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Program Report

International Trade and Investment

Robert C. Feenstra*

NBER's Program on International Trade and Investment (ITI) aims to cover all areas of research dealing with the movement of goods and factor inputs across borders, with an emphasis on empirical research. This report summarizes research conducted in the ITI Program since mid-1997. The starting point for such research is always the explanation of trade patterns: what causes countries to export some goods and import others, and how well can we explain these patterns? In addition, what is the impact of these trade patterns on the incomes earned by particular groups and on the country overall? After reviewing these topics, I turn to a discussion of the policies that countries use to limit international trade flows and the international organizations that govern these policies.

Explaining Trade Patterns

The Hecksher-Ohlin-Vanek (HOV) model, which links a country's endowments of land, labor, and capital to its exports and imports of these factors as embodied in goods, is the leading explanation for trade patterns. Past research has been marked by a series of successes (the HOV model predicts trade well) and failures (it does not predict much better than a coin toss), leading to yet another round of investigation. Three researchers in the ITI program extend the empirical investigation of the HOV model in new directions, resulting in more plausible explanations for trade patterns than have been obtained previously. Donald R. Davis and David E. Weinstein loosen the assumptions of the HOV model to allow for different technologies across countries, different factor prices across countries, and a more general struc-

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ture of demand.¹ At the same time, they carefully construct datasets for the United States, Japan, and other countries that are consistent internally and with respect to external trade flows. The results of this research substantially close the gap between predicted trade flows (based on the factor endowment of countries) and actual trade flows (as measured by the factors embodied in trade). James Harrigan's work also confirms the importance of factor endowments in explaining trade patterns, while allowing for different technologies.²

One feature that is left out of the HOV model, but is surely important in many industries, is increasing returns to scale. The theoretical implications of increasing returns for international trade patterns have been known for some time, because of the work of Paul R. Krugman, Elhanan Helpman, and others. Recent empirical work has caught up to the theory and offers the first tests of the importance of increasing returns for trade patterns. One implication is that industries with particularly strong increasing returns to scale will want to "agglomerate," locating in the same region or country. This means that a country with strong demand for some product will attract industries producing it, and the country's demand-side bias will cause it to be an *exporter* rather than an *importer* of that good. Krugman calls this the "home market effect." Davis and Weinstein,³ as well as James A. Markusen, Andrew K. Rose, and I⁴ empirically investigate his theoretical prediction. We show that the home market effect can arise from models even without increasing returns to scale and that it is much more pronounced in industries producing differentiated rather than homogeneous goods. Other work on the geographical location of industries (across or within countries) has been done by Richard E. Baldwin⁵ and by Gordon H. Hanson.⁶

The Gravity Equation

Closely related to the home market effect is the use of the "gravity equation" to explain trade patterns. The gravity equation states that the trade flow between two countries will be proportional to the product of their GDPs, so that countries of sizes ten and one (for example, the United States and Canada) should have roughly as much trade between them as do two countries of size 3.3 (such as Germany and England). This equation can be derived from an increasing returns trade model, but current research has shown that it can also be obtained from models with homogeneous goods.⁷ One such justification, developed by Jonathan Eaton and Samuel S. Kortum, considers a Ricardian trade model with random technological differences across countries and transportation costs.⁸ In this framework, there is a probability that any particular country will have the best technology in each good, and therefore will export it to neighboring countries. This gives rise to a gravity equation that incorporates country size as well as transportation costs and technological spillovers across countries.

The gravity equation represents a useful benchmark against which other explanations for international trade can be assessed. One alternative explanation explicitly takes account of *traders*: goods are exchanged only if two agents in different countries want to trade them. Considering that countries have such diverse languages, customs, and institutions, the process of "matching" buyers and sellers is bound to create some frictions. James E. Rauch has investigated this empirically, and finds that *ethnic networks* work to promote trade.⁹ He developed the theoretical basis for these findings with Alessandra Casella.¹⁰ In related work, Robert Z. Lawrence confirms the importance of information and

search costs in the trade flows of multinationals and particularly in their response to changes in exchange rates.¹¹

A final direction of current research on trade patterns is to use *plant-level* rather than *industry-level* data. This is important because of the abundant evidence that plants are not the same within each industry, but rather differ dramatically in their productivity. In particular, Andrew B. Bernard and J. Bradford Jensen have found that the most productive plants become exporters.¹² This finding is significant because it contradicts the idea that promoting exports might lead to more efficient firms; on the contrary, Bernard and Jensen find that productivity causes exports, but not the reverse, at the level of the plant. This empirical finding can be explained in Eaton and Kortum's theoretical model¹³ in which firms have random productivities, or alternatively in Marc Melitz's model which allows for heterogeneous firms within each industry.¹⁴ In Melitz's model, opening trade leads to a rationalization of plants (with the less efficient exiting), so that trade implies productivity gains at the level of the industry. Nina Pavcnik and James A. Levinsohn also have done work documenting the importance of firm heterogeneity.¹⁵

Immigration and Capital Flows

In addition to studying the movement of goods across borders, much research is devoted to explaining the movement of labor and capital. Hanson and Matthew J. Slaughter have investigated in detail the effects of cross-state migration in the United States and of immigration from Mexico.¹⁶ They argue that cross-state flows of workers have relatively little impact on local wages but are absorbed mainly through changes in the mix of goods produced in that

state. Whether this is also true for immigration from other countries, including Mexico, is an important policy question. Hanson investigates enforcement measures at the Mexican-U.S. border on wages in adjoining U.S. cities and finds a minimal impact.¹⁷ In contrast, Daniel Trefler forcefully argues that immigration into the United States has had a significant downward effect on the wages of less-skilled workers, a topic to which we return below.¹⁸

Movements of capital between countries, or foreign direct investment (FDI), are explained by many of the same features that affect trade (factor endowments, transportation costs, and increasing returns). In addition, though, because FDI is defined as the ownership of capital abroad, there must be some reason that firms wish to own the facility used for production rather than simply exporting to the other country. Markusen has developed tractable models of the multinational enterprise¹⁹ and applied data to test their main hypotheses.²⁰ One particularly interesting hypothesis looks at whether the activities of multinational enterprises mainly fit a "horizontal" model (with firms spreading into the same activities in other countries) or a "vertical" model (in which firms go abroad to invest in other, complementary production activities). At this time the evidence strongly supports the "horizontal" model.²¹ Both Baldwin²² and Joshua Aizenman²³ have developed other theoretical models of FDI.

In addition to determining the reason for FDI, we are also interested in its impact on local wages, employment, and trade. Bruce A. Blonigen uses information on foreign plants in the United States to study their local impact.²⁴ He finds that foreign plants: typically grow faster than U.S. plants of similar size; lead to a larger positive impact on local wages; and generate some shifts in local government

budgets away from public education and towards transportation and public safety. He also investigates the extent to which FDI and imports are substitutes (with inflows of capital reducing imports) or complements (with FDI leading to higher imports). He finds evidence to support both hypotheses,²⁵ as does Linda S. Goldberg using data from Latin America.²⁶

The longest-standing contributions to our understanding of FDI have been made by Robert E. Lipsey, Director of NBER's New York office. His contributions were honored at a conference organized by Magnus Blomström and Goldberg and held at the Federal Reserve Bank of New York in December 1998.²⁷ Lipsey and his co-authors have used data from the United States,²⁸ Sweden,²⁹ Japan,³⁰ and other Asian³¹ and developed³² countries to explore the impact of FDI on production³³ and capital flows,³⁴ as well as on other policies affecting prices and wages.³⁵

Globalization and Wages

Interest in the movement of goods and factors across borders is not just academic; it spills over into policy debates because these flows affect the wages earned in import-competing and export industries. While a decade of unbroken economic growth in the United States has raised the incomes of many, the less-skilled workers have gained less than others, and globalization (in addition to technological change) may well explain this. The impact of trade on wages was the subject of a conference held in February 1998 in Monterey, California.³⁶ The conference volume included contributions by many researchers in the ITI program,³⁷ and covered such topics as: changes in inter-industry wage differentials; the effect of offshore assembly on wages; the impact of

international competition on technological change; and the effect of exchange rates on employment. One of the most intriguing findings from this work is that, while the wage gap between workers at the top and bottom 10 percent of incomes indeed increased in the United States on average between 1970 and 1990, its pattern was markedly different across various states. Bernard and Jensen find that states located around the Great Lakes have experienced *rising* inequality (like the national trend), but states in the Southeast have experienced *falling* wage inequality. Many of these state-level changes are larger than the national changes that have occurred, suggesting that the focus of most researchers on national changes may be missing an important part of the story.

Besides contributing to this conference volume, researchers in the ITI program have investigated many channels by which trade might affect wages. Using evidence from the United Kingdom and from the activities of U.S. multinationals,³⁸ Slaughter considers the effect of falling tariffs and transportation costs, the "sector bias" of technological change, and the effect of trade on the elasticity of labor demand. Pavcnik investigates the factors accounting for the shift toward more skilled labor in Chile and finds that plant-level measures of capital and investment, the use of imported materials, foreign technical assistance, and patented technology all have a positive influence on the relative demand for skilled workers.³⁹ Goldberg shows that wage sensitivity to exchange rates in U.S. industries rises with industry export orientation and declines with imported input use. These effects depend on the competitive structure of industries, as pricing-to-market studies would predict.⁴⁰ Eckhard Janeba goes on to consider the extent to which redistributive poli-

cies of education subsidies could be used to offset the income inequality caused by trade,⁴¹ while Dani Rodrik investigates the desirability of international tax coordination.⁴²

Theoretically, the impact of trade on wages depends very much on the model being used. In the conventional HOV model, trade has an impact only through changes in prices, and the evidence is that prices have not changed enough in the United States to explain the actual rise in the relative wage of skilled/unskilled workers since 1980.⁴³ Nevertheless, international trade still can have a substantial impact in other models. One intriguing channel, described by Michael Kremer and Eric Maskin, involves the hiring of low-skilled and high-skilled workers in a single firm.⁴⁴ Under certain assumptions about technology, this strategy will boost the wages of the less-skilled workers. But if the overall distribution of workers by skill *widens*, then firms instead can segregate high-skilled and low-skilled workers in different plants, which lowers the wages of the latter and increases wage *inequality*. Although Kremer and Maskin apply their model to a closed economy, the analysis is highly suggestive of foreign outsourcing, whereby firms in one country are able to send abroad the less skill-intensive activities in the production process. Extending the Kremer-Maskin analysis to an open economy is an important research priority. Gene M. Grossman and Giovanni Maggi have begun such research, but further work is needed.⁴⁵

Another perspective on globalization can be obtained by using the long trends afforded by historical data. The claim is sometimes made that growth in world trade during the past three decades is, after all, no big deal: the "golden age" from early in the nineteenth century to World War I witnessed equally large, if not larger, growth in trade and

factor flows. Is this claim correct? Douglas A. Irwin and Richard Baldwin both point to a number of features that distinguish trade today from trade at the turn of the century, and that would allow us to consider the current period as remarkable.⁴⁶ Like Alan M. Taylor,⁴⁷ Irwin uses historical data to investigate the HOV model and a range of topics related to tariffs and "infant industry" protection.⁴⁸

Gains from Trade

The debate over globalization and wages belies the more fundamental impact of trade on *incomes overall*. Few economists would doubt the beneficial effects of trade, despite the adverse impact on some groups. Yet the hard evidence supporting such gains from trade — in either a static or a dynamic sense — is surprisingly thin. Perhaps the reason for this is that it is difficult to control for the myriad other factors that influence a country's level of income and growth, and thus to isolate the effect of trade alone. This is the goal of the research by Dan Ben-David, who uses episodes including the entry of countries into free trade areas, or their statistical grouping with countries of similar incomes, to argue that trade raises per capita income.⁴⁹ His research has led to a debate over whether the "other factors" have been controlled for fully, and Slaughter argues that the data and statistical tests do not completely support the beneficial impact of trade.⁵⁰ Likewise, Ann Harrison and Hanson,⁵¹ and Rodrik⁵² question whether existing studies convincingly demonstrate the positive impact of trade on the growth rate of per capita income.

The dynamic effects of trade on growth depend crucially on the extent of technology transfer, or knowledge spillovers, across countries. That is the message of past research on "endogenous growth"

models by Grossman and Helpman. Accordingly, current research focuses on quantifying the extent of knowledge spillovers. Helpman argues that these cross-country knowledge flows are substantial and that both trade and FDI are important channels of transmission.⁵³ Initial work by Wolfgang Keller suggests instead that the extent to which knowledge spillovers are related to international trade is not fully known yet.⁵⁴ His subsequent work does provide a partial answer, though, showing that bilateral trade patterns are important in determining the strength of knowledge spillovers when those patterns are strongly biased toward or away from technological leaders.⁵⁵ In other work, Keller confirms the finding of strong cross-country spillovers, especially in the same industry where the R and D spending occurs.⁵⁶ Using quite different sources of data, Lee G. Branstetter investigates the extent of knowledge spillovers at the firm level.⁵⁷ Focusing on Japan, he quantifies the impact of changes in Japanese patent law and of research consortia on the innovative activity of firms.

Trade Policies

We turn now from a discussion of trade patterns to the analysis of trade policies. A host of policies used worldwide aim to limit the inflow of goods. The application of tariffs has been regulated by international agreements under the General Agreement on Trade and Tariffs (GATT) and the World Trade Organization (WTO), but other more complex policies have sprung up in their place. One of the most commonly used is antidumping duties, which are applied contingent on the prices charged by foreign firms in the import market. While antidumping appears to be similar to tariffs, in practice it has a more pronounced anti-competitive effect, because foreign firms will charge higher prices to

avoid the claim of dumping. Indeed, the dumping investigation itself (which has several distinct phases) raises import prices and reduces import values, while also changing the responses of import prices and values to exchange rates. These results, found by Blonigen and Thomas J. Prusa,⁵⁸ demonstrate the adverse impact of antidumping policy.

Another policy believed to have anti-competitive effects is "market access requirements" (MAR), by which an importing country (for example, Japan) has to accept a higher level of imports (perhaps semiconductors) than it otherwise would. MARs have been implemented to offset perceived barriers to imports, such as the *keiretsu* in Japan, although Barbara J. Spencer argues that such perception may well be misplaced.⁵⁹ The efficacy of MAR policies can be questioned, because they can lead domestic firms to *raise* their prices (thereby shifting demand toward imports). Whether this occurs or not depends on how the MAR is implemented. Kala Krishna and Marie C. Thursby argue that a MAR subsidy given to the *importing* firm may well have a pro-competitive rather than an anti-competitive effect.⁶⁰ Merger policy also is *directly* aimed at influencing competition, and Levinsohn investigates how that policy interacts with trade liberalization.⁶¹

Beyond asking how trade policies affect prices, and thus welfare, we wonder why the policies are enacted in the first place. Put simply: if economists find so many reasons to dislike trade policy, why is it used so frequently? One possible answer is that "strategic" trade policy, aimed at imperfectly competitive industries, may be in the national interest. That answer has been shown quite convincingly to be false,⁶² although each new type of market structure and conduct needs to be investigated carefully.⁶³ A more promising avenue is to explore the political basis for trade

policies, as enacted in response to industry lobbying pressures balanced against consumer interests. This has been the subject of theoretical work by Grossman and Helpman,⁶⁴ as well as Maggi.⁶⁵ Now attention has turned to testing these theories empirically. Robert Baldwin provides a test for the United States drawing on congressional voting records,⁶⁶ while Slaughter also uses U.S. data to investigate the determinants of individuals' trade policy preferences.⁶⁷ In contrast, Branstetter and Feenstra apply the political economy framework to China. They use the willingness of different provinces to accept foreign investment to estimate the objective function of state planners.⁶⁸

International Institutions

Finally, let us discuss the institutions that govern international trade policies. The contribution of such institutions is demonstrated theoretically by James E. Anderson, who examines models in which market exchange is alternately subject to opportunism⁶⁹ and to "predation."⁷⁰ Legal institutions can arise to limit this activity and therefore to support trade. Although these theoretical models are highly stylized, they are supported by empirical evidence, in the context of a gravity equation, which finds that corruption discourages trade.⁷¹

Turning to actual institutions, Kyle Bagwell and Robert W. Staiger examine in detail the economic rationale for the trading rules embodied in GATT and the WTO.⁷² These rules include GATT's principle of reciprocity, whereby one country will agree to reduce its trade barriers in return for a reciprocal reduction by another country, and non-discrimination or the most-favored-nation (MFN) principle, whereby all GATT member countries should be treated equally.

Bagwell and Staiger show that in a wide class of political economy models, these principles eliminate the incentives for manipulation of the terms-of-trade by member countries, and they ensure that efficient outcomes are obtained. This provides a quite general rationale for the GATT rules. John Whalley also examines the economic benefits of MFN rules in a computable general equilibrium model.⁷³ Krishna focuses on the "rules of origin" governing free trade areas, whereby goods cannot be shipped back and forth between countries duty-free unless some substantial production has occurred in the area.⁷⁴ These rules play a prominent role in the North American Free Trade Agreement, as Anne O. Krueger discusses.⁷⁵

The inclusion of environmental concerns has been a relatively new feature of international negotiations. Bagwell and Staiger investigate whether the GATT rules need to be modified to accommodate such concerns.⁷⁶ Also focusing on the environment, Brian R. Copeland introduces this feature into trade models and uses his framework to examine global warming and the Kyoto Protocol.⁷⁷ Likewise, Whalley examines the outcomes when trade and environmental issues are linked in international negotiations.⁷⁸

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