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The rise in exports from China has been one of the most significant events in international trade in recent decades. This trend has accelerated since that country’s entry into the World Trade Organization (WTO) in 2001. Even before that date, by a vote of the U.S. Congress China received the low-tariff, most-favored-nation status associated with WTO membership each year. But with WTO membership, Chinese firms experienced a reduction in the uncertainty associated with the outcome of that vote. This contributed importantly to the surge in exports to the United States, according to studies by Justin Pierce and Peter Schott and by Kyle Handley and Nuno Limão; their hypothesis is supported by empirical work by Ling Feng, Zhiyuan Li, and Deborah Swenson.1 Pierce and Schott observe that the surge in Chinese exports to the United States coincides with a substantial decline in U.S. manufacturing employment. Handley and Limão find that the welfare gain for consumers due to this increase in Chinese imports is of the same order of magnitude as the U.S. gain from new imports in the preceding decade. These initial findings highlight the dual role that Chinese imports play for the United States: on the one hand, they create import competition with associated labor-market dislocation; on the other, they benefit U.S. consumers.

The first of these roles is explored in a series of papers by David Autor, David Dorn, and Gordon Hanson.2 They analyze the impact of Chinese import competition between 1990 and 2007 on local U.S. labor markets, exploiting geographic differences in import exposure that are due to initial differences in industry specialization. Higher exposure increases unemployment, lowers labor force participation,

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and reduces wages. [See Figure 1, at right] At the aggregate level, a conservative estimate is that the import surge accounts for one-quarter of the decline in U.S. manufacturing employment. The regional concentration in the decline in manufacturing employment is inconsistent with some alternative explanations of this phenomenon, not only the possibility of a systemic technology shock. The trade effects on unemployment are confirmed by examining worker-level evidence. More recently, in joint work with Daron Acemoglu and Brendan Price, these authors find that the import surge from China also contributed to unusually slow employment growth in the United States following the global financial crisis and the Great Recession.

While these papers have explored the impact of import competition from China, they do not incorporate the consumer gains or the export opportunities created by expanded Chinese exports. The first attempt to put the surge in Chinese imports into a general equilibrium context is that of Lorenzo Caliendo, Maximiliano Dvořík, and Fernando Parro. Their computable general equilibrium model incorporates labor mobility frictions and dislocation costs. They find that growing Chinese import competition resulted in a 0.6 percentage point reduction in manufacturing’s share of total employment, or approximately one million jobs lost, which is about 6.5 percent of U.S. factory employment not explained by a secular trend. At the same time, the China shock increased U.S. welfare by 0.2 percent in the short run and 6.7 percent in the long run, with very heterogeneous effects across labor markets. Despite the fact that employment impacts and labor market dislocation are much stronger in some areas, the consumer gains and export opportunities mean that nearly all regions experience net benefits from rising Chinese imports.

This work has inspired much additional research on the China shock. In the United States, Arvabham Ebenstein, Ann Harrison, and Margaret McMillan analyze the impact of globalization at the occupational level and find that offshoring to low-wage countries and imports are both associated with wage declines for U.S. workers, though imports from China have a greater impact than does offshoring. In France, analysis by James Harrigan, Arielle Reshef, and Farid Toubaïl concludes that increased protection of the labor market is associated more with technological change than with imports from China. In Denmark, Wolfgang Keller and Håle Uran find that import competition from China of the change in manufacturing employment is a cause of job polarization, with about four times the impact of offshoring. They confirm a strong role for technological change and competition in leading to polarization, but find that these factors cannot explain the rise in low-wage employment up to the early 2000s.

Global Supply Chains and Wage Inequality

A great deal of work in the International Trade and Investment Program examines relationships between multinational firms, their global sourcing decisions, and wage inequality. Understanding which countries a company chooses to use for offshoring is a challenging theoretical problem. In the presence of fixed costs of procurement, that problem is inherently discrete in nature, since the firm must choose zero, one, or two more countries to which to outsource. Pol Antrás, Teresa Fort, and Felix Tinell develop a method to analyze the outsourcing problem as though the firm is choosing a continuous rather than a discrete outcome, and they apply it to firm-level U.S. data. They study the implications of a hypothetical 100 percent increase in China’s sourcing potential, such as could be produced by a reduction in transportation costs. They find that such a shock tends to create gains by decreasing the equilibrium industry-level U.S. price index, but that these gains are offset by the gains to Chinese producers that come from sourcing to China as a result of the shock, and these firms on average also increase their input purchases from the U.S. and other countries. Greater sourcing by U.S. firms from China can lead to enhanced demand for local inputs, too, as these firms grow.

In other work, Antrás and Davin Chor analyze offshoring using a property rights model of the firm. They consider a continuum of production stages, where at each stage a final goods producer contracts with a distinct supplier for a customized, stage-specific component. They show that the incentive to integrate suppliers varies systematically with the relative position—upstream versus downstream—at which the supplier enters the production process and that the nature of the relationship between integration and “downstreamness” depends crucially on the elasticity of demand faced by the final goods producer. Using the U.S. Census Bureau’s Related Party Trade database, they find empirical evidence broadly supportive of these predictions. In work with co-authors Laura Alfaro and Paola Conconi, they provide further evidence supporting this theory of trade by analyzing the impact of China on the production activities of firms operating in more than 100 countries. These papers build on work by Antrás and Chor on co-authorship networks and Russell Hillberry which measures the “upstreamness” of production and trade flows. Fally and Hillberry further show some U.S. importers are able to leverage their own Coasian model of international production chains.

The links between wage inequality and global supply chains is studied in a...
Down further to examine inequality, Muendler, and Stephen Redding drillable characteristics.

17 agoine for workers with similar observion between countries. But when we model the data, it becomes clear that country rather than an effective U.S. tariff cut. That is also the case for the research of Chang-Tai Hsieh and Ralph Ossa dealing with the impact of China’s export growth on the rest of the world.21 The reason that an effective cut is not used in the models is twofold. First, as noted, the U.S. tariff cut received by China when it entered the WTO in 2001 was actually a reduction in the risk of having non-WTO tariffs applied, since most-favored-nation tariffs had been approved in previous years.

Setting aside this issue, there is a second reason why we do not use a cut to explain China’s export surge. Suppose that we model the Chinese economy and the rest of the world as being composed of heterogeneous firms with a Pareto distribution of productivities across firms, as assumed by Melitz-Chaney model.22 Then, let us introduce an iceberg trade cost—the assumption that trade costs rise with the distance between as a proxy for border costs. It turns out that a reduction in the iceberg trade cost has no impact on the entry of firms into the monopolistic competitive sector. For this reason, it would be difficult to calibrate the large export surge from China as arising from a reduction in trade costs. Furthermore, in this setting, the gains from trade resulting from a reduction in trade costs are much the same as in an monopolistic competition model, quite different from a truncated Pareto by allowing for the productivity distribution to take on a truncated Pareto by allowing for the productivity distribution cannot be unbounded.23

My own work extends the discussion of truncated Pareto by allowing for a wide range of preferences beyond the constant elasticity of substitution, called “quadratic mean of order q” preferences.24 Again, entry by firms responds to changes in trade costs. The average markup charged by firms and the variety of goods available to consumers also change. Therefore, increased trade has positive pro-competitive and variety effects. Using a truncated Pareto distribution in this way avoids the result of Arkolakis, Costinot, Dave Donaldson, Federico Ezaro, and Ina Simonovskii.25 The welfare effects of changing markups and variety must take into account the cost of the exit of the firm, Colin Hottman, Redding, and Weinstein document how markups differ in the United States and Europe across firms of various sizes, with only the largest firms showing evidence of variable markups.26

For Mexico, David Arkin, Benjamin Faber, and Natalia Gonzalez-Navarro document how the arrival of foreign firms in the retail sector created gains for consumers by creating more competition and lowering markups, as well as expanding variety.27

See Figure 2.) They also find evidence of store exit. Despite this, the gains are on average positive for all inclusive groups but regressive, benefitting those with higher income more. A different view of the gains from trade are distributed across consumers and countries of origin in the models are presented by Pablo Fajgelbaum and Amit Khandelwal, who use an Almost-Ideal Demand system.28 They find that trade typically favors the poor, because they spend more in tradable sectors.

These papers refer to general sources of gains from trade. Returning to the specific case of tariffs, recent research has shown that changes in tariffs—in striking contrast to the conclusion in models with iceberg transport costs—can indeed induce firm entry and exit. This point was recognized by Costinot and Rodriguez-Clare in their survey; they allow for post-depletion of U.S. sugar duties from 1890 to 1930. Douglas Irwin finds a striking asymmetry: a tariff reduction is immediately passed through to consumer prices with no impact on the import price, whereas about 40 percent of a tariff increase is passed through to consumer prices and 60 percent is borne by foreign exporters.29

A tariff is then equivalent to a tax on costs and on profits. We find a quite pronounced impact of the Uruguay Round on entry and therefore also on welfare, due to the component of the tariff that functions as an implicit tax on profits. There is a strong link between the trade and the profits of exporters is also apparent from the empirical work of John De Loecher, Pindulio Goldberg, Khandelwal, and Nina Pavcnik, who focus on trade liberalization in India.30 They find that a reduction in output tariffs has the expected pro-competitive effects, with firms lowering their net-of-tariff prices.

The Gravity Equation and Intra-national Trade

An ongoing topic of research in the ITI program is the gravity equation, which explains trade between countries, based on their size and the distance between them, as well as other variables. The foundations of this equation and its estimation are constantly being expanded. Chaney shows how this equation can arise from stable networks of firms with their suppliers and potential buyers. Arkolakis, and Yuta Takahasi nest alternative models to provide a more refined treatment of this equation in what they call “Universal Gravity.”31 The estimation of the gravity equation and its applications is discussed by Morales, Gloria Sheu, and Andreas Zahrle, who also examine “extended gravity,” whereby a firm’s entry into one country makes entry into neighboring countries easier.32 On the other hand, the difficulty of entering markets means that many country-pairs have zero trade between them in specific products. While it can be difficult to account for zero trade flows in the gravity equation, an approach is proposed and implemented by Jonathan Eaton, Samuel Kortum, and Sebastian Sneha.33 One goal of estimating the gravity equation is to obtain estimates of the elasticity of trade flows with respect to trade costs. Simonovskia and Michael Waugh show the elasticity obtained is very sensitive to the underlying model for the gravity equation.34 Their work is being undertaken by Kyle Bagwell, Robert Staiger, and Ali Yurukoglu.35 They have access to recently declassified data from rounds of the GATT/WTO, but access to the tariff bargaining. These data give us an unprecedented opportunity to examine the mechanisms behind the GATT/ WTO rules, such as most-favored-nation status and reciprocity.
inform the trade elasticity that is used in computational models. In addition to the micro-elasticity between foreign buyers and sellers, the macro-elasticity between importers and exporters is also important. We find a macro-elasticity between foreign and home variety. We consider conventional variables such as transportation costs, border barriers, and intraregional transport costs. The gravity equation to incorporate the alternatives to current trade policies is surveyed by Redding and Matthew J. R. Pierce and P. K. Schott, “The Impact of Trade on Labor Market Inequality,” NBER Working Paper No. 18938, April 2013, and the Economic Journal, 125(S84), May 2015, pp. 621–646.

This research suggests that the results from multi-country general equilibrium models may be very sensitive to the efficiency with which different margins of substitution operate—substitution between crops, between regions, and between countries. Understanding those margins of substitution and the costs associated with them is an important ongoing direction of research in the ITI program. Another unifying theme in all trade research is the concern for social welfare—accounting for the well-being of consumers and the profits earned by firms.

Other important topics, such as immigration and the evaluation of policies to promote growth in developing countries, are beyond the scope of this chapter. Work on the other hand is likely to be a substantial volume of future research: the impact of global climate change. Donaldson, Costinot, and Corry Smith examine the implications of climate change for a variety of crops and locations around the world. They fully incorporate the alternatives to current crop patterns as global temperature rises. With this cost substitution of crops and allowing trade to adjust, they find that the following countries are most affected by agricultural markets in their study would amount to a rather modest 0.26 percent reduction in welfare.

Klaus Deinert and Ross-Hanßberg use a less-detailed model of agriculture along with a manufacturing sector, both of which are subject to falling international trade barriers. Kerem Cosar and Faigbeilga also study the connections between internal geographical, national specialization, and international trade, using data from Chinese prefectures.

The gravity equation can also be used to study optimal policies at the state level. Faigbeilga, Morales, Juan Carlos Suarez Serrat, and Owen Zidar analyze the potential spatial displacement arising from differing state tax policies in the United States. They find that revenue-neutral tax harmonization leads to aggregate real GDP and welfare gains of 9.7 percent. Ossa studies how the difference in state tax rates can arise from welfare-enhancing subsidy competition between them. He finds that subsidy competition can create large distortions, so that the gains from cooperative setting of state taxes and subsidies are substantial. Caliendo, Parro, Ross-Hanßberg, and Pierre-Daniel Sarte abstract from taxes to study how productivity shocks within U.S. regions spill over to the entire economy.

Internal transportation costs can have a significant impact on international trade, too. Arkin and Donkina used newly collected CPI microdata from Ethiopia and Nigeria to assess the impact of internal distance on the prices at the port of exit. They find that the effect of distance on trade costs within Ethiopia or Nigeria is five times larger than in the U.S. (See Figure 3). In addition, they find that internal transportation costs capture the majority of welfare benefits from international trade, and that their share is even higher in countries with large distances between ports that remote consumers receive only a small share of the gains from falling international trade barriers. Kerem Cosar and Faigbeilga also study the connections between internal geographical, national specialization, and international trade, using data from Chinese prefectures.

In another natural experiment, Gabriel Olivier and Yoan Otov develop a methodology to flexibly estimate both intranational border barriers and intraregional trade costs. A more detailed examination of intraregional costs is undertaken by the Federal Reserve Bank of St. Louis, and Esteban Rossi-Hansberg.

They examine spatial linkages between goods markets through trade costs and factor markets through commuting and migration. The latter are subject to heterogeneous moving costs between regions. They find that without these costs, commuting flows cannot be explained by only considering conventional variables such as the difference between regions in their size or wages. There are many “natural experiments” that can be used to test spatial models. Andrew Bernard, Andreas Manoukis, and Yukiyo Sato use the opening in Japan of a high-speed bullet train (Shinkansen) line that lowered the cost of passenger travel between cities and suburbs. They find significant improvements in firm performance as well as creation of new buyer-seller links, consistent with their model. Allison and Winters apply a quite general theoretical framework to the construction of the interstate highway system in the United States and find that this system increased U.S. welfare by 3.5 percent, which is roughly twice its cost.

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