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The International Trade and Investment Program

Robert C. Feenstra*

The research of the International Trade and Investment (ITI) Program, which includes 90 current members, covers a wide range of topics, such as explaining patterns of international trade, foreign direct investment, and immigration, and improving our understanding of the impact of trade policies. In addition, specialized ITI conferences cover such topics as “Globalization and Poverty” and “China’s Growing Role in World Trade.”¹ These two projects illustrate that a good deal of our research is concerned with developing countries, although that will not be discussed in this summary. Here I focus on a few topics related to trade patterns and trade policy.

The Great Trade Collapse

The financial crisis and great recession of 2008–9 brought with it a “great trade collapse”: world trade relative to GDP fell by nearly 30 percent between these two years, exceeding the experience of other post-war recessions. Why did trade fall so much, and why did it recover relatively quickly? The leading explanations stress, in varying degrees, the roles of: inventory adjustment for imports; demand for durable versus non-durable goods; the use of intermediate inputs in trade, which might magnify the impact on trade as “supply chains” are temporarily disrupted; and the role of trade credit, which appears to have dried up temporarily during the crisis.

Beginning with the last of these explanations, Kalina Manova and her co-authors provide the strongest evidence supporting the role of credit constraints on exports. These constraints limit the extensive margin of exports in sectors that are most vulnerable to financial stress.² Furthermore, she

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argues that such sectors faced greater reductions in their exports to the U.S. market during the financial crisis.³ That idea is confirmed for Japan by Mary Amiti and David Weinstein.⁴ They find that Japanese exporters faced greater reductions in their sales abroad if they were affiliated with main banks that performed poorly. Focusing on China, my co-authors and I find that firms faced tighter credit constraints on their exports than on their domestic sales, and that exports experienced a significant slowdown because of the 2008 crisis.⁵ Ann E. Harrison and her co-authors find that, for the United States, import prices often rose during the crisis, which is inconsistent with falling demand but can arise from a supply constraint, such as a lack of export credit.⁶

Other work casts some doubt on the importance of export credit. George Alessandria and co-authors instead stress the role of inventory adjustment, which can lead to a rapid fall in imports as stocks are adjusted downwards.⁷ Andrei Levchenko, Logan Lewis, and Linda Tesar also find a limited role for trade credit in their regression analysis of U.S. trade, but they use an accounting definition of "trade credit" that applies equally well to exports or domestic sales.⁸ As an alternative explanation, they find that sectors which are more reliant on imported intermediate inputs suffered more during the crisis, because these supply chains were temporarily disrupted. Fabio Ghironi and his co-authors also stress the importance of imported inputs. They model the different components of aggregate demand (consumption, investment, government spending, and exports) as having different import intensities.⁹ They then construct a weighted average of those factors with the weights reflecting their import intensities. Using the resulting variable as an income term, and including an import price, they are able to construct a model that predicts the fluctuations in import demand during the current crisis and earlier episodes much more accurately than do conventional methods that rely on GDP and aggregate prices.

Of course, in the end it will be a combination of factors that explain the great trade collapse: even if inventories or imported intermediates are more important quantitatively, that finding need not detract from the significance of trade credit. Amiti and Weinstein, for example, argue that trade credit can account for about 20 percent of the fall in exports for Japan, so it

was not the most important factor, but it was still economically significant. That point is also made for Peruvian exports by Veronica Rappoport and co-authors, who argue that the reduction in loans from banks performing poorly reduced aggregate exports by 15 percent during the crisis.¹⁰ Perhaps the most comprehensive evaluation of the different factors contributing to the great collapse in trade was written by Jonathan Eaton, Sam Kortum, Brent Neiman, and John Romalis.¹¹ They argue that the relative decline in demand for manufactures was the most important driver of the decline in manufacturing trade, and especially the decline in demand for durable manufactures. These factors account for more than 80 percent of the global decline in trade/GDP. While they find that trade frictions increased and played an important role in reducing trade in some countries, notably China and Japan, these frictions only had a small impact on global trade.

Offshoring, Wages, And Employment

One of the explanations mentioned earlier for the great trade collapse was that supply chains may have been disrupted during the crisis. While the “supply chain” concept is often mentioned in the social sciences, it has had limited modeling within the international trade context. That shortcoming is being addressed in very recent research. Arnaud Costinot, Jonathan Vogel, and Su Wang model a sequential supply chain in which mistakes potentially occur at each stage in a continuum.¹² There are many countries which differ in their probabilities of making mistakes, and in equilibrium there is a matching between stages of production and countries. Richard Baldwin and Anthony Venables call this type of sequential product chain a “snake” and label the assembly of multiple parts at a central facility a “spider.” They provide a partial equilibrium model that illustrates the difficulties of solving for the location of stages in this framework and also make clear that the assignments might be non-monotonically related to transportation costs.¹³

Closely related to the supply chain concept is the role of intermediaries who provide services between buyers and sellers. Examples include large trading houses, such as “Li and Fung” in Hong Kong. Recent research by Costinot and Pol Antràs has modeled these intermediation activities.¹⁴ JaeBin Ahn, Amit Khandelwal, and Shang-Jin Wei provide empirical evidence on the role of intermediaries in China.¹⁵

Also closely related to international supply chains is the fragmentation of production across borders, or offshoring. The most recent theoretical paradigm for offshoring draws on “trade in tasks,” which is described in work by Gene Grossman and Esteban Rossi-Hansberg.¹⁶ In this framework, offshoring in low-skilled tasks acts like labor-saving technological progress in that factor. At unchanged prices for goods—as in a small-country framework—increased offshoring raises the wages of low-skilled labor. In contrast, when the prices of goods are endogenous—as in a large-country framework—increased offshoring of less-skilled tasks raises the output of that good and lowers its relative price. This change in relative prices has the expected result of lowering the real and relative wage of less-skilled labor, consistent with earlier work on “trade in inputs” by Gordon Hanson and me.¹⁷ The overall change in wages depends on whether the impact of labor-saving technological change attributable to offshoring dominates the opposite effect of changing international prices, which depends on parameters of production and other features of the economy.

This work on offshoring has been extended by ITI Program members in a number of directions. Richard Baldwin and co-authors integrate the earlier “trade in goods” and “trade in tasks” frameworks, as well as examining the role of heterogeneous firms.¹⁸ Andrés Rodríguez-Clare examines the impact of offshoring in a Ricardian model with a continuum of industries.¹⁹ Costinot and Vogel provide the most general treatment of offshoring attributable to factor endowment differences, in a model with a continuum of goods and factors. This leads to

a sophisticated matching of factors with goods, for which they provide a complete solution.²⁰ Antràs, Luis Garicano, and Rossi-Hansberg consider the effects of offshoring in a model of multinationals where managers monitor and solve problems for workers.²¹ Ariel Burstein and Vogel also consider the role of multinationals that bring technology to the host countries.²² Based on a quantitative exercise, they argue that the growth of multinationals has been at least as important as the growth of trade in explaining the rising skill premium in the United States. Finally, Grossman and Rossi-Hansberg model offshoring between similar countries, where it is not factor-price differences that determine the location of production, but rather local external economies.²³

Ann E. Harrison, Margaret S. McMillan, and co-authors provide new empirical studies of offshoring, using data on U.S. multinationals and data from the Current Population Survey (CPS).²⁴ They find that it is occupations rather than particular industries that are the best unit of analysis for identifying the wage effects of offshoring, which can be significant. Runjuan Liu and Daniel Treffer also use the CPS data to link U.S. workers who are switching jobs, or becoming unemployed, to their original industries.²⁵ They find only a small effect of services offshoring on either switching or unemployment, with an offsetting positive impact of “in-shoring” on employment rates and earnings. Focusing only on employment, Gianmarco Ottaviano, Giovanni Peri, and Greg Wright analyze the impact of offshoring and immigration in a framework that is consistent with the Grossman and Rossi-Hansberg model.²⁶

Rather than examining the impact of offshoring on the *level* of wages and employment, one might consider its impact on their volatility. John McLaren and his co-author model employment contracts as long term, and then examine whether international integration weakens these relationships.²⁷ Paul Bergin, Hanson, and I take an alternative approach, whereby wage fluctuations vary the range of tasks offshored, and the availability of offshoring magnifies the

wage fluctuations themselves.²⁸ Evidence from Mexico supports the hypothesis that wages exhibit greater fluctuations because of offshoring than occurs in similar industries in the United States. Alejandro Cuñat and Marc Melitz argue that industries displaying greater volatility will tend to locate in countries with more flexible labor market institutions.²⁹

Of course, offshoring can be expected to influence unemployment as well as wages. Current research on unemployment using trade models depends on either “fair wages”—that are above the market clearing level—or on search frictions. Work by Donald Davis, Amiti, and James Harrigan are all examples of papers that use the concept of “fair wages”.³⁰

Recent theoretical work has put these search frictions into models of offshoring. One of the early models was by Devashish Mitra and Priya Ranjan, who find that unemployment is actually reduced because of offshoring, since the cost savings for firms leads them to expand employment.³¹ A series of papers by Elhanan Helpman with Oleg Itskhoki and Stephen Redding provide more general treatments of trade and unemployment.³² Their framework combines search frictions, wage bargaining, and firm heterogeneity. They find that openness to trade may increase unemployment, but that the gains from trade are still positive. Empirical evidence on the effects of trade on labor market outcomes also comes from Kerem Coşar, Nezih Guner, and James Tybout.³³ Their analysis is based on a model with search frictions, wage bargaining, and firm heterogeneity which is then fitted to Colombian micro data on establishments and households.

Extending The Monopolistic Competition Model

A great deal of research in international trade uses the monopolistic competition model, introduced during the early 1980s by Paul Krugman, Elhanan Helpman, and others. The early models assumed that firms were symmetric in size, which contradicts the fact that a large fraction of exports in most economies are

accounted for by a relatively small number of large firms. That observation was incorporated into the monopolistic competition model by Melitz, who added heterogeneous firms with random productivities.³⁴ Since that time, the research has focused on extending many other aspects of the monopolistic competition model. Costas Arkolakis and Vogel make two rather fundamental contributions. Arkolakis introduces marketing costs into the model, thereby allowing for the presence of small exporters (which cannot arise in the Melitz model).³⁵ Vogel is the first to introduce heterogeneous firms into a spatial version of the monopolistic competition model.³⁶

Evaluating the importance of firm heterogeneity requires firm-level data, which may be restricted because of confidentiality. Fortunately, those problems can be overcome in a number of ways. For the United States, the imports and exports of individual firms are collected by the Foreign Trade Division of the Census Bureau from customs documents. Several members of the ITI group have obtained permission to merge those data with data from the Census of Manufactures, a firm-level database that is available at the Census Bureau’s Regional Census Research Data Centers. One of these is at the NBER’s office in Cambridge and another, also partly supported by the NBER, is at Baruch College in New York. When analyzing these data in a series of papers,³⁷ Andy Bernard, Bradford Jensen, and Peter Schott have coined the term “most globally engaged” firm to describe the small number of U.S. firms that are involved in a disproportionate amount of trade. The researchers find that many importing firms are also exporters, and are extremely important to the U.S. economy. For example, the total number of workers at firms that either imported or exported in 2000 was about 50 million, or one third of the total civilian workforce. More than half of the firms in the United States that import also export and these firms account for 90 percent of U.S. trade. So it is these large, trading firms that account for the vast majority of U.S. trade and related employment. In joint work with

Redding, these authors also analyze the importance of wholesalers and retailers in trade, and in intra-firm trade.³⁸

Firm-level trade data is also available for France, where Jonathan Eaton and Sam Kortum work with Francis Kramarz at the Center for Research on Economics and Statistics.³⁹ They analyze the trading patterns of firms and confirm that more productive firms sell in many more markets. Arkolakis and Marc-Andreas Meunier use data for Brazil to analyze the extensive margin of exporting firms.⁴⁰ In addition to these country studies, some firm-level data from public sources may be available for particular industries. One example is the motion picture industry, analyzed by Hanson and Chong Xiang.⁴¹

Other important features of the monopolistic competition model being examined in current research are product quality and product variety. Melitz observes that exogenous product quality enters the heterogeneous-firms model in much the same mathematical way as exogenous productivity. But a key difference is that with productivity, the firms that become large are the most productive and therefore have the lowest prices, whereas with quality, the largest firms have the highest quality products and therefore high prices. So, this implies a natural dichotomy between industries where firms compete based on productivity and the largest firms should have low prices and industries where firms compete based on product quality and the largest firms should have high prices. Baldwin, Harrigan, and Tadashi Ito explore this dichotomy.⁴²

We would expect that the demand for high-quality goods varies with income, so that non-homothetic preferences and the distribution of income become important. David Hummels and his co-authors examine the role of income distribution, using a utility function from Harry Flam and Elhanan Helpman, which implies that cross-country differences in income distributions are related to variations in import variety and price distributions.⁴³ They find empirical support for the model by using micro data on income and price distributions that are derived

from trade data. Pablo Fajgelbaum, Gene Grossman, and Helpman use an alternative preference structure, drawing on the discrete choice literature.⁴⁴ Their framework allows us to study the welfare consequences of trade, transport costs, and trade policy for different income groups in an economy. Ina Simonovska also uses a non-homothetic utility function to study the role of price discrimination in international trade,⁴⁵ while Ana Cecilia Fieler introduces non-homothetic preferences into the Eaton-Kortum model of trade.⁴⁶ James Markusen provides a survey of results obtained with non-homothetic preferences.⁴⁷ Finally, Maurice Kugler and Eric Verhoogen, who analyze data for Colombia firms, develop a production-side explanation for the quality of traded inputs and outputs.⁴⁸

The studies described above are general equilibrium, combining theory and empirical work. Other empirical research focuses on partial-equilibrium frameworks used to develop measures of product quality. Amit Khandelwal uses a discrete choice framework to estimate product quality in a wide range of U.S. manufacturing industries, at the Harmonized System 10-digit level.⁴⁹ In his framework, a product that is in high demand but does not have a low price necessarily must be high quality. The same idea, but with different functional form for demand, is used by Juan Carlos Hallak and Schott to estimate product quality for the United States.⁵⁰ Manova and Zhiwei Zhang examine the quality heterogeneity across Chinese exporting firms.⁵¹

Not only product quality but also product variety lends itself to empirical implementation. Bruce Blonigen and Anson Soderbery compare two methods of measuring product variety in automobiles: one using product-level import data and the second using actual market data on automobiles sold in the United States.⁵² They find that implied welfare benefits from using the product-level import data are only half what is found with the market-based data. They further show that the welfare gains from all foreign-owned varieties (both imported and from foreign affiliates) are well over 50 percent larger

than those stemming from imported varieties alone. Other researchers have studied the positive impact of importing a greater variety of intermediate inputs on the productivity of the downstream industries. Penny Goldberg, Amit Khandelwal, Nina Pavcnik, and Petia Topalova show this with Indian data.⁵³ Further, in dynamic models the gains from product variety in inputs can contribute to enhanced efficiency and increased growth, as demonstrated by Christian Broda, Joshua Greenfield, and Weinstein.⁵⁴

Closely related to the concept of variety in trade is the “extensive margin” of exports, which refers to the number of firms within an industry who are exporting. For an individual firm, the extensive margin of exports refers to the range of products that it produces and exports. Hand-in-hand with the large differences in the size and productivity of firms are differences in their product range. Bernard, Jensen, Redding, and Schott demonstrate this theoretically and empirically in U.S. data.⁵⁵ An alternative theoretical approach to analyzing the scope of firms is presented by Volker Nocke and Stephen Yeaple.⁵⁶

A final area where the monopolistic competition model is being extended is the assumption of CES preferences, which leads to constant markups being charged by firms. Alternative preferences, such as the non-homothetic cases referred to above, will lead to markups that are endogenous and therefore have important implications for welfare. This topic is discussed in the next section.

Trade Policy And Welfare

In the ITI program an ongoing area of research is the impact of, and explanations for, trade policies. Some studies examine the impact of policies in particular sectors. One important example is the textile and apparel sector, which experienced a large reduction in quotas as the Multifibre Agreement was phased out in January 1, 2005. Many people expected that China would take over in this sector, since it had been the most constrained in its textile and apparel exports. But

Harrigan and Geoffrey Barrows show that along with these changes in market shares, there was a massive downgrading in the type of product exported from China.⁵⁷ These products at the lower end took sales away from countries such as Mexico or Guatemala, and to some extent served to offset the competitive impact on other Asian countries.

Another sector that has received attention for its ongoing trade policies is steel. Bruce Blonigen and co-authors show that the response of this industry to tariffs versus quotas, which they estimate, is highly sensitive to its market structure.⁵⁸

There is also strong interest in the topic of the impact of free trade agreements, particularly on workers. This topic has received renewed interest for the United States in what might be considered “round two” of the debate over the impact of trade on wages and employment. Making use of broad changes in tariffs through trade agreement and detailed datasets on individuals, these studies identify potentially large effects of tariff reductions. A recent example is the work by David Autor, David Dorn, and Hanson, which examines the acceleration in Chinese exports to the United States following its WTO accession in 2001.⁵⁹ They match the changes in wages and employment in local labor markets defined by “commuting zones” to the Chinese exporters to manufacturing industries in those zones. They link the rise in Chinese exports, and the implied reduction in employment, to changes in federal support payments to individuals for trade adjustment assistance, disability, retirement, and the like. They find that the deadweight loss from the increase in support payments is very similar in magnitude to the welfare gains from the increased imports: both are on the order of \$30–\$70 annually per capita. But because the support payments are expected to be temporary while the welfare gains from imports are permanent, there are still gains from trade.

A second example of a study that uses data on individuals (from the decennial census) is the paper by John McLaren and

Shushanik Hakobyan which analyzes the impact of NAFTA on local labor markets in the United States.⁶⁰ Drawing on earlier theoretical work by McLaren, they allow for possible wage increases in response to anticipated tariffs cuts (as workers leave industries) and for wage decreases when the tariff cut occurs. They find a significant negative impact of NAFTA on blue-collar workers, with smaller positive or negative effects on college educated workers. Their overall message is that NAFTA has large distributional effects, even if its overall welfare impact is small.

All of these studies find sizable changes in trade flows following the enactment of the tariff changes, despite the fact that U.S. tariffs on Mexico were already low, and that tariffs on China were already at their MFN level before its accession to the WTO. Why can trade change so much in response to small tariff changes? Kyle Handley and Nuno Limão suggest that preferential agreements may reduce the policy uncertainty surrounding tariffs that could change in the future.⁶¹ They study Portugal, which was already a member of the EFTA and had an agreement with Spain when it joined the EEC in 1986. There was no drop in Portugal's tariffs with members of the EEC who were also in EFTA, but nevertheless there was a sizable increase in exports to EC members. Handley and Limão attribute this to a reduction in policy uncertainty, which they measure by the difference in the zero tariffs within the EEC and the MFN tariffs charged to outside members. Variation in that difference allows the researchers to identify the policy impact across industries and to explain the increase in trade.

In addition to these empirical studies, several members of the program, using game-theoretic techniques, have theoretically analyzed the question of why countries pursue preferential agreements. For example, Philippe Aghion, Antràs, and Helpman model this as a question of sequential bargaining, whereby a country makes deals with a series of other countries, but the bargains negotiated must be consistent with the deals that potentially will be made in the future.⁶² The researchers show that this model generates both

“building bloc” and “stumbling bloc” effects of preferential trade agreements, to use the terminology of Jagdish Bhagwati. In particular, they find conditions under which global free trade is attained when preferential trade agreements are permitted to form (a building bloc effect), and other conditions where global free trade is attained only when preferential trade agreements are forbidden (a stumbling bloc effect).

In a series of papers, Kyle Bagwell and Robert Staiger analyze games in which countries are constrained by the WTO rules and show that these rules can lead to welfare improvements.⁶³ One example is the most-favored nation rule, which states that all WTO members must be treated equally. This rule means that a reduced trade barrier given to a current negotiating partner must be automatically extended to later partners. Bagwell and Staiger argue that the MFN principle makes it less likely for countries to be willing to offer concessions at early stages of the sequential bargaining process, but that this potential source of conflict can be offset by two other WTO principles: first, by renegotiation at later stages; second, by reciprocity in the concessions made by each country. Incorporating these principles into the bargaining game allows for an efficient outcome even under the MFN rule. This line of research enables Bagwell and Staiger to rationalize various provisions of the WTO.

There are other approaches, too, that can be used to rationalize the provisions to the WTO. Ralph Ossa uses a monopolistic competition model with a “home market” effect, whereby tariffs attract firms to enter the protected market.⁶⁴ That framework can generate political economy considerations for trade policies and WTO rules that are similar to what arises from the terms-of-trade model. Using a different approach, Giovanni Maggi and his co-authors argue that WTO-type rules can be understood as arising from the inevitable incompleteness of trade agreements.⁶⁵

The analysis of trade policy naturally leads to the question of the gains from international trade, and we conclude with this classic question. Analysis of

the monopolistic competition model has shown that it gives rise to a remarkably simple formula for the gains from opening trade: those gains are equal to one minus the import share of the economy, raised to a negative power that depends on the specific details of the model. In the Krugman monopolistic competition model with homogeneous firms, that power depends on the elasticity of substitution in consumption. In the Melitz model with heterogeneous firms that have a Pareto distribution for productivities, the same formula for the gains from trade holds, but the power depends on the Pareto parameter.⁶⁶ I argue that this result obtains in the Melitz model because import competition drives out a number of domestic varieties that just cancel out in welfare terms, so that the only remaining source of gains from trade is productivity improvements.⁶⁷ Remarkably, Arkolakis, Costinot, and Andrés Rodríguez-Clare have recently argued that a similar result holds in a broader class of models. The fact that such a simple formula for the gains from trade arises in models that can be quite complex in their market structure leads them to pose the question: “new trade models, same old gains?”⁶⁸

This view has been challenged in other recent work. Weinstein and I estimate a monopolistic competition model with heterogeneous firms, where the aggregate consumer has translog preferences.⁶⁹ In that case, the markups charged by firms are endogenous, and we do not expect that the gains from trade depend only on the import share. We estimate the gains from rising imports over 1992–2005 for the U.S. economy, and find that the gains from reduced markups are on the same order of magnitude as the gains attributable to increased import variety.

Ina Simonovska also obtains variable markups, as discussed above, as do Beatriz de Blas and Kathryn Russ in the context of the model by Bernard, Eaton, Jensen, and Kortum.⁷⁰ In that model, Bertrand competition leads to markups that equal the difference between the productivity of the most efficient and second-most efficient firms. But with entry by a finite number of potential rivals, de Blas and

Russ show that these markups are not fixed by the productivity distribution of firms, but depend on the number of rivals. If opening to trade alters the number of potential rivals, then markups will also change. In that case, we can conjecture that the gains from trade will not depend on only the import share and a parameter. Understanding the class of models in which this conjecture holds true is an important direction for further research.

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⁵ R. C. Feenstra, Z. Li, and M. Yu, "Exports and Credit Constraints under Incomplete Information: Theory and Evidence from China," NBER Working Paper No. 16940, April 2010.

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