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policy. Program members also try to bring their research to the attention of the policymaking community through outlets such as the annual "Tax Policy and the Economy" conference, held in Washington, D.C., at which researchers present their latest policy-relevant findings.

During the last three years, program members have served in a number of distinguished capacities. Lawrence H. Summers, while a Research Associate (on leave) in the PE Program, served as Secretary of the Treasury. R. Glenn Hubbard is currently serving as the Chairman of

the Council of Economic Advisers (CEA), while Mark B. McClellan is one of the Council members. Douglas Holtz-Eakin is the Chief Economist at the CEA. Kathleen McGarry has served, and Jeffrey Brown is currently serving, as a senior staff economist at the CEA.

Research Summaries

Integrating Multinational Firms into International Economics

James R. Markusen*

As recently as the mid-1980s, research on multinational firms was almost entirely separate from research on international trade. The latter was dominated by general-equilibrium models using the twin assumptions of perfect competition and constant returns to scale. In this theory, there was little role for individual firms; indeed, theorists spoke only of industries, not firms. Multinational firms generally were approached from a case-study perspective, or at best in a partial-equilibrium setting.

To the extent that multinationals and foreign direct investment were treated at all in trade theory and open-economy macroeconomics, they were viewed as part of the theory of portfolio capital flows. The view was that capital, if unrestricted, flows from where it is abundant to where it is scarce. The treatment of direct investment as a capital flow was evidenced in data sources as well. There were lots of data on direct investment stocks and flows, but little on what multina-

tionals actually produced, where they produced it, and where they sold it.

It took little staring at available statistics to realize that viewing direct investment as a capital flow was largely a mistake. The overwhelming bulk of direct investment flows both from and to the high-income developed countries and there is a high degree of cross penetration by firms from these countries into each other's markets. It also appeared that the decision about whether and where to build a foreign plant is quite separate from how and where to raise the financing for that plant. Lastly, casual observation suggested that the crucial factor of production involved in multinational location decisions was skilled labor, not physical capital. By the late 1970s, I began to believe that location and production decisions should be the focus of a new microeconomic approach to direct investment while financial decisions should remain part of the traditional theory of capital flows.

Much of my work over the last two decades¹ has thus been to develop a microeconomic, general-equilibrium theory of the multinational firm. This theory should satisfy several conditions. First, it should be easily incorporated into general-equilibrium trade theory. Second, it should be consistent

with important stylized facts, such as the large volume of cross investment among the high-income countries. Third, it should generate testable predictions and survive more formal econometric testing.

One useful starting point for theory is a conceptual framework proposed by British economist John Dunning, who suggested that there are three conditions needed for a firm to become a multinational. First, the firm must have a product or a production process such that the firm enjoys some market power or cost advantage abroad (ownership advantage). Second, the firm must have a reason to want to locate production abroad rather than concentrate it in the home country (location advantage). Third, the firms must have a reason to want to own a foreign subsidiary rather than simply license to or sub-contract with a foreign firm (internalization advantage).

I have used these ideas as conceptual guides in building a formal theory. In my models with Horstmann and Venables², the ownership advantage is modeled by the existence of firm-level as opposed to plant-level scale economies. The general idea is that there are knowledge-based activities such as R and D, management, marketing, and finance that are at least

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partially joint inputs across separate production facilities in that they can yield services in additional locations without reducing services in existing locations. We assume that activities can be fragmented geographically, so that a plant and headquarters can be located in different countries, for example. Finally, we assume that different activities have different factor intensities, such as a skilled-labor-intensive headquarters or components production and an unskilled-labor-intensive production plant. I have termed these properties jointness, fragmentation, and skilled-labor intensity respectively.

Jointness is the key feature which gives rise to horizontal multinationals, firms that produce roughly the same goods and services in multiple locations. For these firms, broadly defined trade costs constitute a location advantage, encouraging branch-plant production abroad. Fragmentation and skilled-labor-intensity are key features which give rise to vertical multinationals, in turn geographically fragmenting the production process by stages. For vertical firms, low trade costs may be a location advantage. Differences in factor endowments and prices across countries encourage geographic fragmentation, resulting in the location of stages of production where the factors of production they use intensively are cheap.

These elements are not difficult to incorporate into industrial-organization models of trade. The latter models are then enriched by allowing firms to choose their “type” in a first-stage, selecting the location of their headquarters and the number and location of their plants. The second stage decision may be a Cournot output game or a standard monopolistic-competition model. Multinationals arise endogenously, depending on country characteristics including country sizes, factor endowments, and trade costs.

Internalization advantages are not easily added to the same models. The issues here are the stuff of the theory of the firm and the boundaries of the firm in particular. The reasons for firms to wish to own foreign subsidiaries rather than to license technol-

ogy, for example, include factors such as moral hazard, asymmetric information, in-complete and non-enforceable contracts, and so forth. It becomes technically awkward to incorporate these factors into general-equilibrium models, so they often are embedded in more specialized, partial-equilibrium models.

Nevertheless, my view is that the same properties of knowledge-based assets that give rise to jointness also give rise to the risk of asset dissipation, moral hazard, and asymmetric information. A blueprint that can be used easily in a foreign plant as well as a domestic one may also be copied easily or stolen. Licensees or possibly the firm’s own employees may quickly absorb the technology and defect to start rival firms if contracts are not enforceable. Thus the theory is relatively unified, but internalization or choice of mode issues (for example, owned subsidiary, licensing, exporting) often are addressed in specialized models.

These new models yield clear and testable predictions as to how we should expect multinational activity to relate to country characteristics, industry characteristics, and trade and investment costs. Consider two countries, and an industry in which firms can decompose production into a headquarters activity and a production activity. Horizontal firms, which roughly duplicate the activities of home-country plants in foreign branch plants will tend to arise when countries are similar in size and in relative endowments, and when trade costs are moderate to high relative to investment costs (or technology transfer costs). In particular, it is the host-country’s trade and investment costs that matter, not the home country’s costs. The results on country size and relative-endowment similarity can best be understood by noting what happens in countries that are not similar in one of these respects. First, if there are plant-level scale economies, then a large difference in country size will favor single-plant national firms that are headquartered and producing in the large country, and exporting to the small country instead of incurring the

high fixed costs of a foreign plant. Second, if countries are of similar size but differ significantly in relative endowments, then single-plant firms headquartered in the skilled-labor abundant country will have an advantage unless trade costs are very high. Third, when countries are similar in size and in relative endowments, there should be two-way direct investment in which horizontal firms penetrate each other’s market via branch plants rather than through exports.

Vertical firms separating a single plant and headquarters, on the other hand, are encouraged by factor-endowment dissimilarities. Under the skilled-labor-intensity assumption just discussed, large differences subject to moderate or small trade costs should favor locating the headquarters in the skilled-labor-abundant country and having a single plant in the unskilled-labor-abundant country. Factor-endowment differences between countries will be reinforced if the skilled-labor-abundant country is also the small country. In the latter situation, the headquarters should be located in the skilled-labor-abundant country, while the single plant should be located in the other country both for factor-price motives and for market-size motives (minimizing total trade costs). Vertical activity generally should be one way, from skilled-labor-abundant (especially smaller) countries to unskilled-labor-abundant (especially larger) countries.

As indicated above, these are clearly testable predictions and suggest regression equations to explain world multinational activity. There are now a number of such studies published, including Brainard³ and Carr, Markusen, and Maskus⁴ with others forthcoming or in working paper form. The dependent variable is generally production in country *j* by affiliates of firms headquartered in country *i*. The right-hand-side variables (including interaction terms among these variables) are the country sizes, country factor endowments, trade costs in both directions, investment barriers, and industry-specific variables such as firm and plant scale measures, *R* and *D* indexes, and so forth. The general

approach outlined above gets good support in the empirical analysis. Key variables have the correct signs and generally high statistical significance. Outward multinational activity from country *i* to country *j* (production by affiliates of country *i* firms in *j*) is increasing in the joint market size, decreasing in size differences, increasing in the relative skilled labor abundance of country *i*, increasing in country *j*'s inward trade cost, and decreasing in country *j*'s investment barriers. Across industries, affiliate activity is increasing in measures of firm-level scale economies such as *R* and *D*, headquarters activities, and advertising intensity, and is decreasing in plant-level scale economies.

There seems to be some consensus that, if one were to look for a single model that is effective in explaining a large proportion of multinational activity, we would clearly choose a pure horizontal model over a pure vertical model. The casual evidence discussed earlier is confirmed by formal econometric testing: multinational activity is highly concentrated among the high-income developed countries with significant two-way penetration of each other's markets in similar products. Such investments quantitatively dominate activity from developed to developing countries. Thus a theory based on knowledge-based assets and firm-level scale economies seems to be a much better approach than a more obvious and traditional theory based on factors flows.

To say that the horizontal approach is a better overall model than a vertical theory is not, of course, to say that vertical activity is unimportant. It is clearly important in many sectors and for many developing host countries and no one is suggesting otherwise. Recent empirical papers by Hanson and Slaughter⁵ and Yeaple⁶ are quantifying the range of strategies taken by multinational firms across industries and host countries. It is also worth emphasizing that some vertical activity, including assembly, footwear, and clothing production is carried out by independent contractors in devel-

oping countries and thus does not appear in the affiliate production statistics.

Future work will likely proceed on several fronts. In the theory area, more work on internalization or micro-theory-of-the-firm models would be welcome, creating a better understanding of the choice of mode by firms. It is particularly desirable if new models can be fitted together with the general-equilibrium models emphasizing ownership and location. Further work with the general-equilibrium models connecting production decisions with factor markets is important. There seems to be some two-way causality at work, where multinationals are only attracted to countries with minimum levels of labor skills and social infrastructure, yet the entry of multinationals in turn contributes to skill upgrading and skill accumulation.

In the empirical area, work on the choice of mode is also desirable. Why do we see owned-subsidaries in electronics assembly, but rarely see them in clothing and footwear production which use independent contractors? When and why do we see licensing instead of owned subsidiaries? More clarification on the importance of vertical firms is also desirable, and on the use of certain countries as export platforms.

Research on policy issues also is needed. The two-way causality just noted is important for public policy and suggests the possibility of multiple equilibriums and low-level development traps. While much work has been done on taxes, there is virtually none on the importance and composition of government expenditure. Yet casual evidence suggests that social infrastructure, including physical, educational, and legal infrastructure, is very important in attracting inward investment.

¹ Most of my work on multinationals has now been rewritten, synthesized, and extended in: J. R. Markusen, *Multinational Firms and the Theory of International Trade*, Cambridge: MIT Press, forthcoming in 2002.

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³ S. L. Brainard, "An Empirical Assessment of the Proximity-Concentration Tradeoff between Multinational Sales and Trade," NBER Working Paper No. 4580, December 1993, and in *American Economic Review*, 87, (4) (September 1997), pp. 520-44; S. L. Brainard, "An Empirical Assessment of the Factor Proportions Explanation of Multi-Nationals Sales," NBER Working Paper No. 4583, December 1993.

⁴ D. L. Carr, J. R. Markusen, and K. E. Maskus, "Estimating the Knowledge-Capital Model of the Multinational Enterprise," NBER Working Paper No. 6773, October 1998, and in *American Economic Review*, 91 (2001), pp. 693-708. J. R. Markusen and K. E. Maskus, "Multinational Firms: Reconciling Theory and Evidence," NBER Working Paper No. 7163, June 1999, and in *Topics in Empirical International Economics: A Festschrift in Honor of Robert E. Lipsey*, M. Blomstrom and L. Goldberg, eds., Chicago: University of Chicago Press, 2001; J. R. Markusen and K. E. Maskus, "Discriminating Among Alternative Theories of the Multinational Enterprise," NBER Working Paper No. 7164, June 1999.

⁵ G. H. Hanson, R. J. Mataloni, Jr., and M. J. Slaughter, "Expansion Strategies of U.S. Multinational Firms," NBER Working Paper No. 8433, August 2001.

⁶ S. R. Yeaple, "The Role of Skill Endowments in the Patterns of U.S. Outward Foreign Direct Investment," University of Pennsylvania Working Paper, 2001.