

International Trade: Why We Don't Have More of It

BY EDITH OSTAPIK AND KEI-MU YI

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lobalization has led to an enormous increase in international trade. Over the past 40 years, world exports as a share of output have doubled to almost 25 percent of world output.

However, despite this enormous increase, economic evidence suggests that significant barriers to international trade still exist. In this article, Edith Ostapik and Kei-Mu Yi summarize the latest developments in the measurement of international trade barriers.

Globalization has many facets. One of the most important is the enormous increase in international trade. Over the past 40 years, world exports as a share of output have doubled to almost 25 percent of world output.¹ However, despite globalization and the increasing share of output that is exported and imported internationally, economic evidence suggests that significant barriers to international trade still exist.² We will summarize the latest developments in the measurement of international trade barriers, drawing mainly from a recent comprehensive survey on the subject by James Anderson and Eric van Wincoop. In their



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survey, these authors report estimates of the magnitudes of different categories of international trade costs. They find that, on average, international trade costs almost double the price of goods in developed countries.³

The primary policy implication of the existing research is that globalization still has a long way to go, so that there is still plenty of room for trade to grow. Growth in trade will likely occur primarily through technological changes that reduce transportation or

¹ Source: The World Bank's World Development Indicators (we use the world export share of world GDP). Since world exports = world imports, imports have risen by the same amount.

² Previous *Business Review* articles have questioned the extent to which globalization has taken place. The article by Janet Ceglowski reviews research on barriers to international trade. Examining another dimension of globalization, Sylvain Leduc explores the lack of international diversification of investment portfolios.

³ They estimate an overall average increase of 74 percent in the prices of goods in these countries.

communication costs or from long-run policy choices, such as a national currency or language. Reduction in policy-related barriers, such as tariffs, will also play a role.

WHY AND HOW TRADE COSTS REDUCE TRADE

The core idea underlying the benefits of international trade goes back to Adam Smith and his famous pin factory parable. According to Smith, when each worker specializes in doing only those tasks he is best suited to do, a factory achieves its maximum economic efficiency. Smith and later economists extended this argument from firms to countries. Economic efficiency occurs when each country specializes in making and exporting only those goods it is relatively efficient at producing. In turn, each country imports those goods other countries produce relatively efficiently.⁴

⁴ David Ricardo formalized the notion of relative efficiency in his theory of comparative advantage. One of the most powerful ideas in economics, comparative advantage shows that countries can gain from trading with each other, even if one country is more productive at producing every single good than another country. Textbooks on international economics (for example, the one by Richard Caves, Jeffrey Frankel, and Ronald Jones or the one by Paul Krugman and Maurice Obstfeld) provide a more detailed description of comparative advantage.

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In other words, international trade enhances a society's economic well-being because it facilitates specialization in production. With trade, prices consumers pay for goods are lower than those they would pay without trade. According to Smith and later economists, when trade is free and unfettered, a society maximizes its economic well-being.

Barriers to international trade prevent the efficient outcome described above from occurring. For example, because these barriers raise the costs of purchasing imported goods, U.S. consumers would buy fewer foreign goods, and foreign consumers would buy fewer U.S. goods. To satisfy the demand for products that previously had been imported under free trade, each country would now be making more goods it is not relatively efficient at producing. In the presence of international trade barriers, there would be less specialization, prices would be higher, and, overall, consumers in all countries would be worse off.

THE TWO MAIN TYPES OF TRADE COSTS

In 19th-century England, economist David Ricardo used these core ideas of the benefits to international trade to argue against a pressing political barrier to trade: the Corn Laws, which protected British agriculture and kept domestic food prices high. Since then, economists have studied many other barriers to trade. We will describe these barriers in terms of costs, following the convention used by Anderson and van Wincoop.⁵

Broadly, trade costs are all costs incurred from the time a good leaves

⁵ Anderson and van Wincoop divide trade costs into three broad categories: border-related costs, international transportation costs, and distribution costs. We focus only on those costs associated with international trade: border-related costs and international transport costs.

the factory or its place of production to the time it is purchased by the end-user. Such costs can be incurred internationally (for example, at the border) or domestically (that is, within a country). In the case of consumer goods such as automobiles, televisions, clothing, and food, trade costs are the difference between the price at the “factory gate” and the retail price.⁶

International trade costs can be broadly divided into two main categories:

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border-related costs and international transportation costs. Border-related costs encompass the broad range of trade barriers encountered between nations, excluding international transportation. These barriers include costs that occur specifically at the border, such as tariffs, quotas, and paperwork due to customs and other regulations, as well as those differences between countries that could affect trade, such as different currencies, languages, or laws (contract enforcement).⁷ Together with international transport costs, these items make up the costs incurred internationally.

Border-related costs can be

⁶ In the case of intermediate goods such as automobile engines, semiconductors, textiles, and wheat, trade costs are the difference between the “factory gate” price and the purchase price by the next firm in the production sequence.

⁷ Economists have studied the importance of international networks in reducing the negative effect of these country-level differences on trade. For example, James Rauch and Vitor Trindade find that trade flows are greater between countries with larger shares of Chinese population. They hypothesize that this linguistic and cultural network facilitates trade by reducing information and contract enforcement costs otherwise present between pairs of countries.

classified based on whether they are attributable to (national) government policies. This allows economists to assess the importance of border costs imposed by government policy relative to other border costs. Border-related costs imposed by government policy are further separated by economists into two categories: tariffs and nontariff barriers.

Tariffs are additional charges added to the price of a good imported

from another country. The charge is usually levied as a proportion of the price, similar to a sales tax. Nontariff barriers⁸ are loosely defined as all other trade barriers imposed by national governments. The most familiar of these are quotas, which are restrictions on the quantity of a good that can be imported from a country. They also include voluntary export restraints, which occur when the exporting country “voluntarily” agrees to limit its exports to the importing country; anti-dumping actions, which are taken when foreign firms are suspected of selling their goods at a price below that in their home market;⁹ paperwork and regulatory procedures encountered

⁸ The main data source for tariffs and nontariff barriers is the United Nations' Conference on Trade and Development TRAINS database. This database lists eight broad categories of trade control measures, which can be further broken down into 150 sub-categories.

⁹ Dumping occurs when exports are sold in foreign markets at a price below their domestic price or production costs (according to U.S. policy). An anti-dumping action is the filing, by a domestic firm or industry, of an accusation that a foreign firm or industry has dumped goods in the domestic market. If the foreign firms are found guilty of dumping, the domestic government levies a duty on the goods in question for a fixed period of time.

specifically at the national border; and “softer” measures, such as product labeling and product quality standards.

Border barriers not due to government policy include information costs (costs incurred by potential importers in finding out more about the goods they are buying); costs due to exchange rate uncertainty, linguistic barriers, or other cultural differences; and contract enforcement costs. International transportation costs are freight charges and transport time associated with moving goods from the exporting to the importing country. These costs include all freight and time costs associated with moving a good from the factory in the exporting country to the first port of entry in the importing country. Freight charges include trucking, shipping, and air charges.

MEASURING TRADE COSTS

We can measure trade costs two ways. The first is to simply measure them directly from concrete data. The second involves an indirect approach whereby the costs are inferred using an economic model of bilateral trade flows known as the gravity model.

Border-Related Costs. Tariffs are the easiest to measure because they are directly collected by U.S. Customs officials. Detailed data are collected on tariff rates for thousands of goods. There are two approaches to combining the detailed tariff data into an overall average tariff measure for the country. One approach is to compute an average across all tariff rates. While this way is simple to implement, it is problematic because it weighs all goods equally, regardless of whether imports of the good are \$10,000 or \$10 billion.

A second approach is to weigh the tariff rates according to the volume of imports. In the above example, the tariff on the heavily imported

good would have a weight 1 million times larger than the weight on the other good. However, this approach is problematic, as well. Suppose that tariff rates on Canadian apples were so high that U.S. consumers did not import them at all. Clearly, the tariffs on apples are negatively affecting imports.¹⁰ But precisely because their impact is so negative that imports fall to zero, they would have a zero weight. In other words, this approach tends

In its simplest form, the gravity model is a statistical relationship that seeks to explain trade between two countries (bilateral trade) by three forces: the economic sizes of the two countries and the distance between them.

to underestimate the true impact of tariffs. Despite this shortcoming, most calculations of overall average tariff rates employ this second approach.

Calculating other border-related trade costs, especially nontariff trade barriers, is considerably more difficult. In his study, Patrick Messerlin converts the nontariff barriers into a tariff equivalent.¹¹ For quotas, Messerlin uses direct information from case studies to do the conversion. For the anti-dumping measures, he either directly converts them to tariff-equivalents¹² or uses the ratio of the “dumping” price

¹⁰ The following historical example illustrates the effect of a tariff on the volume of imports. In April 1984, the U.S. government increased the tariff rate on heavyweight motorcycles from 4.4 to 45 percent. From 1983 to 1984, the total customs value (the value at the “entry gate” of a country) of heavyweight motorcycle imports (700-790 cubic centimeters of engine displacement) fell from \$5.7 million to \$55,000.

¹¹ In their survey, Anderson and van Wincoop cite Messerlin’s article.

¹² Ad valorem duties, which are taxes levied as a percentage of the value of the imported goods, are converted directly.

to the standard world price to convert the measures to tax equivalents. These different measures are summed to an overall tariff equivalent and then combined with the average tariff rate to yield an estimate of border-related trade costs imposed by government policy.

For border-related trade costs not related to government policy, economists generally rely on a combination of direct and indirect measurement

based on the gravity model. For example, the costs of not sharing a common currency or a common language, as well as security costs and information costs, are calculated using the gravity model.

In its simplest form, the gravity model is a statistical relationship that seeks to explain trade between two countries (bilateral trade) by three forces: the economic sizes of the two countries and the distance between them. Economists perform a statistical analysis called a regression in order to obtain an estimate, for example, of the effect of an increase in distance on trade flows.

More sophisticated versions of the gravity model include additional variables to further explain bilateral trade flows. In our context, the additional variables capture whether the two countries share a common currency, language, border, trade agreement, or legal system. While the lack of a common currency, for example, will not show up as a direct add-on to the price of the imported good as does a tariff, it will still reduce trade. The gravity

regression provides a statistical means for measuring the tariff-equivalent of this reduction in trade.¹³

International Transport Costs.

The four primary modes of transport are boat, rail, truck, and airplane. The two key transport costs are direct freight, or shipping, costs and travel time. Exporters must decide on the most efficient mode (or combination of modes) of transport for their goods, balancing per unit shipping costs and travel time. In general, transport by air is more expensive in terms of freight costs but cheaper in terms of time. In addition, countries with poorly developed infrastructure (for example, roads, airports, and ports) will generally have higher freight costs compared with countries that have large stocks of infrastructure.

Anderson and van Wincoop explore research on measuring freight costs, where shippers and handlers are interviewed, industry trade journals are examined, and customs data are analyzed. Customs data provide both total imports including freight charges and total imports excluding freight charges. These customs data facilitate the calculation of total freight charges associated with importing.¹⁴

Anderson and van Wincoop ulti-

¹³ The tariff-equivalent of the effect of not having a common currency could be calculated if the gravity regression includes both tariff rates and a variable for whether or not the two countries share a common currency. Then, the regression would indicate how much a one-percentage-point change in tariffs reduces trade, and it would also indicate how much not sharing a common currency would reduce trade. From these two pieces of information, the tariff-equivalent of not sharing a common currency can be calculated.

¹⁴ From these two measures it is possible to calculate the average free on board (f.o.b.) price (the price on the mode of transport before any trade costs) as well as the average cost, insurance, and freight (c.i.f.) price. The difference between these two numbers is one way of measuring transport costs.

mately draw from an article by David Hummels for a measure of international transport costs because he incorporates time into transportation costs.¹⁵ In his article, Hummels develops methodologies to translate time costs into dollars, from which the costs can then be expressed as a percentage of the value of the good transported. Then, the freight costs and the time costs can be totaled to yield an overall measure of international transport costs.

ESTIMATES OF TRADE COSTS

Before beginning the discussion of estimating trade costs, we advise the reader to review the table and figure.

¹⁵ See the 2001a article by Hummels.

The table contains a breakdown of the two main international trade costs and their components. The figure illustrates the importance of tariffs and other border-related costs, on the one hand, and international transport costs, on the other hand, via a hypothetical example of a pair of shoes produced in a foreign country and shipped to the U.S.

Tariffs. To arrive at a single overall tariff measure for a country, economists typically calculate average tariffs according to the trade-weighted method discussed above. Average tariffs can differ across countries for a number of reasons, but the most obvious and basic reason is that tariff rates on individual goods are higher in one country than in another.¹⁶ Anderson

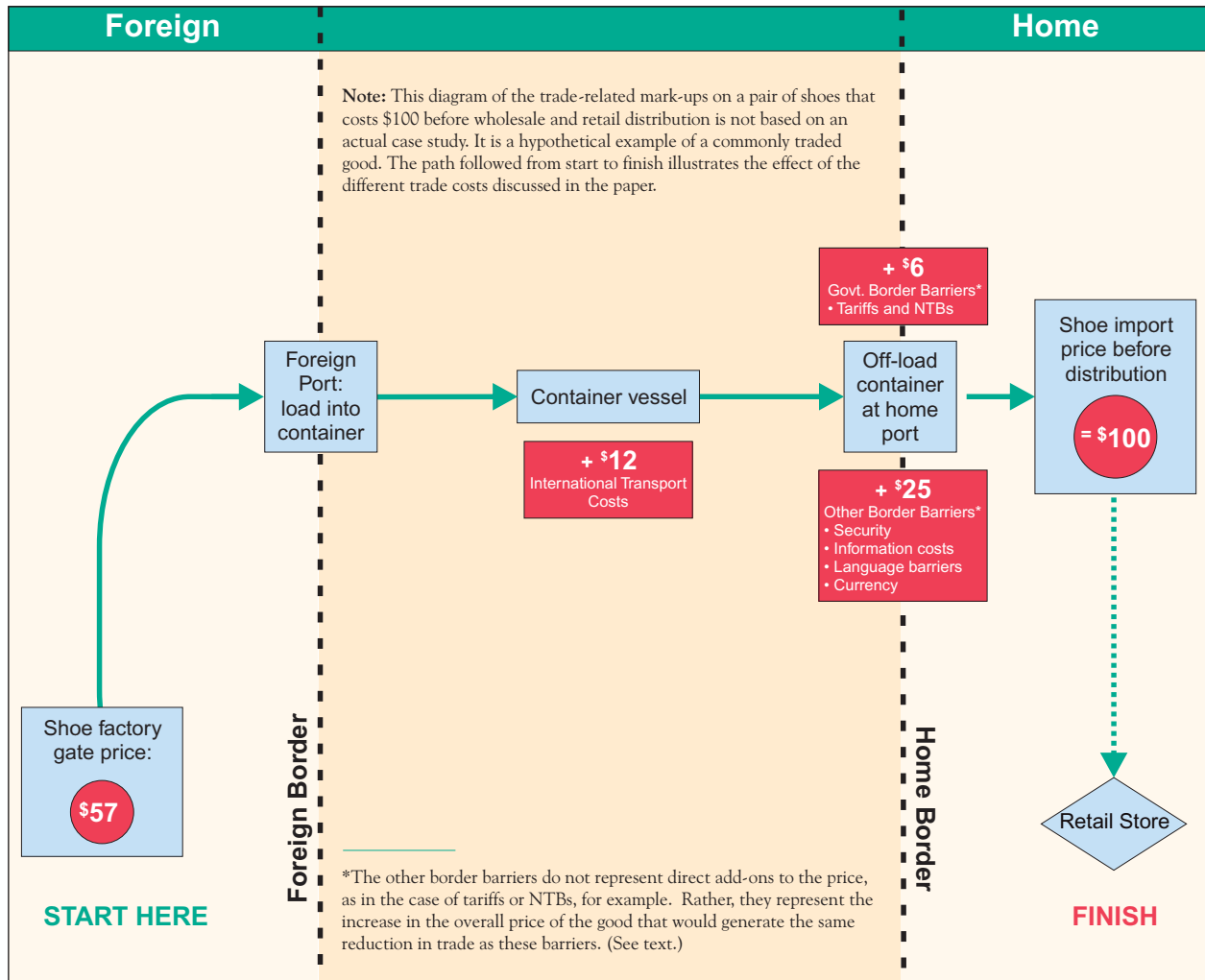
TABLE

A Breakdown of Trade Costs*

Description	Percent Markup over the Price of the Good
time costs	9
+ shipping costs	11
Total Transport Costs	21
tariffs and NTBs	8
language costs	7
currency costs	14
information costs	6
+ security costs	3
Total Border-Related Barriers	44%
TOTAL	74%

* The table presents the various trade costs described in this paper, along with categorical sub-totals and the final total. In totaling these components of the overall trade cost, recall the multiplicative accounting procedure employed by Anderson and van Wincoop, described in detail on page 25.

FIGURE



and van Wincoop report that in 1999, this trade-weighted average tariff rate ranged from 0 to 30 percent across different countries. They find that

¹⁶ Another reason would be if a country happens to heavily import those goods that face high tariff rates. This would be unusual, however, because high tariff rates presumably discourage imports.

developed countries' tariffs tended to be considerably lower than tariffs in developing countries: Developing countries tend to have tariffs of more than 10 percent, while developed countries' tariffs are in the range of 0 to 5 percent.

While average tariffs in developed countries are low, there is some variation between countries, as the

following numbers from Anderson and van Wincoop indicate. At the low end in 1999, Switzerland, Hong Kong, and Singapore had 0 percent tariffs. At the high end, Australia and Canada had average tariffs of about 4.5 percent. In between were New Zealand and the major advanced economies, including Japan, the United States, and the European Union (EU), which had

average tariffs of about 2 to 3 percent.

Nontariff Barriers. Traditionally, the tendency has been to apply nontariff barriers broadly to goods in a few sectors, as Anderson and van Wincoop show using United Nations data.¹⁷ For example, nontariff barriers in 1999 were applied, respectively, to 74 percent, 71 percent, and 39 percent of the categories of goods in the food, textiles, and wood-related sectors.¹⁸ This contrasts with the overall picture of nontariff barrier coverage in 1999, where only 1.5 percent of all goods were protected by such barriers. Additionally, there has been a rise in other types of nontariff barriers, most notably anti-dumping actions. If these anti-dumping actions were included in the nontariff barriers, the share of all goods protected increases to 27.2 percent in 1999.¹⁹

Incorporating all of these types of trade policy barriers into models, researchers have found that for the EU in 1999, tariffs and nontariff barriers can be translated into a 7.7 percent “tax” on industrial goods. In light of the tariff numbers presented above, this estimate indicates that for the EU, at least, nontariff barriers exert more of a tax than do tariffs.

¹⁷ United Nations Conference on Trade and Development’s Trade Analysis & Information System: TRAINS, and general insight from the work of Jon Haveman available at: www.maclester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeConcordances.html.

¹⁸ In 2005 the World Trade Organization’s textile quota system known as the Multi-Fiber Agreement (MFA) was phased out. However, subsequent dramatic changes in trade flows have caused countries to invoke other methods to control the amount of textiles traded.

¹⁹ All percentages reported are simple averages of the nontariff barrier coverage ratios over the appropriate categories of goods (that is, the share of total goods in a category that are subjected to nontariff barriers).

Other Border-Related Barriers.

Using the gravity model described above, a number of researchers have been able to estimate, for developed countries, the indirect trade costs at national borders. Anderson and van Wincoop summarize the main findings as follows: (1) The costs of not sharing the same language are roughly 7 percent of the value of the goods

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traded. (2) The cost of employing different currencies is about 14 percent. (3) Information costs are 6 percent. (4) Security costs are 3 percent.

Overall, these nonpolicy border-related costs equal 33 percent. Note that the combined effect is not obtained by simply adding up each border cost. Rather, because each border cost is applied to the total value of trade inclusive of all other border costs, a multiplicative formula must be used: $(1.07) \times (1.14) \times (1.06) \times (1.03) - 1 = 0.33$ (or 33 percent).²⁰ Adding government

²⁰ When border costs are small, the multiplicative formula yields numbers very similar to what would be obtained by adding up the costs. However, when border costs are large, the formula yields numbers quite different from those obtained by simple addition.

policy barriers to these barriers yields a total border-related trade cost of $(1.33) \times (1.077) - 1 = 0.44$ (or 44 percent).

International Transport Costs. Anderson and van Wincoop report results on transport costs from another article by David Hummels.²¹ Using U.S. national customs data to get detailed data on transport costs and then calculating a simple average across all of the costs, Hummels obtains a freight transport cost estimate of 10.7 percent.

Anderson and van Wincoop also report results from Hummels on-time costs.²² As of 1998, about half the value of U.S. exports are shipped by air. Hummels imputes a willingness to pay for saved time and translates that into a percentage of the value of the goods shipped. His estimate of U.S. time costs is 9 percent.²³ Combining the freight costs and the time cost estimates yields a total transport cost of $(1.107 \times 1.09) - 1 = 0.21$, or 21 percent of the price of the good at the factory gate.

To summarize, Anderson and van Wincoop list two main sources of trade costs: border barriers and international transport costs. They then draw on the existing empirical research to obtain a rough approximation of each of these costs for the United States, as well as an approximation of the overall costs. All border barriers, including tariffs, nontariff barriers, and nonpolicy barriers, add up to a 44 percent “tax” on imports. Transportation costs are an additional 21 percent. Combining these costs — again using the multiplicative formula — yields the final overall tax-equivalent international trade cost of 74 percent of the factory gate price.

²¹ See Hummels’ 2001b article.

²² See Hummels’ 2001a article.

²³ This is a sharp decrease from 32 percent in 1950.

CONCLUSION


Barriers to international trade impede the free flow of goods and services, leading to increased production by relatively inefficient firms, thereby reducing the overall economic well-being of societies. While the globalization of the world's economies has seized the attention of policymakers, the media, and economists, researchers have recently collected a great deal of evidence that indicates that barriers to trade remain quite high. The types and magnitudes of these barriers in developed countries are highlighted in an important recent article by James Anderson and Eric van Wincoop.

Combining the results from current research on trade costs, Anderson and van Wincoop find that border barriers and international transport costs are equivalent to a 74 percent tax on the factory gate price — 74 percent seems like a high number; imagine a sales tax that high! How is it that in a rapidly globalizing world the costs of international trade are still so high? For evidence of these high trade costs, it is useful to look at the United States

data in relation to the predictions of theories of international trade.

The United States is the world's largest economy, yet its output is still less than one-third of the world total. If there were no costs to international trade — if it were as costless to ship goods to Europe and China as it is to send an e-mail — most existing trade theories would predict that the United States would export about two-thirds of its output. In fact, exports are only about 10 percent of U.S. GDP. From the sharp divergence of the theory's prediction and the actual data, we can infer that costs to international trade are quite high.

Anderson and van Wincoop's article shows that nonpolicy barriers account for the vast majority of total trade costs. Policy barriers, such as tariffs and quotas, play a smaller role. Will these nonpolicy and policy barriers ever be completely eliminated? The answer certainly is no. It is not possible that the economists' idealized world of frictionless trade in which trade costs and barriers are zero will ever be realized.

For the world's developed economies, however, significant reductions in trade costs and increases in trade can come from technological improvements that reduce international transportation costs, or from long-run policy changes, such as policies to reduce currency and information costs (or language and cultural barriers). One example is the recent adoption of a single currency, the euro, by 12 nations within Europe in 1999.²⁴ In addition, Anderson and van Wincoop show that for certain categories of goods, policy barriers have been strongly persistent over time. If these barriers were to be reduced significantly or eliminated, this would further increase international trade. Regardless of which barriers fall, firms and consumers, on the whole, would be better off. 

²⁴ Between 2000 and 2005, euro-area trade increased by 10.3 percent, which was larger than the increase between 1993 and 1998 (8.3 percent). This is consistent with (but not proof of) the notion that the adoption of the euro reduced trade costs, thus increasing trade.

REFERENCES

Anderson, James E., and Eric van Wincoop. "Trade Costs," *Journal of Economic Literature*, 42 (September 2004), pp. 692-751.

Caves, Richard E., Jeffrey A. Frankel, and Ronald W. Jones. *World Trade and Payments: An Introduction*, 10th edition. Addison Wesley: New York, 2006.

Ceglowski, Janet. "Has Globalization Created a Borderless World?" *Federal Reserve Bank of Philadelphia Business Review* (March/April 1998), pp. 17-27.

Harrigan, James. "OECD Imports and Trade Barriers in 1983," *Journal of International Economics*, 34:1-2 (1993), pp. 91-111.

Hummels, David. "Time as a Trade Barrier," manuscript, Purdue University (2001a).

Hummels, David. "Toward a Geography of Trade Costs," manuscript, Purdue University (2001b).

Krugman, Paul, and Maurice Obstfeld. *International Economics: Theory and Policy*, 6th edition. Addison Wesley: New York, 2002.

Leduc, Sylvain. "International Risk Sharing: Globalization Is Weaker Than You Think," *Federal Reserve Bank of Philadelphia Business Review* (Second Quarter 2005), pp. 18-25.

Messerlin, Patrick. *Measuring the Cost of Protection in Europe*. Institute of International Economics: Washington, D.C. (2001).

Rauch, James E., and Vitor Trindade. "Ethnic Chinese Networks in International Trade," *Review of Economics and Statistics*, 84:1 (2002), pp. 116-29.