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Measuring Barriers and the Benefits of Integration: Existing Studies

The greatest obstacle to measuring the openness of markets accurately today is the fact that countries can, whether deliberately or inadvertently, protect their industries in many different ways that are difficult to measure. Tariffs were once the major obstacle to trade, and their transparency made measurement relatively easy. With the reduction of tariffs, however, measurement issues have become more important as governments continue to protect markets with more opaque, nontariff barriers. Governments also continue to use a variety of less visible but effective means for insulating domestic markets against foreign competition. These hidden barriers include subsidies, biased government procurement, lax antitrust enforcement, health and safety standards and other regulations, burdensome customs procedures, antidumping duties, and threats of protection. Even when not created with protectionist intent, standards can differ internationally, inhibiting arbitrage and allowing producers to engage in price discrimination. Prohibitions on parallel importing (see appendix 1.1) can also facilitate such discrimination. In addition to these policy obstacles, other factors such as transport costs, lack of information, language gaps, and cultural and legal differences may fragment markets. It is also likely that barriers to competition and barriers to trade interact. In markets in which foreign firms (and would-be arbitrageurs) face high entry costs, firms with pricing power will be able to charge high prices.

Approaches to Measuring Trade Barriers

Given the opacity of many trade barriers today, estimating their cost is not straightforward. The exercise must first measure the barriers. For

this, three different approaches are commonly used. The first, traditional approach uses explicit measures, for example, official data on tariff and nontariff measures. The strength of this approach is that the barriers themselves, and not just their effects, are identified. The weakness is that many behind-the-border obstacles to trade are overlooked.

A second approach, called the quantity approach, tries to overcome this lacuna and attempts to infer the height of behind-the-border barriers by estimating their impact on trade. A model is used to predict what trade patterns would be in the absence of the barriers, either on the basis of factors such as country size, distance from other countries, and factor endowments, or by comparison with some other benchmark, such as intracountry trade. One popular version of this approach is the use of so-called gravity equations.[1] Deviations of actual outcomes from the effects attributable to the variables that are modeled are taken as indicating the impact of barriers. One problem with this approach is that the results depend greatly on what variables are included in the model. Another is that the barriers are often not explicitly identified. Also, it is necessary to adopt additional assumptions to translate the quantity shortfalls into tariff-equivalent measures.

The third approach uses price differentials. Like the second, this method has the virtue of capturing the full impact of both border and behind-the-border obstacles to trade. Additional virtues are that it is not dependent on any single model and provides tariff-equivalent measures directly. The major problem in applying this approach is obtaining appropriate price measures. In particular, most existing national price surveys are undertaken with a view to comparing the costs of different goods to the consumer. Accordingly, they will include distribution margins, which reflect nontraded inputs. Other problems are ensuring that the products compared in different countries are similar and that they are sufficiently representative of all traded goods.

The next step is to simulate the impact on welfare of removing the barriers. This requires embedding the measures of barriers in an explicit economic model. Results will obviously be sensitive to both the size of the measured barriers and the model that is used. In all cases, estimates must be made of model parameters. In addition, a structure must be imposed on the economy. One important choice is that between general or partial equilibrium estimation techniques. Partial equilibrium approaches have the virtue of being relatively easy to interpret. The problem with them is that they may violate aggregate constraints and identity relationships and fail to incorporate interactive effects across markets. General equilibrium models can deal with these problems, but only by making the models' predictions more difficult to interpret. Results from these models, which often have many hundreds of equations, appear to come out of a black

1. For an excellent review of this methodology, see Frankel (1997). For applications see Frankel and Rose (2002), Rose and Engel (2000), and Feenstra, Markusen, and Rose (1998).

box. A second issue relates to assumptions about competitive structure. When markets are competitive, eliminating trade barriers will achieve only the gains from specialization. When they are not, the additional effects that could result from increased competition can be taken into account. In theory, these could raise or reduce the impact (Richardson 1989). A third issue relates to whether the model is static or dynamic. Static estimates, which capture only the benefits of resource reallocation, produce the smallest results. Larger numbers result from incorporating dynamic gains such as induced investment and productivity growth.

Direct Measures

For the most part, border barriers in goods markets in industrial countries are relatively low. (Although protection in services markets appears to be more substantial, it will not be considered here.) According to World Bank estimates, for example, in 1999 US average weighted tariffs were just 3.1 percent for primary products and 2.4 percent for manufactured goods. Similar measures for the European Union were 3.3 and 3.2 percent, respectively, and for Japan, 4.5 and 2.0 percent, respectively.[2] To be sure, tariffs remain high in some sectors in the industrial economies; typically these are labor-intensive sectors such as clothing, textiles and footwear, and agriculture. There are also instances of restrictive quotas on textiles and clothing and agricultural products. Hufbauer and Elliott (1994), for example, estimated that a group of such products that accounted for about 10 percent of US imports in 1990 had tariffs or tariff-equivalent protection averaging 35 percent. Similarly, Messerlin (2001) found that protection remains high in agricultural and labor-intensive goods in Europe. Nonetheless, if these were the only trade barriers, with some exceptions we would not expect to see large price differentials for similar traded goods. Similarly, although the gains could be large relative to the size of the sectors involved,[3] the sectors in question account for small shares of GDP, and therefore one would not expect that removing only directly measured protection would add greatly to national income.

Quantity Evidence

Because all border barriers have been removed within the EU customs union, and almost all such barriers have been removed between Canada and the United States, focusing only on border barriers would lead to the conclusion that no further gains are to be had from regional integration,

2. As reported in Bergsten, Ito, and Noland (2001, 125).

3. For example, in the United States, Hufbauer, Wada, and Warren (2002) estimated that the consumer cost per job saved was $170,000.

and only limited gains from eliminating the remaining barriers to external trade. But the idea that, even in these well-established free trade areas, the only remaining barriers to trade are border barriers and transport costs is hard to square with other evidence.[4]

One line of inquiry that has produced such evidence uses the gravity model, which controls for the impacts of a country's income and distance from its trading partners in explaining its trade volumes. Studies using this approach generally indicate that additional border effects exist and are significant.[5] McCallum (1995) found, for example, that after controlling for distance and size, trade between two Canadian provinces in 1988–90 was on average more than 20 times larger than average trade between a Canadian province and a US state. Others have replicated these findings qualitatively, although the size of the effect is sensitive to the period examined and the precise specification of the model. Using data for 1993–96, Helliwell (1998) found that this unexplained Canadian home bias had fallen to a factor of 12, and Anderson and van Wincoop (2002) found a factor of 6. Wei (1996) extended the analysis to other OECD countries. Using a different specification,[6] he found that the typical OECD country tends to "import" two and a half times as much from itself as from an otherwise identical country. Wei also found that this home bias has declined over time, albeit very slowly.[7] Overall, according to Obstfeld and Rogoff (2000, 4), "a balanced interpretation of the literature is that countries do exhibit a considerable degree of home bias, but the bias is not as extreme as McCallum's original estimates suggested."

Nonetheless, this finding of home bias leaves important questions unanswered. One relates to the role played by differences in consumer preferences. If goods are differentiated and consumers prefer domestic varieties, home bias could exist even in the absence of border effects.[8] A

4. For the United States, in 2001, the costs of transportation, insurance, and freight amounted to only 4.2 percent of the value of imports.

5. In its basic form, the gravity model consists of an equation in which, much like the physical equation for gravity, the linkage between two bodies (countries) is explained by their masses (national income) and the distance between them. The equation can be specified in linear form when the variables are expressed as logarithms. Thus we have $T_{ij} = a_1 + a_2 \ln Y_i + a_3 \ln Y_j + a_4 \ln(\text{Dist}_{ij}) + a_5 B + E_{ij}$, where T_{ij} is trade between two countries i and j, Y is income, Dist_{ij} is the distance between them, B stands for any other variable or variables whose impact the researcher seeks to measure, and E_{ij} is a random error term.

6. In his equations, in addition to controlling for distance and size, Wei added controls for language and for whether countries are adjacent, and, to introduce other than bilateral considerations, he included a measure of remoteness, namely, average distance from other trading partners.

7. Evans (1998) obtained results that lie between those of Wei and Helliwell.

8. Head and Mayer (1999) claimed that diversity in national and regional tastes are important in European home bias.

second issue relates to the height of the barriers. As Evans (1998) pointed out, the existence of fairly large home bias in buying patterns does not necessarily indicate large barriers to arbitrage. She noted that if demand is very elastic, barriers that are quite small could give rise to volume effects that are fairly large. Moreover, the welfare effects of such barriers need not be large. However, the less elastic is demand, the larger the barrier required to generate any particular degree of home bias, and the larger the welfare costs associated with given volume shortfalls. Employing this reasoning, Obstfeld and Rogoff (2000) claimed that the home bias puzzle could be solved if there are only small border frictions but sufficiently high (but still plausible) elasticities of substitution. But other studies based on gravity equations reach different conclusions. For example, Evans (2001) found that, with elasticities of substitution between 5 and 8, the impact of the border is equivalent to a tariff of between 51 and 105 percent, depending on the industry. Similarly, Anderson and van Wincoop (2002) estimated, based on an elasticity of substitution of 5, that the border barriers between the United States and Canada are equivalent to a tariff of 49 percent and that, even if the elasticity of substitution were 10, the border barriers would still be equivalent to roughly a 20 percent tariff. Head and Mayer (1999) estimated that, even with an elasticity of 8, within-Europe border effects have a tariff equivalent of 45 percent. Finally, even Obstfeld and Rogoff acknowledged that solving the home bias problem in this way does not allow one to explain the evidence provided by studies of international price behavior that points to much higher border effects.[9]

Price Evidence

If goods are perfect substitutes for each other, they should sell for the same price in an integrated market. This is sometimes referred to as the law of one price. In the short run, prices may well differ until markets adjust, but over the long run, arbitrage should remove any tendency for prices to diverge. This should be the case even where the product is supplied by a monopolist. As Knetter and Goldberg (1995, 4) observed, "A monopoly supplier may charge a price above marginal cost, but be incapable of price discrimination if buyers are well organized or the product is easily transported across markets." The absence of price convergence therefore suggests the presence of barriers. Market segmentation due to distance, tariffs, or other barriers, for example, could cause international prices to differ permanently, but by no more than their impact on the

9. "We cannot claim the degree of success in elucidating pricing puzzles as in the case of quantity puzzles, at least not with the kind of very simple models we have featured here" (42). Obstfeld and Rogoff also discussed the need to build in a distinction between retail and wholesale price levels.

costs of arbitrage.[10] Thus differences in the international prices of similar goods provide a measure of the tariff equivalence of barriers.

If barriers are relatively small, therefore, it should not be possible for producers to charge different prices in international markets. If home bias reflects a combination of low barriers and goods that are close substitutes, deviations from the law of one price should be relatively small and short-lived. Yet a large number of studies, using a variety of methodologies and asking somewhat different questions, find that international market segmentation is significant.

One set of studies has explored whether the law of one price holds for specific commodities. These studies have generally found deviations that are large and persistent. The classic study of this question was by Isard (1977), who speculated that nominal exchange rate changes were an important reason for these deviations. Since then his results have been replicated many times, for example, by Richardson (1978) and Giovannini (1988). Froot, Kim, and Rogoff (1995) obtained data on eight commodities in England and Holland over a 700-year period and found that the substantial deviations from the law of one price are no smaller or less persistent today than they were in the past.

A second set of studies explores the pass-through of exchange rate changes. Generally, these studies report that, when exchange rates change, the resulting changes in domestic-currency costs are not fully passed through to the prices charged in foreign currencies. Pass-through for US imports is typically on the order of 50 to 60 percent.[11] A related phenomenon is that firms engage in international price discrimination, charging different prices in different markets for the same product. Knetter (1989) studied unit values, for exports at a highly disaggregated level, from a single source to different destinations, and found large and volatile differentials when similar goods are shipped to different destinations. Marston (1990), using a model of a price-discriminating monopolist selling in a domestic and an export market, found similar evidence in Japanese data. Another interesting study is that undertaken by Haskal and Wolf (2001), who explored pricing by a single multinational furniture retailer and found that price deviations across branches in different countries for the same product were typically between 20 and 50 percent. They also found that differences in local costs (such as distribution costs and taxes) did not account for these deviations, and they ascribed them instead to strategic pricing behavior.

Presumably, firms can maintain these price differences only when there are barriers to arbitrage. Although individual consumers would probably

10. For a review of the theory that prices can fluctuate within a range set by the costs of arbitrage, see O'Connell and Wei (2000).

11. According to Knetter and Goldberg (1996), for the United States, pass-through appears to be in the neighborhood of 60 percent. For other countries it appears to be higher.

find it too costly to engage in international comparison shopping for most goods, the fact that wholesalers do not eliminate these differences implies the presence of substantial barriers. In addition to government policies, manufacturers can contribute to such barriers by enforcing marketing contracts, providing location-specific warranties and service, and other mechanisms. Location-specific standards also facilitate their efforts.

A third group of studies explores the relationship between nominal exchange rate changes and purchasing power parity (PPP).[12] Generally, these studies seek to test for an association between nominal exchange rate changes and relative inflation rates; thus they test what is sometimes termed "relative" rather than "absolute" PPP. All prices in the United States could be half those in Japan (and thus absolute PPP would be absent), but if US inflation is 10 percent higher than Japanese inflation, and in the same period the yen appreciates by 10 percent, relative PPP would hold.[13]

There is some evidence that, over the very long run, exchange rates converge to absolute PPP, but the adjustment appears remarkably slow. According to Rogoff (1996, 647), "A number of recent studies have weighed in with fairly persuasive evidence that real exchange rates tend toward purchasing power parity in the long run. Consensus estimates suggest however that the speed of convergence to PPP is extremely slow; deviations appear to damp out at the rate of roughly 15 percent per year." For our purposes these results are interesting because (assuming price indexes all have similar weights) PPP is a necessary if not a sufficient condition for markets to be fully integrated. If PPP fails to hold, it means that, when converted into the same currency, similar goods persistently sell for different prices. This persistence suggests that, if there are no barriers, profitable arbitrage opportunities remain.[14]

A fourth set of studies explores relative price variability. These are tests for what Engel and Rogers (1996) have termed the proportional law of one price. Examining prices in 14 consumption categories for 23 Canadian and US cities, they found that distance significantly affects the monthly variability of relative prices but, in addition, that variability is much higher between cities separated by a border. They concluded that the effect of a border on price variability is equivalent to that of adding between 2,500 and 10,000 miles between cities in the same country. Similarly, Parsley and Wei (1996) examined price data for 51 final goods obtained from local chamber of commerce staff and found that domestic tradable goods prices converge rapidly. They also concluded that distance

12. For an excellent review see Rogoff (1996).

13. Technically, these are actually tests of nominal neutrality.

14. The evidence on convergence within countries is more mixed. Parsley and Wei (1996) estimated a half-life of only about one year. Cecchetti, Nelson, and Sonora (2002) found quite long half-lives using long-term consumer price data for US cities.

alone cannot explain why convergence is faster within the United States than across countries. Parsley and Wei (2000), using data on prices for 27 traded goods across 96 cities in the United States and Japan,[15] confirmed the vast difference in speeds of intracountry and international relative price adjustments.[16] The same authors (Parsley and Wei, 2001), using disaggregated data for 95 goods in 83 cities between 1990 and 2000, found that goods market integration increases over time.

Most studies use price observations taken at the retail level. Even for goods, these will include an element of nontradable value added. This leads naturally to the question of whether this nontradable element helps explain departures from PPP. In an effort to sort this question out, several studies have compared the covariability of prices of goods and services. In fact, Engel and Rogers (1997) found that covariability is actually lower for goods than for services, suggesting that perhaps the services or nontraded component in final goods prices drives prices toward rather than away from PPP. However, as they noted, this result could also reflect the greater volatility of goods prices.

The most important source of relative price variability in these studies generally turns out to be the nominal exchange rate.[17] But this is not a full explanation. If the same good sells for different prices when expressed in a common currency, why is there no arbitrage? Although the exchange rate change could well induce the price difference, the persistence of such differences implies that an additional barrier must exist.[18]

Overall, therefore, the literature based on price data supports the idea that border barriers are significant. Obstfeld and Rogoff (2000, 40) concluded:

> The traditional thinking is that even though a broad range of goods is non-traded, there is always a broad range of goods that are traded, and these tie down the exchange rate. But a recurring theme here is that the markets for most "traded" goods are not fully integrated, and segmentation due to various trade costs can be quite pervasive. In fact, the spectrum of goods subject to low trade costs may be very narrow.

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15. The US-Japan border adds significantly to the cross-country volatility of relative prices. Cross-country mean absolute deviations range between 75 and 140 percent, whereas within each country the deviations are between 10 and 15 percent.

16. They did find that the border effect between Japan and the United States declined over time, but this seems to be mainly a phenomenon of the early 1980s.

17. Engel and Rogers (1999) studied prices across the United States and found that sticky-nominal prices play a more important role than distance in inducing deviations in relative prices.

18. Moreover, using only data from the fixed exchange rate period up to 1973, Lawrence (1979) found that within-country variances in inflation rates across US cities were significantly smaller than between-country variances.

Welfare Effects

How large would be the benefits of eliminating these barriers? Hufbauer and Elliott (1994), using a partial equilibrium approach that assumed perfect competition, concluded that eliminating protection in the highly protected sectors of the US economy would have improved US welfare in 1990 by $10.4 billion, or around 0.2 percent of GDP. Consumers in the United States would have gained an estimated $70 billion, or about 1.3 percent of GDP in that year, from removing all US protection, but most of these benefits would have come at the expense of US producers.[19] In 1999 the US International Trade Commission undertook a general equilibrium study that reached very similar results. The study concluded that, in 1996, US border barriers imposed a deadweight loss on the economy of $11 billion.

A study by Messerlin (2001) of the costs of protection in EU goods-producing sectors yielded results of a similar order of magnitude. Following Hufbauer's methodology, Messerlin found that European protection in 1990 cost consumers between 60 billion and 65 billion.[20] Again, however, the benefits of protection to producers are substantial, so that the net welfare benefits for highly protected sectors amount to just 12 billion. Overall, therefore, these results also suggest that although protection may be significant for the most heavily protected sectors, eliminating the remaining protection in goods markets would have a relatively small impact on aggregate welfare in Europe.

Somewhat larger gains have been estimated at the global level for full liberalization of border barriers in goods, but these would require the simultaneous removal of barriers in both industrial and developing countries. Anderson et al. (2001) estimated the gains from liberalization at $254 billion (in 1995 dollars), of which the high-income countries would gain $140 billion and the low-income countries $115 billion (the numbers do not sum to the total because of rounding). This implies gains of 0.58 percent of GDP for the high-income countries, 2.2 percent of GDP for the low-income countries, and, worldwide, 0.87 percent of world GDP.[21]

Although numerous studies have examined the welfare implications of removing border barriers, very few studies have tried to estimate the

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19. The Institute for International Economics has produced a similar analysis of 25 highly protected sectors in China (Zhang, Zhang, and Wan 1998). The study found that the static consumer gains of removing protection in these sectors would be 1.1 percent of GDP ($35 billion), with efficiency gains of around $5 billion. The authors estimated that if the entire Chinese economy were liberalized, gains to consumers could reach 2.6 percent of GDP. For a similar study of Korea, see Kim (1996).

20. Using a more inclusive definition of protection that takes account of nontariff barriers and antidumping measures, Messerlin calculated that consumers lost 92 billion in 1990.

21. The combined GDP of the OECD countries at 1995 prices and exchange rates was $23.9 trillion, and the International Monetary Fund estimated global GDP in that year at $29 trillion.

welfare effects of either price convergence or other more inclusive measures of border barriers. An important exception, however, is the work by Hufbauer, Wada, and Warren (2002), who have undertaken a pioneering study based on price surveys conducted by the Economist Intelligence Unit.[22] They explored international price differentials and considered what the welfare implications would be if international goods prices were to converge toward the range typically found within the United States. By aggregating results of a partial equilibrium analysis, Hufbauer and his coauthors concluded that, for industrial countries as a group, the benefits could be around 0.60 percent of global GDP. Although the United States, which already has relatively low prices, derives only modest benefits of 0.07 percent of GDP, the boost to GDP in other industrial countries is larger. These authors projected the following gains by country (reported in ascending order): United Kingdom, 0.14 percent of GDP; Canada, 0.21 percent; the Netherlands, 0.49 percent; Australia, 0.84 percent; Germany, 0.99 percent; and Japan, 1.82 percent.

As already discussed, Anderson and van Wincoop (2002) were able to extract tariff-equivalent measures of border barriers by combining their estimates of border effects with assumptions about demand elasticities. They also explored the implications of assuming that these barriers absorb real resources rather than merely generating economic rents. Under the extreme assumption that barriers represent resource costs only, they concluded that the elimination of border effects could have very large benefits, particularly for small countries. Removing border barriers would raise Canada's welfare by 52 percent, US income would rise by 6 percent, and income in the rest of the OECD would rise by 37 percent. Making the more conventional assumption that barriers are like tariffs, generating rents rather than consuming actual resources, they still came up with large numbers: Canada's gains are 30 percent of its GDP, and the rest of the OECD and the United States would see gains of 14 percent and 3 percent, respectively. These two studies clearly indicate very different orders of magnitude for the effects of border barriers, highlighting the importance of further work on this question, a task to which we now turn.

22. Another exception is the study of Japan by Sazanami, Urata, and Kawai (1995), discussed in chapter 3.