competition.

For the past several years, I have been investigating the historical aspects of U.S. trade policy as part of the NBER’s research on international trade and the development of the American economy. The purpose of this research has been to study the economic effects of past trade policies on the U.S. economy and understand the political and economic forces that have shaped those policies.<sup>1</sup>

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### Early American Trade Policy

To say much about the stance of a country’s trade policy requires, at a minimum, data on the average tariff level. Unfortunately, standard U.S. trade statistics only started calculating average tariff figures from 1821. To fill the gap in the historical data, I gathered information from early government documents to calculate the average tariff on total and dutiable imports for the period from 1790 to 1820.<sup>2</sup> These figures reveal that tariffs started out at relatively low levels, about 15 percent in the 1790s, but rose thereafter to generate additional revenue and help finance the War of 1812. Because re-exports were a significant component of U.S. foreign trade at this time, my study suggests that it is important to adjust for drawbacks (rebated tariff revenue on re-exported goods) to determine the true level of the tariff.

One of the classic, early statements on U.S. trade policy is Alexander Hamilton’s Report on Manufactures in 1791. This report called for government

support of manufacturing through subsidies and import tariffs, but it is commonly believed that the report was never implemented. Although Hamilton’s proposals for bounties (subsidies) failed to receive support, my research has shown that Congress adopted virtually every tariff recommendation put forward in the report by early 1792.<sup>3</sup> These tariffs were not highly protectionist duties, because Hamilton feared discouraging imports, the critical tax base on which he planned to fund the public debt. Indeed, because his policy toward manufacturing was one of limited encouragement and not protection, Hamilton was not as much of a protectionist as he is often made out to be. Hamilton’s moderate tariff policies found support among merchants and traders, the backbone of the Federalist Party. But disappointed domestic manufacturers shifted their political allegiance to the Republican Party, led by Thomas Jefferson and James Madison, both of whom were willing to consider much more draconian trade policies aimed at Britain.