

**TRADE IN SERVICES AND INTERNATIONAL TRADE AGREEMENTS:
THE DEVELOPMENT DIMENSION**

A World Bank Course

***Module 2: Empirical Analysis of Barriers to International
Services Transactions and the Consequences of Liberalization***

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I. Introduction

Barriers to trade interfere with the ability of firms from one economy to compete with firms from another. This is true of trade in goods, where a tariff or nontariff barrier (NTB) typically drives a wedge between the price of the good on the world market and its domestic price. This wedge, or “tariff equivalent,” provides a convenient and often observable measurement of the size of the impediment. In the case of services, however, no such simple measurement is often observable. It remains true, though, that the concept of a tariff equivalent – now thought of as the equivalent tax on foreign suppliers in their competition with domestic suppliers – is a useful way of quantifying a barrier to trade even though it may be much harder to observe. Both the role of barriers to trade in services and the possible meaning of a tariff equivalent can be better understood by considering each of the standard four “modes of supply” that arise for traded services. An indication of the value of transactions in each of the four modes is provided in Table 1 for 1997.

Mode 1 refers to “separated” services such as telecommunications, which are traded internationally across borders in a manner similar to cross-border trade in goods. Here, foreign suppliers of a service provide it to domestic buyers through international means of communication and perhaps transportation, with a unit of the service itself often unobservable as it crosses national borders. A French telecoms company, for example, may provide telephone services to a customer in Mexico, in competition with a Mexican-based provider. A trade barrier in this case might consist of Mexican restrictions on the French firm’s access to phone lines in Mexico, discriminatory taxes on its operations, or regulations on the ways that Mexican consumers are allowed to access the foreign firm’s services. A tariff equivalent of all such impediments would be defined as the tax on the French firm’s operations in Mexico that, if it replaced all other impediments, would cause it to operate at the same level and have the same effects on

the domestic telecoms providers and consumers within Mexico. As in the case of traded goods, a single tariff equivalent may not capture all of these effects simultaneously, especially if competition is imperfect. And even with perfect competition, such a tariff equivalent is unlikely to be observable as a simple price difference. There is no world price of Mexican telephone services, for example, with which to compare what Mexican firms are charging, since the nature and cost of a service depend in part on the location of the consumer. Nonetheless, a tariff equivalent is a conceptually useful way of quantifying barriers to trade in services as well as goods, and many studies have sought to express their results in this form.

Mode 2 of services trade refers to services that require the consumer to be in the location of the producer, as in the cases of tourism and education. Here again, the service provided is likely to be differentiated by the location or identity of the provider, so that a world price of the service may not be meaningful. It would be meaningless, for example, to try to compare the “world price” of a visit to the Taj Mahal or an MBA degree from the Wharton School with the prices of these services within, say, Brazil. But it remains the case that Brazilian restrictions on their citizens’ travel to India or the U.S. to consume these services will alter the markets for other tourist attractions and educational institutions within Brazil. Such restrictions again can in principle be quantified as equivalent to a tax on Brazilians’ visits abroad for these purposes.

Mode 3 of international services provision is arguably the most general and the most important: provision through a commercial presence that is the result of foreign direct investment (FDI). Almost any service can be provided by firms from one economy to consumers in another if the firms are allowed to establish a physical presence there. This is true even of tourism – think of Euro-Disney. In this case there may well be a foreign price with which one could easily compare, but the comparison is unlikely to be meaningful. It would be a mistake to infer a trade barrier from the higher price of admission to Euro-Disney in Paris as compared to Florida, or the absence of a trade barrier from the lower price of a MacDonald’s hamburger in Argentina than in New York. In all such cases, prices depend on local costs of labor and raw materials as much as they do on trade barriers. However, and once again, foreign service

providers may well face impediments, both to their establishment and to their ongoing operations, the effects of which would be similar to a tax if only we could infer what it is.

The final mode of supply, Mode 4, refers to the temporary cross-border movement of workers. Most such movements that are actually permitted are of workers within industries that produce traded goods, or that produce services that are primarily thought of as traded through other modes. Thus we do not think of many industries as producing services that are primarily traded through Mode 4. On the other hand, labor itself is a service that could be traded in this way, and occasionally it has been, in the form of guest-worker programs and the like. The fact that Mode 4 service-provision figures small in the data on services trade is therefore symptomatic of the very high barriers that exist for it except within industries where it facilitates other kinds of trade. Mode 4 is the one mode in which the tariff equivalent of barriers could most easily be measured, as simply the differences across countries in the real wages of particular kinds of labor.

For all of the modes, then, one objective of empirical measurement is to deduce some sort of tariff equivalent of the barrier to trade in particular services. Since direct price comparisons seldom serve that purpose, however, researchers have pursued other means of inferring the presence and size of barriers to trade. Some of these have been quite direct: they simply ask governments or participants in markets what barriers they impose or face. The answers are usually only qualitative, indicating the presence or absence of a particular type of barrier, but not its quantitative size or effect. Such qualitative information takes on a quantitative dimension, however, when it is tabulated by sector, perhaps with subjective weights to indicate severity. The result is a set of “frequency measures” of barriers to trade, recording what the barriers are and where, and perhaps also the fraction of trade within a sector or economy that is subject to them. Frequency measures do not directly imply anything like the tariff equivalents of trade barriers, but in order to use them for quantitative analysis, analysts have often converted them to that form in rather ad hoc ways that we will indicate below.

Other, more indirect, measurements of trade barriers in service industries have also been used, alone or in combination with frequency measures. These may be divided into two types: measurements

that observe quantities of trade or production and attempt to infer how trade barriers have affected these quantities, and measurements that use information about prices and/or costs. In both cases, as we will discuss, if one can also measure or assume an appropriate elasticity reflecting the response of quantity to price, a measured effect on either can be translated into an effect on the other. Thus both price and quantity measurements are also often converted into, and reported as, tariff equivalents.

In what follows, we begin in Section II with a simple conceptual framework for understanding international services transactions and the barriers that may affect them. We then turn in Section III to a discussion of the characteristics of services barriers, and we provide some examples of barriers for the banking sector and for foreign direct investment in services sectors. This is followed in Section IV with a discussion of methods of measurement of services barriers, including frequency measures and indexes of restrictiveness, price-effect and quantity- effect measurements, gravity-model estimates, and financial-based measurements. In each case, we provide information and examples of how the measurements are constructed and an evaluation of their merits and limitations. We also provide brief summaries of studies that have used these methods. In Section V, we consider how the various measurements can be used in assessing the economic consequences of the liberalization of the services barriers. Since this module is designed for instructional purposes, we conclude in Section VI with a presentation of guideline principles and recommended procedures for measuring services barriers and assessing the consequences of their liberalization. Finally, we include two appendices containing study questions and exercises.

II. Conceptual Framework

Figure 1 illustrates the functioning of a domestic market for a service in the presence of both domestic and foreign suppliers. It is assumed here that the market is perfectly competitive and that the services provided by the two sets of suppliers are perfect substitutes. Other cases will be considered below. The foreign suppliers may be serving the domestic market through any of the four modes of supply discussed in Section I, although the assumption of perfect substitution may be less plausible for some modes than for others.

The horizontal axis in Figure 1 measures the quantity of the service supplied and demanded, to and by domestic purchasers. This could include, in the case of Mode 2, amounts that would be purchased abroad, which are nonetheless regarded here as competing with domestic supplies. The demand for the service is a decreasing function of the price, P , which is the same for all suppliers. The supply curves for the two sets of suppliers, domestic and foreign, are shown by the upward sloping supply curves, S_D for domestic firms and S_F for foreign firms. As drawn, the foreign supply is smaller than the domestic supply at any given price, but this is not necessary. In the absence of any impediments to trade, the relevant total supply curve in this market is the horizontal sum of these two curves, labeled S_D+S_F . Price is determined where this intersects the demand curve, P^0 , with the quantity Q^0 divided between domestic firms, Q_D^0 , and foreign firms, Q_F^0 .

Suppose now that there is an impediment of some form interfering with the ability of the foreign firms to serve this market. This may raise foreign firms' marginal costs, shifting their supply curve upward, or it may reduce or constrain the quantity that they supply, shifting the curve to the left in some fashion. Either way, the curve S_F is shifted up and to the left, as is the market supply curve S_D+S_F , to the positions shown as S_F' and S_D+S_F' . The effect is to raise the price of the service to P^1 , to reduce the total quantity purchased, and to increase the quantity sold by domestic firms. Sales by the foreign firms fall from Q_F^0 to Q_F^1 , which is the decline in imports of the service due to the impediment.

The tariff equivalent of this impediment may be defined as the *ad valorem* tax on foreign service providers that would have caused the same effects as this impediment. Such a tax, by increasing the marginal cost of sales by foreign firms, would cause their supply curve to shift up by the amount of the tax. Therefore, a tax that shifts S_F up so as to pass through point A is the tariff equivalent. That is, the tariff equivalent is the percentage by which point A lies above point B . Clearly, in the case drawn in Figure 1, this is not measurable from any observable price or price change. In particular, the increase in the price of the service on the domestic market is considerably smaller than the tariff equivalent that caused it.

There is, however, a special case in which the tariff equivalent would equal the price change. Suppose that foreign supply is infinitely elastic at some price P^0 and that the effect of the impediment is to raise foreign firms' marginal cost to P^1 . Then the two foreign supply curves are horizontal at these prices, and the tariff equivalent would be just the amount by which they shift up. To the extent that empirical measurements of tariff equivalents are based on observed prices, they usually implicitly assume this special case.

Figure 2 shows an alternative case in which the services provided by domestic and foreign firms are less than perfect substitutes and can therefore command distinct prices. In this case we must consider markets for the two services separately, as is done in the two panels of Figure 2, but we must also allow for the fact that the two services are substitutes, albeit imperfect. This is done by having the two demand curves each depend on the price in the other market, as indicated. Once again, the figure shows supply and demand curves, quantities, and prices without any trade impediment with superscript 0, and those in the presence of an impediment with superscript 1. The impediment shifts the foreign supply curve to the left and up, as before, to S_F' and leads to higher prices in both markets, P_F^1 and P_D^1 , which cause both demand curves to shift somewhat to the right. As in the above case of a homogeneous service, the domestic quantity supplied increases while foreign quantity supplied declines, although here we cannot be certain what happens to their sum. And here again, the tariff equivalent can be observed in the figure as the percentage by which S_F' lies above S_F at the new equilibrium, or the percentage by which point A is above point B , although observing this in the real-world market may again be difficult unless supply is assumed perfectly elastic.

So far we have assumed that markets are perfectly competitive, but this is clearly inappropriate in many service markets where an incumbent domestic firm may have a monopoly or only a very limited number of competitors. In such markets, the impediment to service trade may be a nondiscriminatory limit on entry by new firms that, by favoring the domestic incumbent, implicitly limits trade more than domestic supply. Figure 3 provides a simple case of this for a homogeneous service, a single domestic

incumbent, and competitive foreign suppliers with constant marginal cost at a level that would permit the domestic market to be shared under free entry. That is, with free entry the price is P^0 ; the single domestic firm with upward sloping marginal cost MC produces Q_D^0 ; total sales are Q^0 ; and the foreign firms sell $Q_F^0 = Q^0 - Q_D^0$ in the domestic market. Suppose now that impediments raise the marginal cost of the foreign firms. For a small increase, the S_F curve shifts up (not shown), causing the domestic firm's sales to rise along MC and foreign sales to decline, much as in the competitive case. If foreign marginal cost rises above P^a (the intersection of domestic MC and demand), however, then foreign sales fall to zero and the domestic firm charges a price that just barely undercuts foreign marginal cost. This is true until the impediment raises foreign marginal cost above P^m , the monopoly price at which marginal revenue equals marginal cost. Beyond this, further impediments leave price at P^m . For any of these cases, the tariff equivalent of the impediment is simply the amount by which it increases foreign marginal cost, up to the limit of $P^m - P^0$. This simplicity, however, is only due to the assumption that foreign sellers have constant cost and thus perfectly elastic supply. If foreign supply were instead upward sloping, then both the analysis and the identification of the tariff equivalent would be much harder, as in the previous cases.

As noted, however, this model is most relevant when impediments limit entry rather than raising operating cost. If additional firms are prevented from entering this market at all, then of course the monopoly price P^m will be charged irrespective of whether the potential entrants are foreign or domestic. If they are foreign, however, the outcome is exactly the same as if a trade impediment had raised their operating cost above P^m . Thus the tariff equivalent of an entry restriction, even when it is not discriminatory, is the excess of the monopoly price over the competitive price that would have obtained if both trade and entry were free.

Figures 1-3 clearly do not exhaust all of the possible cases. The real world is bound to involve further mixtures of imperfect substitution and imperfect competition that have not been considered here. Also, actual service industries have numerous special features, both in the ways that they operate and in their amenability to measurement, that simple theoretical models like these fail to take into account.

Empirical work must address these issues in ways that we have neither the space nor the sectoral expertise to handle here. The studies we review and summarize below provide much of this sectoral detail, as do other modules in this collection, and they can be consulted.

III. Characteristics of Services Barriers

As noted by Hoekman and Primo Braga (1997, p. 288), border measures such as tariffs are generally difficult to apply to services because customs agents cannot readily observe services as they cross the border. It is also the case that many services are provided in the economy of consumption rather than cross-border. Typically, therefore, services restrictions are designed in the form of government regulations.

These regulations may affect the entry and operations of both domestic and foreign service suppliers and in turn increase the price or the cost of the services involved. Services barriers are therefore more akin to NTBs than to tariffs, and their impact will depend on how the government regulation is designed and administered. In this connection, it is useful to distinguish the government regulations of services along two dimensions, according to whether restrictions are:¹

- “imposed on establishment or ongoing operations; and
- non-discriminatory (treat domestic and foreign service suppliers equally) or discriminatory (treat foreign service suppliers differently from (typically less favorably than) domestic suppliers).”

In terms of the conceptual framework in Section II, the first of these distinctions may be thought of as roughly determining whether the regulation shifts the foreign service supply curve to the left or up. That is, regulations that restrict or impede the establishment of service providers within a market will usually reduce their numbers and therefore the quantity supplied at any given price. Regulations of ongoing operations, on the other hand, may not reduce the number of suppliers, but they will increase

¹For more details, see the website of the Australian Productivity Commission (www.pc.gov.au/research/memoranda/servicesrestriction/index.html). See also Hoekman and Braga (1997, p. 288), who classify and provide examples of services barriers as follows: (1) quotas, local content, and prohibitions; (2) price-based instruments; (3) standards, licensing, and procurement; and (4) discriminatory access to distribution networks.

their costs, causing them to supply a given quantity only at a higher price. This distinction is not perfect, however, and in any case it does not need to be, since as long as the supply curve is upward sloping, shifts to the left and up have the same qualitative effects, as we have seen. The distinction is useful mainly for classifying different types of barriers.

Likewise, the second distinction above determines whether a regulation shifts the supply curve of only foreign service providers (when it is discriminatory), or instead raises costs and shifts supply for both foreign and domestic suppliers. As we saw in Section II, a regulation that impedes establishment of all new service providers, in spite of being nondiscriminatory, can nonetheless limit trade and competition by favoring a domestic incumbent.

Actual regulations differ greatly across service industries and are often based on characteristics of the particular service being provided. To illustrate the foregoing distinctions, therefore, we first focus on a specific real-world service industry: banking services. In Table 2 we list groupings of restrictions that affect commercial presence and “other restrictions” applied to banking services, together with a brief indication of what these restrictions represent and how an index of them has been constructed by McGuire and Schuele (2000).² As these authors note (p. 206): “The commercial presence grouping covers restrictions on licensing, direct investment, joint venture arrangements, and the permanent movement of people. The ‘other restrictions’ grouping covers restrictions on raising funds, lending funds, providing other lines of business (insurance and securities services), expanding banking outlets, the composition of the board of directors and the temporary movement of people.”

An indication of the restrictiveness of these regulations is also provided in the table. Within each category (pp. 204-05), the authors assign scores for different degrees of restriction, ranging between 0 (least restrictive) and 1 (most restrictive). The various categories are weighted judgmentally in terms of how great the costs involved are assumed to be with respect to the effect on economic efficiency. Thus, for example, it can be seen in Table 2 that restrictions on the licensing of banks are taken to be more

² See the Productivity Commission website for detailed listings by economy of the categories of domestic and foreign restrictions on establishment and ongoing operations for some selected services sectors, including: accountancy, architectural, and engineering services; banking; distribution; and maritime services.

burdensome than restrictions on the movement of people. Also, in Table 2, the scores are given separately for the restrictions applicable only to foreign banks and the “domestic” restrictions applicable to all banks. The differences between the foreign and domestic measures can then be interpreted as indicating the discrimination imposed on foreign banks. Finally, it will be noted in Table 2 that the foreign scores sum to a maximum of 1 and the domestic scores to a maximum of 0.808, because some of the restrictions noted apply only to foreign banks and not to domestic banks. Based on detailed information available, the scores for banking restrictions in individual countries can be constructed. Using the category weights in Table 2, it is then possible to calculate “indexes of restrictiveness” of the foreign and domestic regulations. Together with information on the other determinants of service transactions, the price and quantity effects of the barriers can be estimated. We shall have more to say on these matters below.

Another perspective on the types of barriers that exist may be found by focusing on FDI (Mode 3), which is of major importance in establishing a commercial presence to provide services in many sectors in host countries. Hardin and Holmes (1997, p. 24) define an FDI barrier as “...any government policy measure which distorts decisions about where to invest and in what form.” In considering ways of classifying FDI barriers, they note (pp. 33-34):³

“The appropriate classification system may vary, depending on the purpose of the exercise. For example, if the purpose is to check and monitor compliance with some policy commitment, then the categories should reflect the key element of the commitment.... If the primary interest is instead the resource allocation implications of the barriers, some additional or different information may be useful.

Barriers to FDI may distort international patterns and modes of...trade. They may also distort allocation of capital between different economies, between foreign and domestic investment, between different sectors, and between portfolio and direct investment. ...the classification system...should highlight the key characteristics of the barriers that will determine their size and impact. Market access and national treatment are...relevant categories from a resource allocation perspective. ...national treatment is generally taken to refer to measures affecting firms after establishment. A...way to classify barriers is therefore...according to what aspect of the investment they most affect: establishment, ownership and control; or operations. In addition..., some further information may be

³ See also Holmes and Hardin (2000).

useful...on distinctions...between direct versus indirect restrictions on foreign controlled firms; and rules versus case-by-case decisions.”⁴

The main types of FDI barriers that have been identified by UNCTAD (1996) are noted in Table

3. Further information on the barriers most commonly used to restrict FDI especially in the APEC economies is provided in Hardin and Holmes (1997, esp. pp. 37-40 and 45-55). As they note (p. 40), some common characteristics appear to be:⁵

“application of some form of screening or registration process involving various degrees of burden for the foreign investor; restrictions on the level or share of foreign ownership, particularly in some service sectors, and often in the context of privatisations; widespread use of case-by-case judgments, often based on national interest criteria; widespread use of restrictions on ownership and control (e.g., restrictions on board membership), particularly in sectors such as telecommunications, broadcasting, banking; and relatively limited use of performance requirements on input controls in services sectors.”

IV. Methods of Measurement of Services Barriers

Measurements of trade barriers, in markets for both goods and services, can be either direct or indirect. Direct measurements start from the observation of an explicit policy or practice, such as an import quota or a regulation of a foreign service provider, and then attempt in some fashion to measure its economic importance. Indirect measurements try instead to infer the existence of barriers using observed discrepancies between actual economic performance and what would be expected if trade were free. Direct measurements have the advantage that one knows what one is measuring, and the disadvantage that they can only include those barriers that are in fact explicit and recognized. Indirect measurements have the advantage that their quantitative importance is known, at least in the dimension used to identify them, but the disadvantage that they may incorporate unrecognized frictions other than the policy impediments that one seeks to identify.

⁴ Direct restrictions include limitations on the total size or share of investment in a sector and requirements on inputs used (e.g., local content). Indirect restrictions include net benefit or national interest criteria and limitations on membership of company boards. The distinction between rules and case-by-case decisions relates to issues of clarity in specification and transparency as compared to the exercise of administrative discretion.

⁵ Hardin and Holmes (pp. 40-43) also provide information on investment incentives, which are widely used and for the most part are not subject to multilateral disciplines.

In the case of trade in goods, direct measurements of NTBs typically take the form of inventories of identified trade restrictions, such as those compiled in the United Nations Conference on Trade and Development (UNCTAD) Trade Analysis and Information System (TRAINS).⁶ Since NTBs usually cover only some industries or products, a first step in quantifying them is often to measure the fraction of trade that they cover in different sectors and countries. These fractions may then be used directly in empirical work, even though they do not themselves say anything about how effective the NTBs have been in restricting trade.⁷ Indirect measurements, on the other hand, can be fairly straightforward in the case of goods, based either on their observed prices before and after they cross an international border or on the quantities that cross it. For example, one can often infer both the presence of an import barrier and its effect on price by simply comparing the price of a good inside an economy to that outside, since in the absence of any barrier one would expect arbitrage to cause these prices to be the same. Indirect measurements based on quantities are more difficult, since they depend on a theoretical benchmark that is likely to be much less certain than simple arbitrage, but such quantity-based measurements of NTBs have nonetheless been used with some success.

For trade in services, direct measurements need to be done somewhat differently, since regulation in service industries is so common that merely to document its presence would not be informative. A common approach to such frequency measures is therefore to incorporate also information about the restrictiveness of various regulations, and then use this information to construct an index of restrictiveness that can be compared across countries. We will provide further detail of how this may be done below, together with examples from the literature.

Indirect measurements are also possible with traded services, although simple price comparisons are seldom of much use. Arbitrage is intrinsically more difficult with most services than with goods, if it is possible at all, and in any case many services are differentiated by location in a way that makes comparison of their prices inside and outside of an economy meaningless. For example, the cost of

⁶ TRAINS is available on-line at www.unctad.org.

⁷ In fact, they are somewhat perverse for this purpose, since the more restrictive is an NTB, the less will be the trade that it permits.

providing telephone service to consumers on the Texas side of the US-Mexican border need bear no particular relationship to the cost, for the same firm, of providing it across the border in Mexico, where wages are much lower but costs of infrastructure may be much higher. So even if trade in the service were completely unimpeded, we would not expect these prices to be the same, and we therefore cannot infer a trade barrier in either direction from the fact that they are not. Similar arguments can be made about most traded services.

Indirect measurements of barriers to trade in services are therefore less common than for trade in goods, although they do exist. As we will discuss below, there has been some success using gravity models as a benchmark for quantities of trade in services, and these have therefore been the basis for indirect measurement of barriers in the quantity dimension. Financial data have also been the basis for inferring barriers from differences in the markups of price over cost, as we will also discuss.

With indirect measurements of the presence of services barriers less common, however, there is therefore the need for some other approach to quantifying the effects of barriers that have been identified in frequency studies. Indexes of restrictiveness typically only quantify restrictiveness on a scale of zero to one, and they do not purport to say how much a barrier either raises price or reduces quantity. To get such information, another step is needed. Typically, these methods use econometric analysis to relate an index of restrictiveness to observed prices or quantities, thus translating the former frequency-based measurements into an effect in the market.

In what follows, then, we first discuss the construction of frequency-based measurements of barriers in services and their use to construct indexes of restrictiveness. This is followed by the use of these indexes to derive effects on prices and quantities. We then turn to methods that attempt to infer the presence of services barriers indirectly, first from a gravity model of the quantities of trade, and second from financial data within service firms.

Frequency Studies and Indexes of Restrictiveness

Frequency studies start by identifying the kinds of restriction that apply to a particular service industry or to services in general. For particular industries, this requires considerable industry-specific knowledge, since each industry has, at a minimum, its own terminology, and often also its own distinctive reasons for regulatory concern. Regulations often serve an ostensibly valid purpose – protecting health and safety, for example – and knowledge of the industry is also necessary to distinguish such valid regulations from those that primarily offer protection. Thus a frequency study must either be done by an industry specialist, or it must draw upon documents that have been prepared by such specialists. Industry studies therefore often build upon the documentation provided by industry trade groups, such as the International Telecommunications Union in the case of telecoms, bilateral air service arrangements in the case of passenger air travel, or the TradePort website in the case of maritime services.

For broader studies of restrictions in services, covering multiple industries, some source must be found that incorporates such expertise across sectors. An early approach to doing this was in the studies by PECC (1995) and Hoekman (1995,1996) that we will discuss below. They used information that countries had submitted to the General Agreement on Trade in Services (GATS) for another purpose, which was therefore not ideally suited for documenting trade barriers. Better information requires that someone deliberately collect the details of actual barriers and regulatory practices, as in the data collected by Asia Pacific Economic Cooperation (APEC) and used by Hardin and Holmes (1997), whose study we will also discuss. In all cases, the goal is not just to assemble a complete list of barriers, but also to know the restrictiveness of these barriers in terms such as the numbers of firms or countries to which they apply and other characteristics.

This latter information is then used to construct an Index of Restrictiveness. Typically, each barrier is assigned a score between zero and one, with one being the most restrictive and zero the least. For examples, see McGuire and Schuele (2000, pp. 204-5) for the scoring of banking restrictions

underlying Table 2 above and the components of an index of FDI restrictions noted in Table 4.⁸ These scores for each type of barrier are then averaged, using weights that are intended to reflect the relative importance of each type, as indicated in these tables.

There are several ways that the weights on different barriers in a restrictiveness index may be assigned. Most commonly, these simply reflect the judgments of knowledgeable investigators as to the importance of each type of barrier. This may well be the best approach if the investigator really is knowledgeable, as in the case when an index is being constructed for a specific, narrowly defined industry.

An alternative that has been used by Nicoletti et al. (2000) and subsequently by Doove et al. (2001) is to apply factor analysis to the data once they are assembled. This enables them to distinguish those barriers that vary most independently among their data, and then to apply the largest weights to them. This is a purely statistical technique that is not, in our view, necessarily an improvement on the use of judgmental weights.

A third approach is not to construct an index at all, but rather to use the scores for each barrier separately in any empirical analysis. The difficulty here is that these scores may be collinear, so that their independent influence on any variable of interest may be impossible to ascertain. If this can be done, however, the advantage is that it allows for the fact that barriers may differ in their importance for different aspects of economic performance, and this approach allows these differences to make themselves known. Ideally, one would prefer an approach that allows the weights in an index of restrictiveness to be estimated simultaneously with the importance of that index for a particular economic outcome. Thus the construction of the index would be interlinked with its use for estimating effects on prices and quantities, for example, which we will discuss below.

First, however, we discuss a few of the main studies that have constructed frequency measurements and indexes of restrictiveness.

⁸ For additional examples, see the literature summaries of trade restrictiveness measurements noted below.

PECC and Hoekman

PECC (1995) and Hoekman (1995,1996) use information contained in the economy schedules of the GATS, referring to all four modes of the supply of services. Frequency ratios measure the extent of liberalization promised by countries in their commitments to the GATS, as part of the Uruguay Round negotiations completed in 1993-94. They are constructed based on the number of commitments that were scheduled by individual countries designating sectors or sub-sectors as unrestricted or partially restricted. The ratios equal the number of actual commitments in relation to the maximum possible number of commitments.⁹ Hoekman focused on commitments relating to market access and national treatment. As he notes (1996, p. 101), there were 155 sectors and sub-sectors and four modes of supply specified in the GATS. This yields $620 \times 2 = 1,440$ total commitments on market access and national treatment for each of 97 countries.¹⁰ The frequency ratio for an economy or a sector is then defined as the fraction of these possible commitments that were in fact made, implying an index of trade restrictiveness equal to one minus this fraction.

There are some important limitations to these numbers that are worth mentioning. Thus, as Holmes and Hardin (2000, pp. 58-59) note, Hoekman's method may be misleading or biased because it assumes that the absence of positive economy commitments in the GATS schedules can be interpreted as indicating the presence of restrictions, which may not be the case in fact. Also, the different types of restrictions are given equal weight.

Hardin and Holmes

Hardin and Holmes (1997) and Holmes and Hardin (2000) have attempted to build on and improve Hoekman's methodology, though focusing only on restrictions on FDI in services and thus Mode

⁹ In counting commitments, the commitment for a sector or sub-sector to be unrestricted is counted as one, whereas a listing of the restrictions that will continue to apply, so that the commitment to liberalization is only partial, is counted as one-half.

¹⁰ As noted in Hardin and Holmes (1997, p. 70), the GATS commitments are based on a "positive list" approach and therefore do not take into account sectors and restrictions that are unscheduled. In PECC (1995), it is assumed that all unscheduled sectors and commitments are unrestricted, which will then significantly raise the calculated frequency ratios compared to Hoekman (1996), who treats unscheduled sectors as fully restricted. It would be useful accordingly to determine how accurate the two assumptions may be.

3. In particular, they use information on the actual FDI restrictions taken from Asia Pacific Economic Cooperation (APEC), rather than just the GATS commitments. Rather than treating all restrictions equally, they devise a judgmental system of weighting that is designed, as in the case of the banking restrictions noted in Table 2 above, to reflect the efficiency costs of the different barriers. The components of their index and the weights assigned to the different sub-categories are given in Table 4. It can be seen, for example, that foreign equity limits are given greater weights than the other barriers noted. Their results for 15 APEC countries for the period 1996-98 are summarized in Table 5.¹¹ It is evident that communications and financial services are most subject to FDI restrictions, while business, distribution, environmental, and recreational services are the least restricted. Korea, Indonesia, China, Thailand, and the Philippines have relatively high restrictiveness indexes, while the United States and Hong Kong have the lowest indexes.

McGuire and Schuele

In Table 2 above, we indicated the restriction categories and weights applied to banking services in the study by McGuire and Schuele (2000), which is based on a variety of data sources (pp. 202-03), including the GATS schedules of commitments and a number of other reports and documentation pertaining to actual financial-sector restrictions in 38 economies for the period 1995-98. The foreign and domestic restrictiveness indexes that were calculated are depicted graphically for selected Asia-Pacific countries, South Africa, and Turkey in Figure 4 and for Western Hemisphere countries in Figure 5. India, Indonesia, Malaysia, and the Philippines can be seen to have relatively high foreign index scores, Korea, Singapore, Thailand, and Turkey have moderate foreign index scores, and Australia, Hong Kong, Japan, New Zealand, and South Africa have the lowest foreign index scores. The domestic index scores are indicative of the restrictions applied both to domestic and foreign banks, and it appears that the domestic index scores are highest for Japan, Korea, Malaysia, and the Philippines.

¹¹ Details on the construction of the indexes and their sensitivity to variations in the restrictiveness weights are discussed in Hardin and Holmes (1997, esp. 103-11).

While the absolute values of the foreign and domestic index scores are not reported, the differences in the scores can be interpreted visually as a measurement of the discrimination applied to foreign banks. Thus, in Figure 4, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Thailand, and Turkey appear to have the highest discrimination against foreign banks. In Figure 5, Brazil, Chile, and Uruguay have the highest foreign index scores, Colombia, Mexico, and Venezuela have moderate scores, and Argentina, Canada, and the United States have the lowest scores. Chile and Uruguay have the highest domestic index scores, while Argentina, Canada, Mexico, the United States, and Venezuela have domestic index scores of zero. Brazil, Colombia, and Uruguay have the most discriminatory regimes against foreign banks.¹² McGuire and Schuele (2000, pp. 212-13) further found that countries with less restricted banking sectors tended to have higher GNP per capita.

Other Studies

The frequency measures and indexes of restriction that we have discussed thus far are especially useful in identifying the types of barriers and the relative degree of protection afforded to particular services sectors across countries. We shall now review briefly some other studies that are based on measurements of this type.

- Mattoo (1998) analyzed market access commitments in **financial services**, covering direct insurance and banking. His results indicated that Latin America was the most restricted in direct insurance and Asia the most restricted in banking services.
- Marko (1998) constructed frequency measures for the basic **telecommunications** markets, using Hoekman's (1995) methodology. Marko found that 58% of the basic telecommunications services market for the 69 signatories of the February 1997 Agreement on Basic Telecommunications was covered by partial or full GATS commitments.
- McGuire (1998) showed that Australia's impediments in **financial services**, including banking, securities, and insurance, were much lower as compared to other economies in Asia.
- Colecchia (2000) provided a methodological, pilot study of the barriers on **accountancy services** for Australia, France, the United Kingdom, and the United States, using OECD information on regulatory regimes for 1997. The United Kingdom was found to be the most liberal, the United States the least liberal.

¹² The detailed scores for the components of the domestic and foreign banking restrictions are broken down by individual countries and are available on the Productivity Commission website.

- Kalirajan (2000) constructed restrictiveness indexes for 38 economies, using GATS schedules and a variety of other information on barriers to **distribution services** as of June 1999. The indexes covered the services of commission agents, wholesalers, retailers, and franchisers. The findings were that: (1) Belgium, India, Indonesia, France, Korea, Malaysia, the Philippines, Switzerland, and Thailand were the most restrictive economies and Singapore and Hong Kong the most open; and (2) the countries that were the most discriminatory against foreign firms included Malaysia, the Philippines, Venezuela, Brazil, the United States, and Greece. The detailed domestic and foreign restrictiveness indexes were broken down by economy and are available on the Productivity Commission website.
- Kemp (2000) constructed restrictiveness indexes for the four modes of providing **educational services**, using GATS data on commitments for market access and national treatment for the five sub-sectors of educational services and covering 29 countries. While only a quarter of GATS member countries scheduled commitments, the evidence suggested that consumption abroad, which is the major mode of educational trade in terms of foreign-student tuition, fees, and expenditures, was comparatively the least restricted mode.
- McGuire, Schuele, and Smith (2000) developed indexes for restrictions on foreign **maritime service** suppliers and all maritime service suppliers covering 35 economies during the period 1994-98, using a variety of GATS and other data sources. They found that: (1) Brazil, Chile, India, Indonesia, Korea, Malaysia, the Philippines, and the United States had the most restricted markets against foreign maritime suppliers; and (2) Chile, the Philippines, Thailand, Turkey, and the United States were the most discriminatory in favoring domestic suppliers. The detailed domestic and foreign indexes of restrictiveness were broken down by economy and are available on the Productivity Commission website.
- Nguyen-Hong (2000) constructed restrictiveness indexes for **accountancy, architectural, and engineering services** for 34 economies and legal services for 29 economies. The indexes were compiled from WTO, OECD, APEC, and a variety of other sources. The findings were that: (1) legal and accounting were the most highly restricted services; (2) Indonesia, Malaysia, Austria, Mexico, and Turkey were the most restrictive for the four professions, and Finland and the Netherlands the most open; (3) nationality requirements were the most extensive in legal and accountancy services; (4) residency requirements were common in accountancy services; (5) partnerships and practices between accountants and lawyers were commonly restricted; and (6) recognition of foreign qualifications and licenses was subject to a variety of restrictions among countries. The detailed domestic and foreign restrictiveness indexes were broken down and are available on the Productivity Commission website.
- Warren (2000a) used data for 136 countries from the International Telecommunications Union (ITU) to construct five indexes for the regulation of **telecommunications** policies that discriminate against: (1) all potential providers of cross-border telecommunications services; (2) foreign providers of cross-border services; (3) all potential providers of fixed network services; (4) all potential providers of cellular services via FDI; and (5) foreign providers of mobile services via FDI. He found: (1) significant variation across countries in all five indexes; (2) most countries relied only on foreign carriers to provide competition in mobile markets; (3) countries were less prepared to use majority-owned foreign carriers in their fixed network markets; (4) countries that liberalized their mobile networks were

more likely to liberalize their fixed networks; (5) countries that limited commercial presence via FDI were more liberal in permitting cross-border entry; and (6) GATS-based indexes that tended to reflect legal conditions, as calculated by Marko (1998), were not altogether well correlated with ITU-based indexes that were designed to reflect economic conditions. The detailed domestic and foreign indexes by economy are available on the Productivity Commission website.

- Doove, Gabbitas, Nguyen-Hong, and Owen (2001) constructed restrictiveness indexes for international air passenger transport, telecommunications, and electricity supply. The index for **air transport** was an average of the bilateral restrictiveness indexes applicable to pairs of countries. The data covered 875 airline routes for 35 economies and referred to the late 1990s. The bilateral restrictions included designation, capacity, fares, and charter services, with weights derived using factor analysis in an OECD study by Gonenc and Nicoletti (2001). The bilateral restrictions were generally not covered under the GATS, so that discriminatory restrictions on third countries may have been applied. The results are shown in column (2) of Table 6 and indicate substantial variation across countries as a consequence of the agreement-specific bilateral restrictions.

The restrictiveness index for **telecommunications** covered 24 OECD member countries and 23 non-OECD countries, using data for 1997. The telecommunications industry has been undergoing rapid technological change in recent decades, and there has been widespread regulatory reform and structural reform undertaken in many countries. Doove et al. built upon the OECD study by Boyland and Nicoletti (2000), who focused on the four major telecommunications sectors: trunk (domestic long distance); international (international long distance); mobile (cellular); and leased-line services. The regulatory measures covered include: market share of new entrants; index of governmental control of the public telecommunications operators (PTOs); degree of internationalization of domestic markets; time to liberalization; and time to privatization. These measurements were incorporated into an econometric framework for the individual sectors in order to estimate the price impacts involved that are noted below in Table 12.

Electricity supply has also been undergoing significant deregulation and structural reform. Building upon OECD work by Steiner (2000), Doove et al. assembled data for 50 economies for 1996. The regulatory measures covered were: unbundling of electricity generation from transmission; third party access; presence of a wholesale electricity market; degree of private/public ownership; time to liberalization; and time to privatization. The price impacts of regulation were estimated and are indicated below in Table 13.

As already mentioned, frequency measures and indexes of restrictiveness convey a considerable amount of information about the identification and characteristics of the different barriers that are used in regulating international services transactions. These measurements and indexes are an important first step, which can provide the basis for assessing the economic content of the barriers and the consequences of maintaining or eliminating them. We turn next therefore to consider the issues involved in the

construction of price-impact or quantity-impact measurements of services barriers, together with a brief review of selected efforts that have been made to construct such measurements.

Price-Impact Measurements¹³

As discussed above, the nature of services tends to prevent the use of differences across borders to measure their presence or their size. Therefore, in order to construct measurements of the price and/or quantity effects of barriers to trade in services, some other approach is needed.

The simplest is just to make an informed guess. For example, having constructed a frequency ratio for offers to liberalize services trade in the GATS as discussed above, Hoekman (1995,1996) then simply assumed that failure to liberalize in a sector would be equivalent to some particular tariff level that he selected using knowledge of the sector. These maximum tariff equivalents ranged from a high of 200 percent for sectors in which market access was essentially prohibited in most countries (e.g., maritime cabotage, air transport, postal services, voice telecommunications, and life insurance) to 20-50 percent for sectors in which market access was less constrained. He then applied his frequency-ratio measurements of liberalization to these maximum tariffs to construct tariff equivalents that differed by economy based on their offers in the GATS. Thus, for example, assuming a benchmark tariff equivalent of, say, 200% for postal services, and a frequency ratio of 40 percent to reflect an economy's scheduled market access commitments, the tariff equivalent for that sector and economy is set at $200 - 0.4(200) = 120$ percent.

Using the value of output by sector for a representative industrialized economy, it is then possible to construct weighted average measurements by sector and economy. The resulting weighted-average tariff equivalent "guesstimates" for 1-digit International Standard Industrial Classification (ISIC) sectors for selected countries are indicated in Table 7. It can be seen that the tariff equivalents are highest for ISIC 7, Transportation, Storage & Communication, reflecting the significant constraints applied within

¹³See Bosworth, Findlay, Trewin, and Warren (2000) for a useful methodological discussion of the construction and interpretation of price-impact measurements of impediments to services trade.

this sector. There is also considerable variation within the individual sectors for the relatively highly industrialized countries listed in Table 7.

It should be emphasized that Hoekman's measurements are designed to indicate only the *relative* degree of restriction, in addition to the problems discussed above with regard to the construction of the frequency ratios on which they are based. We refer to them as "guesstimates," which are not to be taken literally as indicators of absolute ad valorem tariff equivalents. Further, the tariff equivalent benchmarks are just judgmental, not distinguished according to their economic impact, include only market access restrictions, and cover all together the different modes of service delivery.

A better approach that has been used in more recent studies is to use other data, together with an index of restrictiveness that has been gathered as described above, to estimate econometrically the effects of barriers. For example, suppose that an index of restrictiveness has been constructed for a group of countries, and that price data are also available for the services involved in this same group. Using knowledge and data on economic determinants of these prices, an econometric model can be formulated to explain them. Then, if the restrictiveness index is included in this equation as an additional explanatory variable, the estimated coefficient on this index will measure the effect of the trade restrictions on prices, controlling for the other determinants of prices that have been included in the model.

Use of this method of course requires data on more than just the barriers themselves, including prices and other relevant determinants of prices. However, these additional data may be needed for only a subset of the countries for which the restrictiveness index has been constructed, so long as one can assume that the effects of restrictions may be common across countries. The coefficient relating restrictiveness to prices can be estimated for a subset of countries for which the requisite data are available, and this estimated coefficient can then be applied to the other countries as well.

An example of this approach may be found in Doove et al. (2001, Chapter 2), who provided price effects for international air passenger transport. They built on work by Gonenc and Nicoletti (2001) at the OECD, who had constructed an index of restrictiveness for this industry in the manner discussed above,

and who had also used an econometric model to estimate the effects of restrictiveness for a group of 13 OECD countries. Doove et al. extended the index of restrictiveness to a larger set of 35 OECD and non-OECD countries and applied this estimated coefficient to calculate price effects.

The estimating equation used for this was the following:

$$\dot{p} = \alpha + \beta BRI + \gamma E + \varepsilon \quad (1)$$

where \dot{p} represents the price of air travel over a particular route, BRI is the index of restrictiveness for that route, and E is a vector of environmental variables that are expected to influence prices, including indexes of market structure both for the route and at the route ends, measurements of airport conditions, government control, and propensity for air travel. α , β , and γ are coefficients to be estimated econometrically, while ε is normal disturbance term. The price variable \dot{p} in this equation is of some interest, since it demonstrates the not uncommon need to model particular features of a service industry. It is based on a separate regression analysis of international airfares, relating them to distance and to other route-specific variables. The price that is entered in equation (1) is then the percentage that the actual airfare lies above the price predicted from this regression. Thus, holding this predicted price constant as unaffected by a particular trade restriction, the estimated coefficient β measures the percentage by which the price – air fare in this case – is increased by a restrictiveness of one above the price at a restrictiveness of zero.

Applying this estimated coefficient to the values of the index of restrictiveness for the larger set of countries, Doove et al. produced the price-effect estimates reported above in Table 6. As can be seen, these tend to be largest for developing economies and for business travel.

Other studies have been done using variations on this technique. These variations include the use of separate indexes of restrictiveness for different types of trade barriers, including individual modes of supply. There is in fact no reason why the technique needs to start from the sort of zero-one index discussed above, since the index itself is only an intermediate step along the way to getting price effects. Thus, some studies have used other economic variables as proxies for different aspects of services

regulation. For example, as noted below, Kalirajan et al. (2000), in a study of banking services, included capital and liquidity variables, by bank and economy, in their price equation, on the assumption that these are set by bank regulators, and they used these to proxy for regulatory restrictions on international banking operations.

To illustrate further, we review below briefly this and other studies of the price impacts of services restrictions:

- Johnson, Gregan, Gentle, and Belin (2000) noted that **international air services** are regulated by means of bilateral agreements and are largely excluded from the GATS. They developed a partial-equilibrium, spatial econometric model that was used to analyze the effects on prices, quantities, and economic welfare, in Australia and foreign countries, of the entry of a new airline (Ansett) into the Australian market, as well as plurilateral reform for an “open club” for airlines among Australia, China, Hong Kong, and Japan. They showed that there were significant benefits realized from the entry of new competitors into the airline markets. Also, members of an open club gained, but at the expense of non-members.
- Kalirajan (2000) used firm-level accounting data for wholesale and retail **food distributors** in 18 economies to indicate the relationship between trade restrictiveness and distributors’ price-cost margins. The results suggested that the restrictions were primarily cost creating rather than rent creating and were accounted for mainly by restrictions on establishment. Using the restrictiveness indexes, coefficient estimates, and sample means, the estimated cost impacts noted in Table 8 range between 0 and 8 percent.
- Kalirajan, McGuire, Nguyen-Hong, and Schuele (2000) developed and estimated a model applied to 694 banks in 27 economies for 1996-97 to assess the impact of non-prudential restrictions on the interest margins of **banks**. The net interest margin is the difference between a bank’s lending and deposit rates. A two-stage procedure was used for estimation purposes. In the first stage, bank-specific variables were used to explain the interest margins in all the economies, and, in a second stage, cross-economy estimation was used to take economy-wide variables into account. The foreign and domestic restrictiveness indexes calculated in McGuire and Schuele (2000) entered into the second-stage estimation. The foreign restrictiveness index was found to be a significant determinant of interest rate spreads, while the domestic restrictiveness index was not significant. The price impacts of the restrictions were calculated from the second-stage results and are presented in Table 9. The price impacts using the foreign trade restrictiveness index range from 5 to 6 percent, and, using the domestic index, from 0 to 23 percent. Chile, Indonesia, Malaysia, the Philippines, Singapore, South Korea, and Thailand have the highest price impacts due to the restrictions on foreign banks.
- Kang (2000) investigated the impact of restrictions on **maritime services**, using a partial-equilibrium econometric model that incorporated cross-economy and bilateral trade data as determinants of demand for these services. Shipping margins for

manufactured goods were derived from FOB/CIF value differentials and were used as a proxy for price. The shipping margins were to be explained by bilateral restrictions, distance, and the scale of bilateral trade. Indexes for 23 countries were adapted from McGuire, Schuele, and Smith (2000), and the remaining data were from the 1995 database of the Global Trade Analysis Project (GTAP). The foreign index of restrictiveness was decomposed into measures affecting commercial presence and into other restrictions such as on cabotage and port services. Allowance was also made for different bilateral relationships as between industrialized and developing economies. The most important conclusion reached was that a low degree of restrictions in any trading partner was necessary in order to have low shipping charges. Further, low-income countries stood to gain the most from eliminating restrictions on shipping services.

- Nguyen-Hong (2000) estimated the influences of restrictions on the price-cost margins of 84 **engineering service** firms in 20 economies, using 1996 company accounting data compiled from a variety of private and official sources. A model of firm behavior was developed to include the determinants of the observed price-cost margins, and a linear version using ordinary least squares was implemented with cross-section data. The index of foreign barriers to establishment was highly significant and had a positive and statistically significant impact on price-cost margins. The index of domestic barriers to establishment had a negative and significant impact. The price and cost impacts of the restrictions were calculated, using the actual indexes of restrictiveness, estimated coefficients, and the sample means of the independent variables. The price impacts, which are summarized by economy in Table 10, exceed 10 percent for Austria, Mexico, Malaysia, Indonesia, and Germany. The cost impacts are relatively small, ranging between 0.7 and 6.8 percent. The price and cost impacts were also calculated by types of barriers.
- Trewin (2000) used time-series data on the total costs of providing **telecommunications services** for 37 countries obtained from the International Telecommunications Union (ITU) for the period 1982-92. He used a frontier cost method as a means of estimating the minimum possible costs that are expended from a given combination of inputs. The distance of an observation above the cost frontier is a measurement of the degree of technical inefficiency. The measurements of restrictiveness calculated by Marko (1998) and Warren (2000a) were used in the estimation process. The results suggested that countries that provide higher levels of FDI face lower costs. Making allowance for the quality-cost aspects of telecommunication services reinforced the importance of the cost impacts of restrictions. When the sample was divided between low and high income countries, the average efficiency of the high income set was more than three times better than the low income set. The results are listed in Table 11. It can be seen, in the high income set, that Luxembourg is close to the efficiency frontier whereas Portugal and Korea are relatively high cost countries.
- Doove, Gabbitas, Nguyen-Hong, and Owen (2001) constructed restrictiveness indexes and estimates of price impacts for international air passenger transport, telecommunications, and electricity supply. Their indexes of bilateral restrictions on **international air passenger transport** referred to 35 economies in the Asia-Pacific, Americas, and European regions. Focusing on the discount segment of the air passenger market, they implement a procedure for estimating the price effects of the applicable restrictions, using fare data primarily for the end years of the 1990s. The

results, which are shown above in Table 6, indicated that the higher price effects range from 12 to 22 percent in the Asia-Pacific economies, 9 to 18 percent in the Americas, and generally below 10 percent in the European economies. The price impacts for business and economy airfares were considerably higher but should be interpreted tentatively due to data constraints.

Measurements of the impact of **telecommunications** regulations were derived for 24 OECD and 23 non-OECD countries, using data for 1997. Price-impact measurements of regulation were calculated for four major sectors of telecommunications, including trunk, international, mobile, and leasing services and are listed by economy and type of service in Table 12. While the results suggested that countries with more stringent regulatory regimes tended to have higher telecommunications prices, the authors noted that there were several cases in which the results appeared to be counter intuitive and sensitive to small changes in the data. The reported results should therefore be treated with caution, pending further clarification and improvement of the model and data that were used.

Measurements of regulation and impacts on **industrial electricity** prices for 50 economies, using 1996 data, were developed. The estimated price impacts are listed by economy in Table 13. The impacts ranged from 0 to 35 percent, with a mean of 13 percent and a standard deviation of 13 percent. The authors noted, however, that the estimated price impacts were quite sensitive to the methodology and data used and therefore should be treated as ordinal rankings rather than absolute values.

Quantity-Impact Measurements

Another approach, appropriate for some service industries, is to model the determination of quantity rather than price, and then include the trade restrictiveness index in this instead of in a price equation. The result, analogous to that for prices above, is an estimate of effects of trade barriers on quantities. This can in turn be converted into an effect on prices by use of an assumed or estimated price elasticity.¹⁴

For example, Warren (2000b) has assessed the quantitative impact of barriers in telecommunications services, chiefly mobile telephony and fixed network services, for 136 countries. For this purpose he estimated equations such as the following, which was for mobile telephony:

$$Q_i^m = \alpha + \beta_1 Y_i + \beta_2 Y_i^2 + \beta_3 PD_i + \beta_4 [P_i^m] + \varepsilon_i \quad (2)$$

¹⁴ That is, having estimated that barriers reduce the quantity of a service by some percentage, this is divided by the elasticity of demand to obtain the percentage price increase to which it corresponds.

Here, for each economy i , Q_i^m is the number of cellular telephone subscribers per 100 inhabitants, Y_i is GDP per capita, and PD_i is population density. $[P_i^m]$ is a policy variable, which for mobile telephony took two forms: an index of market access for investment in the industry based on number of competitors, privatization, and policies towards competition; and a broader average of several trade and investment-related indexes.

Combining these quantitative estimates of the effects of removing existing barriers with an estimate of the price elasticity of demand for the telecommunications services involved, tariff equivalents in the form of price wedges were calculated. The tariff equivalents for domestic and for foreign providers of telecommunication services in the major nations are shown in Table 14. The estimates for the advanced industrialized countries are relatively low in comparison to the much higher estimates for the newly industrializing countries shown. There are cases of developing countries (not shown) that in some cases have very large tariff equivalents, including some with several hundred percent, e.g., China (804 and 1,000 percent), Colombia (11 percent and 24 percent), India (861 and 1,000 percent), Indonesia (71 and 128 percent), South Africa (14 and 21 percent), and Venezuela (10 and 15 percent).

Gravity-Model Estimates

Because the modeling of prices that is needed to estimate a price effect above is necessarily very sector specific, the techniques described are of little use for quantifying barriers across sectors. Likewise, they are not useful for comparing the overall levels of service trade barriers across countries. For that, one needs a more general model of trade to use as a benchmark, and the natural choice is the gravity model. This model relates bilateral trade volumes positively to the incomes of both trading partners and negatively to the distance between them.¹⁵ It has become a very popular tool in recent years for eliciting

¹⁵ Typically, the log of the volume of total bilateral trade between two countries is regressed on the logs of their national incomes, the log of distance between them, and other variables such as per capita income and dummy variables to reflect a common border, common language, etc.

the effects of a wide variety of policy and structural influences on trade in a manner that controls for the obvious importance of income and distance.

Francois (1999) has fit a gravity model to bilateral services trade for the United States and its major trading partners, taking Hong Kong and Singapore to be free trade benchmarks. The independent variables, in addition to distance between trading partners, included per capita income, gross domestic product (GDP), and a Western Hemisphere dummy variable. The differences between actual and predicted imports were taken to be indicative of trade barriers and were then normalized relative to the free trade benchmarks for Hong Kong and Singapore. Combining this with an assumed elasticity demand of 4, tariff equivalents can be estimated. The results for business/financial services and for construction are indicated in Table 15. Brazil has the highest estimated tariff equivalent for business/financial services (35.7 percent), followed by Japan, China, Other South Asia, and Turkey at about 20 percent. The estimated tariff equivalents are considerably higher for construction services, in the 40-60 percent range for China, South Asia, Brazil, Turkey, Central Europe, Russia, and South Africa, and in the 10-30 percent range for the industrialized countries.

As noted in Deardorff and Stern (1998, p. 24), measurements of this kind are useful mainly in identifying *relative* levels of protection across sectors and countries. But they have some important drawbacks. That is, by attributing to trade barriers all departures of trade from what the included variables can explain, there is a great burden on the model being used. Thus, the worse the model, the more likely it is that trade barrier estimates will have an upward bias. Moreover, since trade cannot be predicted accurately for particular industries and countries, it is not clear how the deviations should be interpreted and the extent to which existing trading patterns depart from free trade.

An additional problem exists when this technique is used to infer barriers for separate industries. The theoretical basis for the gravity equation, as in Anderson (1979) and Deardorff (1998), applies to total trade, not to trade in individual sectors. The gravity equation makes sense at the sectoral level only if all countries are equal in their capacity to produce in a sector, which of course would be a denial of the role of comparative advantage. Thus, if an economy were in fact to have a comparative advantage in a

particular service sector, so that its output would be high and its cost of serving its domestic market itself would be low, then it will import less from abroad than would be expected based on income and distance alone. Thus comparative advantage may show up as an implicit barrier to trade, when in fact none exists.

Financial-Based Measurements

Hoekman (2000) has suggested that financial data on gross operating margins calculated by sector and economy may provide information about the effects of government policies on firm entry and conditions of competition.¹⁶ As he notes (p. 36):

“In general, a large number of factors will determine the ability of firms to generate high margins, including market size (number of firms), the business cycle, the state of competition policy enforcement, the substitutability of products, fixed costs, etc. Notwithstanding the impossibility of inferring that high margins are due to high barriers, there should be a correlation between the two across countries for any given sector. Data on operating margins provide some sense of the relative profitability of activities, and therefore, the relative magnitude (restrictiveness) of barriers to entry/exit that may exist.”

The economy-region results of Hoekman’s analysis, averaged over firms and sectors for 1994-96, are indicated for agriculture, manufacturing, and services in Table 16. Sectoral results for services only are given in Table 17. Services margins are generally higher than manufacturing margins by 10-15 percentage points, and the services margins vary considerably across countries. Australia, Hong Kong, and Singapore have the lowest services margins – in the neighborhood of 20 percent – while Chile, China, Indonesia, Philippines, Chinese Taipei, Thailand, and the United States have services margins in excess of 40 percent. The sectoral results indicate that the margins for hotels and financial services are relatively high, and the margins for wholesale and retail trade are lower. The margins for several developing countries appear to be relatively high in a number of sectors. Overall, as Hoekman suggests (p. 39):

“...business services, consultancy, and distribution do not appear to be among the most protected sectors. ...barriers to competition are higher in transportation, finance, and telecommunications. These are also basic ‘backbone’ imports that are crucial for the ability of enterprises to compete internationally.”

¹⁶Gross operating margins are defined as total sales revenue minus total average costs divided by total average costs.

V. Measuring the Economic Consequences of Liberalizing Services Barriers

While the various measurements of services barriers noted are of interest, they need to be incorporated into an explicit economic modeling framework for economy-wide analysis in order to determine how the existence or removal of the barriers will affect conditions of competition and costs of production, economic welfare, and the intersectoral movement of capital and labor. Such a framework is provided by computable general equilibrium (CGE) models.

Most CGE modeling research to date has been focused on barriers to international trade in goods rather than trade in services and FDI. The reasons for this stem in large part from the lack of comprehensive data on cross-border services trade and FDI and the associated barriers, together with the difficult conceptual problems of modeling that are encountered. Some indication of pertinent CGE modeling work relating to services is provided in Hardin and Holmes (1996, p. 85), Brown and Stern (2001, pp. 272-74), and Stern (2002, pp. 254-56). The approaches to modeling can be divided as follows: (1) analysis of cross-border services trade liberalization in response to reductions in services barriers; (2) modeling in which FDI is assumed to result from trade liberalization or other exogenous changes that generate international capital flows in response to changes in rates of return; and (3) modeling of links between multinational corporations' (MNCs) parents and affiliates and distinctions between foreign and domestic firms in a given economy/region.

The third type of CGE modeling studies just noted comes closest to capturing the important role played especially by MNCs and their foreign affiliates in providing services. Thus, for example, in the study by Brown and Stern (2001), each MNC is assumed to produce a differentiated product and to allocate production to its various host-economy locations. The monopolistically competitive firms employ capital, labor, and intermediate inputs in their production, and they set prices as an optimal mark-up of price over marginal cost. The number of firms is permitted to vary to hold MNC profits at zero. Consumers are assumed to allocate their expenditure between goods and services that are produced by firms domestically and varieties that are imported from each national source. Labor is taken to be freely mobile among domestic sectors but not across borders. Capital, however, is mobile internationally,

although not perfectly so, because there is a risk premium that will vary depending on the size of an economy's capital stock.

Barriers to FDI are assumed to take the form of an increased cost of locating investment in a host economy. For this purpose, Brown and Stern use the cost-price margins estimated by Hoekman (2000), which have been discussed above and are listed in Tables 16 and 17, as indicative of barriers to FDI. Since the cost-price gap is smallest in most sectors in Hong Kong, an economy thought to be freely open to foreign firms, the excess in any other economy above the Hong Kong figure is taken to be due to barriers to the establishment of foreign firms.

Using the aforementioned modeling structure with three sectors (agriculture, manufactures, and services) and 18 countries/regions, Brown and Stern calculate the economic effects of removal of services barriers according to the following three scenarios:¹⁷

Scenario A: Removal of services barriers, with perfect international capital mobility and fixed world capital stock.

Scenario B: Removal of services barriers, with risk-premium elasticity = 0.1 to allow for imperfect capital mobility, and fixed world capital stock.

Scenario C: Removal of services barriers, with risk-premium elasticity = 0.1 to allow for imperfect capital mobility, and world capital stock increased by 3%.

When barriers are lowered, international capital in the form of FDI will then be attracted to countries with the relatively highest rates of return and away from other countries.

The welfare effects, as a percentage of GNP and in billions of dollars, resulting from the assumed removal of the services barriers for each of the three scenarios are listed in Table 18 for the countries/regions covered by the model.¹⁸ When services barriers are lowered, international capital in the

¹⁷ See also studies undertaken at the Australian Productivity Commission by Dee and Hanslow (2001) and Verikios and Zhang (2001) for computational results based on a related modeling framework and with estimates of services barriers taken from Kalirajan et al. (2000) and Warren (2000 a,b).

¹⁸ See Brown and Stern (2001, pp. 277-78) for the results for the absolute changes in imports and exports, the percentage change in the terms of trade, and the percentage change in the real wage. The sectoral results for the three aggregated sectors for Scenario C are reported in Brown and Stern (pp. 281-82). They show that output increases economy-wide in just about every sector in all countries/regions, and there is a wide prevalence of the realization of economies of scale. There are also generally significant increases in activity by foreign-owned affiliates, especially in the countries that record large increases in output.

form of FDI will then be attracted to countries with the highest rates of return and away from other countries.

It is evident in Table 18 both that the welfare effects of removing the services barriers are sizable and that they vary markedly across countries. For the industrialized countries in Scenario A with perfect international capital mobility, the largest increases are for Canada, \$84.0 billion (14.8% of GNP), the European Union (EU), \$42.4 billion (0.5% of GNP), and the United States, \$35.0 billion (0.5% of GNP). Because it loses capital, Japan has a decline of \$103.7 billion (2.0% of GNP). Among the developing countries, the largest increases are for Indonesia, \$30.8 billion (15.6% of GNP), China, \$26.9 billion (3.8% of GNP), and Chinese Taipei, \$20.7 billion, \$7.6% of GNP). It is also evident that there are declines in welfare for a number of developing countries, in particular, Korea, Thailand, Chile, Mexico, and the Rest of Cairns Group. What is reflected in the results is that welfare is affected by whether or not an economy attracts or loses capital as a result of services liberalization. Countries that lose capital become “smaller” in the economic sense of the word. As the economy contracts, surviving firms produce less than before. The fall in firm output generally occurs in order to avoid a large loss in variety of domestically produced goods. The subsequent economy-wide reduction in scale economies is usually the source of the welfare loss.

The results in Scenario A are sensitive to the assumption of perfect capital mobility. As noted above, countries that import capital are assumed to pay a risk premium that is a function of capital imports. The elasticity of the risk premium with respect to the volume of capital imports can be set exogenously in the model. Thus, in Scenario B, Brown and Stern assume that capital imports that result in a 1% increase in the capital stock generate an interest-rate risk premium of 0.1%. That is, the risk-premium elasticity is 0.1%. It is immediately apparent from the results for Scenario B in Table 18 that the introduction of a risk premium that reflects a decrease in international capital mobility has the effect of reducing the welfare effects of services liberalization as compared to Scenario A, in which there was perfect capital mobility.

In both Scenarios A and B, there is a rise in the real return to capital. Therefore, it is likely that, over time, there will be an increase in the world's capital stock as savers and investors respond to the increased incentive to accumulate capital. To take this into account, in Scenario C, with the risk premium elasticity remaining at 0.1%, Brown and Stern allow for an increase in the world's capital stock by 3%. This is the amount necessary to hold the real return to capital equal to the level in the base period. As can be seen in Table 18, the welfare effects of services liberalization are now positive for all of the countries shown. For the world as a whole, welfare rises by \$703.7 billion. Canada's welfare increases by \$85.0 billion (14.9% of GNP), the EU by \$202.4 billion (2.5% of GNP), and the United States, \$222.5 billion (3.1% of GNP). There are also sizable absolute and percentage increases for the developing countries, in particular China, Indonesia, Chinese Taipei, and Hong Kong. It is further noteworthy that welfare increases for all of the countries/regions shown.

It is evident accordingly that these welfare effects associated with an increase in the world's capital stock in response to an increase in the rate of return to capital are considerably larger than what is commonly seen in CGE models in which capital is assumed to be internationally immobile.¹⁹ This may not be surprising because it has been apparent from previous CGE analyses of trade liberalization that have made allowance for international capital flows that the largest welfare gains stem from these flows rather than from the removal of tariffs and other trade barriers that distort consumer choice in goods trade.²⁰

The understanding of the consequences of liberalizing services barriers thus is enhanced when allowance is made for the behavior of multinational firms whose foreign affiliates are already located in or attracted to host countries. When services liberalization occurs and the real return to capital is increased, so that there are FDI international capital flows and the world capital stock expands, most countries stand to gain significantly in terms of economic welfare.

¹⁹ Compare, for example, the results of the Michigan Model reported in Brown, Deardorff, and Stern (2003).

²⁰ See Brown, Deardorff, and Stern (1992).

VI. Guideline Principles and Recommended Procedures for Measuring Services Barriers and Assessing the Consequences of Their Liberalization

As a summary of what we have reported in detail here about the methodologies for measuring services barriers and using these measurements to assess the consequences of liberalization in services, we conclude first with several principles to be kept in mind during this process and then with more detailed procedural steps that we recommend should be followed:

Principles:

1. Most barriers to trade and investment in services take the form of regulations, rather than measures at the border.
2. No single methodology is sufficient for documenting and measuring barriers to trade in services. Instead, investigators need to draw upon all available information, including both direct observation of particular barriers and indirect inference of barriers using data on prices and quantities.
3. Because of the special role of incumbent firms in many service industries, regulations do not need to be explicitly discriminatory against foreign firms in order to have discriminatory effects.

Procedures:

1. Collect the details of regulations and other policies affecting services firms in the countries and/or industries being examined, including the manner in which they apply to foreign versus domestic firms, plus quantitative details of their application, such as any percentage or dollar limits that they impose.
2. Ideally, this information should be collected by systematic surveys of governments and/or firms. However, it may also be possible to infer it less directly from documents prepared for other purposes, such as the commitments that governments made to the GATS in the Uruguay Round and subsequent negotiations.

3. For each type of regulation or policy, define degrees of restrictiveness and assign scores to each, ranging from zero for least restrictive to one for most restrictive.
4. Construct an Index of Restrictiveness by weighting the scores from step 3 based on judgments of the relative importance of each policy. This index can then be used directly for reporting the presence and importance of barriers across industries and countries, as well as for providing an input to subsequent analysis.
5. Convert the Index of Restrictiveness from step 4 into a set of tariff equivalents by one or more of the following methods. Depending on the quality of information that goes into their construction, these tariff equivalents may be superior to the Index itself for reporting about barriers and analyzing their effects.
 - a. Assign judgmental tariff-equivalent values to each component of the index, representing the percentage taxes on foreign suppliers that each is thought to correspond to at their most restrictive levels (index = 1).
 - b. Use data on prices and their determinants as the basis for a regression model that includes the Index and estimates its effect on prices.
 - c. Use data on quantities produced or traded as the basis for a regression model that includes the Index and estimates its effect on quantities. This estimate can then be converted to tariff equivalents using an assumed or estimated price elasticity of demand.
6. Use either the Index of Restrictiveness or the tariff equivalents constructed above as inputs into a model of production and trade in order to ascertain the effects of changes in the barriers to which they correspond. The appropriate model for this purpose depends somewhat on the policy changes being analyzed. But unless these are very narrow in scope, the model should be a general equilibrium one, incorporating the full effects of barriers across sectors and countries. Ideally, too, the model should be designed to capture the effects of service regulations in the form that they have been observed and quantified above.

References

- Anderson, James E. 1979 "A Theoretical Foundation for the Gravity Equation," *American Economic Review* 69, (March), pp. 106-116.
- Bosworth, Malcolm, Christopher Findlay, Ray Trewin, and Tony Warren. 2000. "Price-impact Measures of Impediments to Services Trade," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Boylard, O. and G. Nicoletti. 2000. "Regulation, Market Structure and Performance in Telecommunications," Working Paper No. 237ECO/WKP (2000), 10, Economics Department, OECD, Paris, 12 April.
- Brown, Drusilla and Robert M. Stern. 2001. "Measurement and Modeling of the Economic Effects of Trade and Investment Barriers in Services," *Review of International Economics* 9:262-86
- Colecchia, Alessandra. 2000. "Measuring Barriers to Market Access for Services: A Pilot Study on Accountancy Services," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Deardorff, Alan V. "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" in Jeffrey A. Frankel, ed., *The Regionalization of the World Economy*, Chicago: University of Chicago Press, 1998.
- Deardorff, Alan V. and Robert M. Stern. 1998. *Measurement of Nontariff Barriers*. Ann Arbor: University of Michigan Press.
- Dee, Philippa and Kevin Hanslow. 2001. "Multilateral Liberalization of Services Trade," in Robert M. Stern (ed.), *Services in the International Economy*. Ann Arbor: University of Michigan Press.
- Dee, Philippa, Alexis Hardin, and Leanne Holmes. 2000. "Issues in the Application of CGE Models to Services Trade Liberalization," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Disclosure. 1998. *Global Researcher – Worldschope Database*. Bethesda, Maryland: Disclosure.
- Doove, Samantha, Owen Gaabbitas, Duc Nguyen-Hong, and Joe Owen. 2001. "Price Effects of Regulation: Telecommunications, Air Passenger Transport and Electricity Supply," Productivity Commission Staff Research Paper, AusInfo, Canberra (October).
- Findlay, Christopher and Tony Warren (eds.). 2000. *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Francois, Joseph. 1999. "Estimates of Barriers to Trade in Services," processed.
- Gonenc, R. and G. Nicoletti. 2001. "Regulation, Market Structure and Performance in Air Passenger Transportation," OECD Economic Studies, No. 32, OECD, Paris.
- Hardin, Alexis and Leanne Holmes. 1997. *Services Trade and Foreign Direct Investment*. Staff Research Paper, Industry Commission. Canberra: Australian Government Publishing Services.

- Hoekman, Bernard. 1995. "Assessing the General Agreement on Trade in Services," in Will Martin and L. Alan Winters (eds.), *The Uruguay Round and the Developing Countries*, World Bank Discussion Paper No. 307. Washington, D.C.: The World Bank. Revised version published in Martin and Winters (eds.), Cambridge University Press, 1996.
- Hoekman, Bernard. 2000. "The Next Round of Services Negotiations: Identifying Priorities and Options," *Federal Reserve Bank of St. Louis Review* 82:31-47.
- Hoekman, Bernard and Carlos A. Primo Braga. 1997. "Protection and Trade in Services: A Survey," *Open Economies Review* 8:285-308.
- Holmes, Leanne and Alexis Hardin. 2000. "Assessing Barriers to Services Sector Investment," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Johnson, Martin, Tendar Gregan, Geraldine Gentle, and Paul Belin. 2000. "Modeling the Benefits of Increasing Competition in International Air Services," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Kalirajan, Kaleeswaran. 2000. "Restrictions on Trade in Distribution Services," Productivity Commission Staff Research Paper, AusInfo, Canberra (August).
- Kalirajan, Kaleeswaran, Greg McGuire, Duc Nguyen-Hong, and Michael Schuele. 2000. "The Price Impact of Restrictions on Banking Services," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Karsenty, Guy. 2000. "Just How Big Are the Stakes? An Assessment of Trade in Services by Mode of Supply," in Pierre Sauvé and Robert M. Stern (eds.), *Services 2000: New Directions in Services Trade Liberalization*. Washington, D.C.: Brookings Institution.
- Kemp, Steven. 2000. "Trade in Education Services and the Impacts of Barriers on Trade," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Marko, M. 1998. "An Evaluation of the Basic Telecommunications Services Agreement, CIES Policy Discussion Paper 98/09, Centre for International Economic Studies, University of Adelaide.
- Mattoo, Aaditya. 1998. "Financial Services and the WTO: Liberalization in the Developing and Transition Economies," for presentation at the Workshop, "Measuring Impediments to Trade in Services," Productivity Commission, Canberra, April 30 – May 1, 1998.
- McGuire, Greg. 1998. *Australia's Restrictions on Trade in Financial Services*. Staff Research Paper, Productivity Commission, Canberra.
- McGuire, Greg and Michael Schuele. 2000. "Restrictiveness of International Trade in Banking Services," in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London

- McGuire, Greg, Michael Schuele, and Tina Smith. 2000.. “Restrictiveness of International Trade in Maritime Services,” in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implication*. London and New York: Routledge.
- Nguyen-Hong, Duc. 2000. “Restrictions on Trade in Professional Services,” Productivity Commission, Staff Research Paper, Ausinfo, Canberra, August.
- Nicoletti, G., S. Scarpetta, and O. Boyland. 2000. “Summary Indicators of Product Market Regulation with an Extension to Employment Protection Legislation,” Working Paper No. 226, Economics Department, ECO/WKP(99)18, OECD, Paris, 13 April (revised).
- Pacific Economic Cooperation Council (PECC). 1995. *Survey of Impediments to Trade and Investment in the APEC Region*. Singapore: PECC.
- Steiner, F. 2000. “Regulation, Industry Structure and Performance in the Electricity Supply Industry,” Working Paper No. 238, ECO/WKP (2000), Economics Department, OECD, Paris, 12 April.
- Stern, Robert M. 2002. “Quantifying Barriers to Trade in Services,” in Bernard Hoekman, Aaditya Mattoo, and Philip English (eds.) *Development, Trade, and the WTO: A Handbook*. Washington, D.C.: The World Bank.
- Trewin, Ray. 2000. “A Price-Impact Measure of Impediments to Trade in Telecommunications Services,” in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- United Nations Conference on Trade and Development (UNCTAD). 1996. *World Investment Report 1996: Investment, Trade and International Policy Arrangements*. New York and Geneva: UNCTAD.
- Verikios, George and Xiao-guang Zhang. 2001. “Global Gains from Liberalising Trade in Telecommunications and Financial Services,” Productivity Commission Staff Research Paper, AusInfo, Canberra (October).
- Warren, Tony. 2000a. “The Identification of Impediments to Trade and Investment in Telecommunications Services,” in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Warren, Tony. 2000b. “The Impact on Output of Impediments to Trade and Investment in Telecommunications Services,” in Christopher Findlay and Tony Warren (eds.), *Impediments to Trade in Services: Measurement and Policy Implications*. London and New York: Routledge.
- Warren, Tony and Christopher Findlay. 2000. “How Significant are the Barriers? Measuring Impediments to Trade in Services,” in Pierre Sauvé and Robert M. Stern (eds.), *Services 2000: New Directions in Services Trade Liberalization*. Washington, D.C.: Brookings Institution.

Table 1
International Services Transactions by Modes of Supply, 1997

Mode of Supply^a	Category	Value (\$bn)	Cumulative share (%)
Mode 1	Commercial services (excl. travel)	890	41.0
Mode 2	Travel/Tourism	430	19.8
Mode 3	Gross output of foreign affiliates	820	37.8
Mode 4	Compensation of Employees	30	1.4
Total		2,170	100.0

^aModes 1, 2, and 4 are derived from balance-of-payments accounts. Mode 3 is derived from data on the operations of foreign affiliates in host countries.

Source: Karsenty (2000).

Table 2
Restriction Categories for Banking Services

Restriction category	Relevant for foreign index	Total weight	Relevant for domestic index	Total weight
<i>Restrictions on commercial presence</i>				
Licensing of banks	Yes	0.200	Yes	0.190
Based inversely on the maximum number of new banking licenses issued with only prudential requirements				
Direct investment	Yes	0.200	Yes	0.190
Based inversely on the maximum equity participation permitted in an existing domestic bank				
Joint venture arrangements	Yes	0.100	No	n.a.
New bank entry only through joint venture with a domestic bank				
Permanent movement of people	Yes	0.020	No	n.a.
Based inversely on years that executives, specialists and/or senior managers can stay				
<i>Other restrictions</i>				
Raising funds by banks	Yes	0.100	Yes	0.143
Banks are restricted from accepting deposits from the public and/or raising funds from domestic capital markets				
Lending funds by banks	Yes	0.100	Yes	0.143
Banks are restricted in types or sizes of loans and/or are directed to lend to housing and small business				
Other business of banks – insurance and securities services	Yes	0.200	Yes	0.095
Banks are excluded from insurance and/or securities services				
Expanding the number of banking outlets	Yes	0.050	Yes	0.048
Based inversely on the number of outlets permitted.				
Composition of the board of directors	Yes	0.020	No	n.a.
Based inversely on the percentage of the board that can comprise foreigners				
Temporary movement of people	Yes	0.010	No	n.a.
Based inversely on the number of days temporary entry permitted to executives, specialists and/or senior managers				
<i>Total weighting or highest possible score</i>		1.000		0.808

Source: McGuire and Schuele (2000), Tables 12.1 and 12.3, pp. 204-5, 208.

Table 3
Barriers to FDI

<i>Restrictions on market entry</i>	<p>Bans on foreign investment in certain sectors</p> <p>Quantitative restrictions (e.g., limit of 25 per cent foreign ownership in a sector)</p> <p>Screening and approval (sometimes involving national interest or net economic benefits tests)</p> <p>Restrictions on the legal form of the foreign entity</p> <p>Minimum capital requirements</p> <p>Conditions on subsequent investment</p> <p>Conditions on location</p> <p>Admission taxes</p>
<i>Ownership and control restrictions</i>	<p>Compulsory joint ventures with domestic investors</p> <p>Limits on the number of foreign board members</p> <p>Government appointed board members</p> <p>Government approval required for certain decisions</p> <p>Restrictions on foreign shareholders' rights</p> <p>Mandatory transfer of some ownership to locals within a specified time (e.g., 15 years)</p>
<i>Operational restrictions</i>	<p>Performance requirements (e.g., export requirements)</p> <p>Local content restrictions</p> <p>Restrictions on imports of labor, capital and raw materials</p> <p>Operational permits or licences</p> <p>Ceilings on royalties</p> <p>Restrictions on repatriation of capital and profits</p>

Source: UNCTAD (1996).

Table 4
Components of an Index of FDI Restrictions

Type of restriction	Weight
Foreign equity limits on all firms	
No foreign equity permitted	1.000
Less than 50 per cent foreign equity permitted	0.500
More than 50 per cent and less than 100 per cent foreign equity permitted	0.250
Foreign equity limits on existing firms, none on greenfield	
No foreign equity permitted	0.500
Less than 50 per cent foreign equity permitted	0.250
More than 50 per cent and less than 100 per cent foreign equity permitted	0.125
Screening and approval	
Investor required to demonstrate net economic benefits	0.100
Approval unless contrary to national interest	0.075
Notification (pre or post)	0.050
Control and management restrictions	
All firms	0.200
Existing firms, none for greenfield	0.100
Input and operational restrictions	
All firms	0.200
Existing firms, none for greenfield	0.100

Source: Holmes and Hardin (2000, p. 62).

Table 5
FDI Restrictiveness Indexes for Selected APEC Economies and Selected Sectors, 1996-98 (Percentage)

Sectors	Australia	Canada	China	Hong Kong	Indonesia	Japan	Korea	Malaysia
Business	0.183	0.225	0.360	0.015	0.560	0.062	0.565	0.316
Communications	0.443	0.514	0.819	0.350	0.644	0.350	0.685	0.416
Postal	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Courier	0.175	0.200	0.275	0.000	0.525	0.050	0.550	0.075
Telecommunications	0.300	0.325	1.000	0.200	0.525	0.100	0.550	0.375
Audiovisual	0.295	0.530	1.000	0.200	0.525	0.250	0.640	0.215
Construction	0.175	0.200	0.400	0.000	0.525	0.050	0.750	0.775
Distribution	0.175	0.200	0.275	0.050	0.525	0.050	0.625	0.075
Education	0.175	0.200	0.525	0.000	0.525	0.200	0.550	0.075
Environmental	0.175	0.200	0.275	0.000	0.525	0.117	0.700	0.075
Financial	0.450	0.375	0.450	0.233	0.550	0.358	0.875	0.608
Insurance and related	0.275	0.425	0.475	0.400	0.575	0.450	0.838	0.600
Banking and other	0.625	0.325	0.425	0.067	0.525	0.267	0.913	0.617
Health	0.175	0.200	0.275	0.000	0.525	0.050	0.550	0.317
Tourism	0.175	0.200	0.283	0.000	0.525	0.050	0.617	0.542
Recreation	0.175	0.200	0.275	0.000	0.525	0.050	0.550	0.175
Transport	0.204	0.235	0.455	0.093	0.525	0.114	0.573	0.122
	Mexico	New Zealand	Papua New Guinea	Philippines	Singapore	Thailand	United States	
Business	0.289	0.086	0.300	0.479	0.261	0.775	0.005	
Communications	0.739	0.434	0.475	0.758	0.518	0.838	0.345	
Postal	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Courier	0.775	0.075	0.300	0.475	0.250	0.775	0.000	
Telecommunications	0.705	0.425	0.300	0.975	0.571	0.804	0.200	
Audiovisual	0.475	0.235	0.300	0.580	0.250	0.775	0.180	
Construction	0.450	0.075	0.300	0.475	0.250	0.775	0.000	
Distribution	0.325	0.075	0.300	0.475	0.250	0.775	0.000	
Education	0.450	0.075	0.300	0.475	0.250	0.775	0.000	
Environmental	0.075	0.075	0.300	0.475	0.250	0.775	0.000	
Financial	0.554	0.200	0.300	0.954	0.378	0.875	0.200	
Insurance and related	0.575	0.125	0.300	0.975	0.250	0.775	0.000	
Banking and other	0.533	0.275	0.300	0.933	0.506	0.975	0.400	
Health	0.408	0.075	0.300	0.475	0.250	0.775	0.000	
Tourism	0.275	0.075	0.300	0.808	0.317	0.775	0.000	
Recreational	0.075	0.075	0.300	0.475	0.250	0.775	0.000	
Transport	0.283	0.131	0.300	0.975	0.250	0.780	0.025	

Note: The higher the score, the greater the degree to which an industry is restricted. The maximum score is 100%. Because of data constraints on the value of output by sector, the indexes shown are based on simple averages of the sub-sectors involved in the individual countries.

Source: Adapted from Holmes and Hardin (2000, pp. 63-64).

Table 6
International Air Passenger Transport: Bilateral Restriction Indexes and Price Impacts

	Number of Agreements /Routes	Bilateral Restriction Index ^a	Price Impacts ^b		
			Business	Economy	Discount
Asia Pacific economies					
Australia	24	0.62	146.0	54.8	14.6
India	20	0.77	164.4	81.3	21.8
Indonesia	16	0.73	139.7	53.0	20.4
Japan	29	0.73	121.1	41.4	18.1
Korea	18	0.72	181.5	89.9	20.4
Malaysia	22	0.71	199.1	95.6	18.4
New Zealand	15	0.39	82.1	66.8	11.7
Philippines	20	0.79	207.5	70.1	20.9
Singapore	30	0.70	141.5	57.5	16.8
Thailand	25	0.68	124.5	71.3	16.2
Americas economies					
Argentina	12	0.74	161.7	62.0	17.5
Brazil	19	0.70	195.5	63.9	15.5
Canada	29	0.60	114.5	56.9	11.4
Chile	17	0.61	125.2	49.5	12.9
Mexico	19	0.82	224.7	92.2	18.4
Uruguay	32	0.52	96.9	38.5	12.3
USA	32	0.40	52.9	33.2	8.9
European economies					
Austria	28	0.32	47.2	20.6	6.1
Belgium	31	0.36	63.3	22.0	6.9
Denmark	30	0.34	53.1	21.1	7.0
Finland	22	0.23	33.6	11.5	3.8
France	32	0.35	57.0	20.8	8.3
Germany	32	0.37	56.5	20.3	8.1
Greece	26	0.31	72.1	24.9	7.2
Ireland	23	0.21	32.2	20.1	4.5
Italy	25	0.29	49.9	18.5	6.4
Luxembourg	23	0.24	36.9	15.0	4.2
Netherlands	31	0.39	104.0	20.0	10.0
Norway	28	0.32	62.1	16.4	4.4
Portugal	21	0.14	45.5	20.3	6.1
Spain	31	0.36	68.0	25.4	8.9
Sweden	29	0.32	45.5	20.3	6.1
Switzerland	32	0.75	102.5	42.6	13.8
Turkey	20	0.56	98.8	32.2	10.7
United Kingdom	32	0.30	46.3	21.5	7.6

^a Unweighted average of the route-level bilateral restriction indexes for each economy based on the number of agreements/routes shown in the preceding column. Ranges from 0 to 0.97, with a higher score indicating more restrictions.

^b Percentage increase in airfares compared to the benchmark regime.

Source: Doove et al. (2001, p. 39).

Table 7
Constructed Ad Valorem Tariff Equivalent “Guesstimates” by 1-Digit ISIC Services
Sectors for Selected Countries (Percentage)

Economy	ISIC 5 Con- struction	ISIC 6 Wholesale & Retail Distr.	ISIC 7 Transp., Storage & Communic.	ISIC 8 Business & Fin. Services	ISIC 9 Social & Personal Services
Australia	12.0	7.4	183.4	24.8	25.4
Austria	5.0	4.6	98.7	20.1	13.9
Canada	6.0	9.0	117.7	25.9	40.2
Chile	40.0	34.4	182.2	45.2	42.9
European Union	10.0	10.0	182.0	27.2	23.6
Finland	19.0	14.6	181.0	23.8	31.7
Hong Kong	32.0	31.5	149.8	39.0	42.9
Japan	5.0	4.6	142.0	28.9	32.3
Korea	16.0	21.4	164.9	36.3	40.7
Mexico	24.0	21.3	152.3	40.9	29.8
New Zealand	5.0	13.4	181.5	30.5	36.1
Norway	5.0	13.4	122.2	25.7	24.0
Singapore	12.0	34.4	138.8	35.9	33.7
Sweden	12.0	13.4	184.2	22.5	26.9
Switzerland	5.0	8.0	178.1	27.7	32.3
Turkey	5.0	34.4	31.6	35.4	35.9
United States	5.0	4.6	111.4	21.7	31.7

Source: Hoekman (1995, pp. 355-56).

Table 8
Estimated Cost Impacts of Foreign and Domestic Barriers to Establishment
in Wholesale and Retail Food Distribution
(Percent)

Economy	Cost Impact of Foreign Barriers to Establishment	Cost Impact of Domestic Barriers to Establishment
Australia	0.57	-
Belgium	4.87	6.69
Canada	3.09	0.98
Chile	1.32	1.92
France	5.16	7.10
Greece	0.25	-
Hong Kong	0.06	-
Indonesia	3.66	-
Ireland	2.70	-
Japan	2.26	6.79
Malaysia	8.23	3.97
Netherlands	2.73	-
New Zealand	0.77	-
Singapore	0.03	-
South Africa	0.47	-
Switzerland	5.24	8.32
United Kingdom	2.76	-
United States	2.26	-

- Zero.

Source: Kalirajan (2000, p. 52).

Table 9
Estimated Price Impacts of Foreign and Domestic Trade
Restrictiveness Indexes (TRI) on Net Interest Margins of Banks
(Percent)

Economy	Price Effect Using the Foreign TRI_i	Price Effect Using the Domestic TRI_i^b
Argentina	5.34	0.00
Australia	9.30	0.00
Canada	5.34	0.00
Chile	34.00	23.67
Colombia	18.35	3.73
European Union ^a	5.32	0.00
Hong Kong	6.91	2.97
Indonesia	49.32	5.26
Japan	15.26	9.99
Malaysia	60.61	21.86
Philippines	47.36	10.79
Singapore	31.45	8.39
South Korea	36.72	14.93
Switzerland	5.95	0.00
Thailand	33.06	0.00
United States	4.75	0.00

^a The European Union grouping excludes Finland, Ireland and Luxembourg.

^b Uses the coefficient estimate for the foreign trade restrictiveness index as a proxy.

Source: McGuire et al. (2000, p. 229).

Table 10
Estimated Price and Cost Impacts of Restrictions on Engineering Services
(Percent)

	Price Impact			Cost Impact
	Foreign Barriers to Establishment	Foreign Barriers to Ongoing Operations	All Foreign Barriers	Domestic Barriers to Establishment
Austria	11.1	3.5	14.5	6.8
Mexico	13.9	0.2	14.2	1.9
Malaysia	11.3	0.7	12.0	5.3
Indonesia	9.9	0.3	10.2	3.2
Germany	4.7	5.5	10.2	2.9
Spain	5.1	3.7	8.7	3.9
United States	5.1	2.2	7.4	3.8
Sweden	5.9	0.9	6.8	0.7
Japan	3.1	3.4	6.6	2.2
Canada	3.1	2.2	5.3	2.7
Singapore	4.9	0.2	5.0	0.8
Hong Kong	3.6	1.5	5.1	2.3
South Africa	3.5	0.2	3.7	0.7
Netherlands	3.5	0.2	3.7	5.2
Australia	2.1	0.7	2.8	2.1
United Kingdom	2.3	0.2	2.5	1.4
Finland	1.8	0.5	2.3	0.7
Denmark	0.3	0.8	1.1	0.7
France	0.3	0.6	0.9	0.7
Belgium	0.3	0.2	0.5	0.7

^aThe price impact for all foreign barriers is the sum of the price impacts for foreign barriers to establishment and ongoing operations, respectively.

Source: Nguyen-Hong (2000, p. 63).

Table 11
Coefficient Estimates of Technical Efficiency in Telecommunications Services

Low Income	Technical Efficiency	High Income	Technical Efficiency
Chile	3.82	Australia	1.67
China	6.31	Austria	1.31
Hungary	2.61	Belgium	1.55
Iceland	1.16	Canada	1.34
Indonesia	11.96	Denmark	1.43
Ireland	3.22	Finland	1.24
Malaysia	4.31	France	1.74
Mexico	15.41	Germany	1.66
PNG	7.75	Greece	1.11
Philippines	3.06	Hong Kong	1.44
Poland	2.30	Italy	1.71
Thailand	5.25	Japan	1.21
Turkey	4.07	Korea	1.98
		Luxembourg	1.03
		Netherlands	1.43
		New Zealand	1.83
		Norway	1.75
		Portugal	2.08
		Singapore	1.57
		Spain	1.75
		Sweden	1.40
		Switzerland	1.42
		United Kingdom	1.67
		United States	1.48
Mean	5.48	Mean	1.54

Note: A coefficient estimate equal to 1.00 indicates full technical efficiency in relation to the minimum-cost frontier.

Source: Trewin (2000, p. 112).

Table 12
Price Impact of Regulation on Telecommunications Prices, 1997
(Percent of Notional Price Existing under Benchmark Regulatory Regime)

Economy	Trunk	International	Mobile	Leasing	Industry-wide
OECD					
Australia	21	33	23	4	19
Austria	10	51	17	11	20
Belgium	41	207	18	5	52
Canada	33	95	8	0	27
Denmark	63	12	16	3	39
Finland	5	34	50	17	22
France	41	95	16	9	34
Germany	40	176	17	8	38
Greece	37	35	10	19	27
Iceland	31	199	96	11	54
Ireland	17	56	16	10	22
Italy	32	41	10	3	21
Japan	39	34	14	5	23
Luxembourg	17	108	105	22	59
Netherlands	32	30	13	5	23
New Zealand	30	24	15	1	21
Norway	26	67	42	14	31
Portugal	22	15	8	6	15
Spain	28	30	7	4	18
Sweden	53	^b	54	15	^b
Switzerland	13	165	49	16	40
Turkey	35	^b	17	24	^b
United Kingdom	78	63	6	2	47
United States	61	32	8	1	38
Unweighted mean	34	73	26	9	31
Standard deviation	17	61	27	7	13

Economy	Trunk	International	Mobile	Leasing	Industry-wide
Additional OECD					
Czech Republic	36	20	6	ne	22
Hungary	69	44	2	ne	38
Korea	18	16	9	ne	14
Mexico	54	16	7	ne	40
Poland	18	30	9	ne	17
Unweighted mean	39	25	7	na	26
Standard deviation	23	12	3	na	12
NON-OECD					
Argentina	64	21	6	ne	45
Brazil	27	15	16	ne	23
Chile	41	35	7	ne	32
China	^b	^b	^b	ne	^b
Colombia	28	22	20	ne	25
Hong Kong	49	47	24	ne	43
India	68	41	^b	ne	^b
Indonesia	41	52	56	ne	46
Malaysia	23	34	23	ne	24
Peru	32	12	7	ne	24
Philippines	30	23	8	ne	23
Russia	63	^b	^b	ne	^b
Singapore	25	196	35	ne	44
South Africa	35	26	^b	ne	^b
Chinese Taipei	25	54	40	ne	32
Thailand	41	111	18	ne	42
Uruguay	42	37	8	ne	33
Vietnam	^b	^b	^b	ne	^b
Unweighted mean	40	48	21	na	34
Standard deviation	15	47	15	na	9
All 47 Economies					
Minimum	5	12	2	0	14
Maximum	78	207	105	24	59
Unweighted mean	36	58	22	9	31
Standard deviation	17	54	22	7	12

ne: not estimated.

na: not applicable.

^a OECD economies not included in Boyland and Nicoletti (2000).

^b Excluded.

Source: Doove et al. (2001, pp. 72-73).

Table 13
Price Impacts of Regulation on Industrial Electricity Prices, 1996^a

Economies in Original Study	Percent	Extended Coverage	Percent
Australia	0.0	Argentina	0.0
Belgium	15.4	Austria	13.2
Canada	8.8	Bolivia	16.5
Denmark	8.5	Brazil	15.6
Finland	0.0	Chile	0.0
France	16.0	China	17.2
Germany	8.3	Colombia	0.0
Greece	16.6	Czech Republic	13.6
Ireland	13.9	Hong Kong	15.6
Italy	17.1	Hungary	13.3
Japan	10.2	Iceland	35.3
Netherlands	15.5	India	17.2
New Zealand	0.0	Indonesia	16.8
Norway	0.0	Korea	15.4
Portugal	17.9	Luxembourg	13.8
Spain	9.5	Malaysia	16.6
Sweden	0.0	Mexico	17.3
United Kingdom	0.0	Peru	0.0
United States	7.5	Philippines	17.6
		Poland	13.6
		Russia	17.1
		Slovak Republic	14.8
		Singapore	15.6
		South Africa	15.6
		Switzerland	21.9
		Chinese Taipei	16.1
		Thailand	16.3
		Turkey	20.7
		Uruguay	32.2
		Venezuela	27.2
		Vietnam	32.0

^a Percentage increase in pre-tax industrial electricity prices relative to the estimated price under the benchmark regulatory regime.
Source: Doove et al. (2001, p. 105).

Table 14
Tariff Equivalents of Barriers to Telecommunication
Services in Major Nations
(Percentage)

	Domestic	Foreign
Australia	0.31	0.31
Austria	0.85	0.85
Belgium	0.65	1.31
Brazil	3.81	5.68
Canada	1.07	3.37
Chile	1.68	1.68
Hong Kong	1.26	1.26
Colombia	10.55	24.27
Denmark	0.20	0.20
Finland	0.00	0.00
France	0.34	1.43
Germany	0.32	0.32
Ireland	1.46	2.67
Italy	1.00	1.00
Japan	0.26	0.26
Korea	4.30	8.43
Mexico	6.24	14.43
Netherlands	0.20	0.20
New Zealand	0.27	0.27
Singapore	2.10	2.72
Spain	2.03	3.93
Sweden	0.65	0.65
Switzerland	1.23	1.23
Turkey	19.59	33.53
United Kingdom	0.00	0.00
United States	0.20	0.20

Source: Adapted from Warren (2000b).

Table 15
Estimated Tariff Equivalents in Traded Services:
Gravity-Model Based Regression Method
(Percentage)

Countries/regions	Business/financial services	Construction
North America [†]	8.2	9.8
Western Europe	8.5	18.3
Australia and New Zealand	6.9	24.4
Japan	19.7	29.7
China	18.8	40.9
Chinese Taipei	2.6	5.3
Other Newly Industrialized Countries	2.1	10.3
Indonesia ¹	6.8	9.6
Other South East Asia	5.0	17.7
India	13.1	61.6
Other South Asia [*]	20.4	46.3
Brazil	35.7	57.2
Other Latin America	4.7	26.0
Turkey [*]	20.4	46.3
Other Middle East and North Africa	4.0	9.5
CEECs & Russia	18.4	51.9
South Africa	15.7	42.1
Other Sub-Saharan Africa	0.3	11.1
Rest of World (ROW)	20.4	46.3

^{*}Turkey and Other South Asia are not available, separately, in the U.S. data, and have been assigned estimated ROW values.

[†]North America values involve assigning Canada/Mexico numbers to the United States.

Source: Francois (1999).

Table 16
Average Gross Operating Margins of Firms Listed on National
Stock Exchanges, 1994-96 by Economy/Region
(Percentage)

Economy/Region	Agriculture	Manufacturing	Services
Australia	8.4	15.5	16.6
Canada	32.1	22.6	32.9
Chile	39.1	40.8	44.0
China	30.6	28.1	49.5
European Union	22.9	23.8	31.6
Hong Kong	25.9	12.8	18.1
Indonesia	41.8	34.3	41.3
Japan	38.4	26.4	28.7
Republic of Korea	11.2	25.7	25.8
Malaysia	22.6	6.0	21.6
Mexico	38.4	39.3	37.2
New Zealand	33.3	16.6	26.8
Philippines	18.1	28.6	42.3
Singapore	0.0	11.1	22.0
Chinese Taipei	19.6	25.1	41.3
Thailand	38.2	27.3	52.6
United States	36.6	21.2	42.3
Rest of Cairns Group ^a	36.3	31.1	39.0

^a Includes Argentina, Brazil, and Colombia.

Source: Hoekman (2000). Based on calculations using Disclosure, *Worldscope* (1998) data.

Table 17
Average Gross Operating Margins of Services Firms Listed on
National Stock Exchanges, 1994-96, by Economy/Region and by Sector
(Percentage)

Economy/Region	Recreation	Business Services	Construction	Consulting	Finance	Health	Hotels	Retail Trade	Wholesale	Transport/ Utilities
Australia	17.9	13.8	15.3	7.0	41.0	b	27.3	7.9	9.1	c
Canada	60.1	51.7	14.4	19.2	44.5	2.3	67.8	12.0	16.0	36.5
Chile	b	b	68.7	b	55.2	b	b	21.3	27.9	46.8
China	b	b	45.9	67.1	34.0	b	77.5	24.4	25.5	46.9
European Union	42.5	32.1	19.3	22.1	51.6	22.3	23.7	23.6	19.9	32.6
Hong Kong	b	6.5	12.9	11.5	25.4	b	31.3	10.1	6.9	31.0
Indonesia	b	81.1	22.9	25.3	53.6	b	68.2	26.4	24.8	45.3
Japan	28.1	31.6	14.2	28.6	40.5	40.1	27.2	32.9	15.6	20.6
Republic of Korea	b	41.2	15.3	b	b	b	b	26.7	14.9	31.2
Malaysia	13.3	c	18.3	14.7	28.3	24.3	38.7	11.2	10.8	30.7
Mexico	19.6	b	25.7	37.3	33.3	b	49.6	28.4	25.0	51.0
New Zealand	b	b	13.8	b	57.6	b	26.9	6.6	19.7	35.6
Philippines	19.9	b	40.2	b	53.9	b	55.8	43.9	40.3	42.3
Singapore	46.7	8.6	10.6	7.7	46.3	29.2	28.2	5.4	7.9	28.0
Chinese Taipei	79.9	36.3	21.6	11.1	64.8	b	74.5	21.5	23.2	38.9
Thailand	85.4	35.8	38.1	c	60.3	40.6	55.5	44.2	25.6	56.7
United States	46.8	56.2	20.2	c	56.3	37.0	48.5	34.6	27.0	43.4
Other Cairns ^a	b	b	28.9	26.2	69.8	29.3	64.6	24.2	22.9	52.4

^a Includes Argentina, Brazil, and Colombia.

^b Data not available.

^c Reflects negative gross operating margin.

Source: Hoekman (2000). Based on calculations using Disclosure, *Worldscope* (1998) data.

Table 18
Welfare Effects of Elimination of Services
(Percent and Billions of Dollars)

Economy	Scenario A Perfect Int'l Capital Mobility and Fixed World Capital Stock		Scenario B Risk-Premium Elasticity=0.1 and Fixed World Capital Stock		Scenario C Risk-Premium Elasticity=0.1 and World Capital Stock Increased by 3%	
	% GNP	\$Bill.	% GNP	\$Bill.	% GNP	\$Bill.
Industrialized Countries						
Australia	1.8	6.0	1.5	5.0	4.9	16.8
Canada	14.8	84.0	12.9	73.7	14.9	85.0
European Union	0.5	42.4	0.5	38.0	2.5	202.4
Japan	-2.0	-103.7	-1.7	-88.4	0.5	25.7
New Zealand	9.1	5.2	7.5	4.3	10.5	6.0
United States	0.5	35.0	0.3	23.2	3.1	222.5
Developing Countries						
Asia						
China	3.8	26.9	3.2	22.9	6.0	42.8
Hong Kong	6.6	6.6	5.4	5.5	13.4	13.5
Indonesia	15.6	30.8	13.1	25.8	16.9	33.3
Korea	-2.8	-12.3	-2.3	-10.1	1.4	6.4
Malaysia	2.3	2.1	1.9	1.8	4.7	4.4
Philippines	2.3	1.6	1.9	1.3	8.3	5.7
Singapore	1.7	1.0	1.3	0.7	4.3	2.5
Chinese Taipei	7.6	20.7	6.8	18.5	7.7	21.2
Thailand	-2.2	-3.6	-1.8	-2.9	4.4	7.1
Other						
Chile	-2.0	-1.3	-1.6	-1.0	2.7	1.7
Mexico	-4.3	-11.7	-3.2	-8.8	0.2	0.5
Rest of Cairns	-3.7	-39.6	-3.2	-34.1	0.6	6.2
Total		90.3		75.6		703.7

Source: Brown and Stern (2001, pp. 277-78).

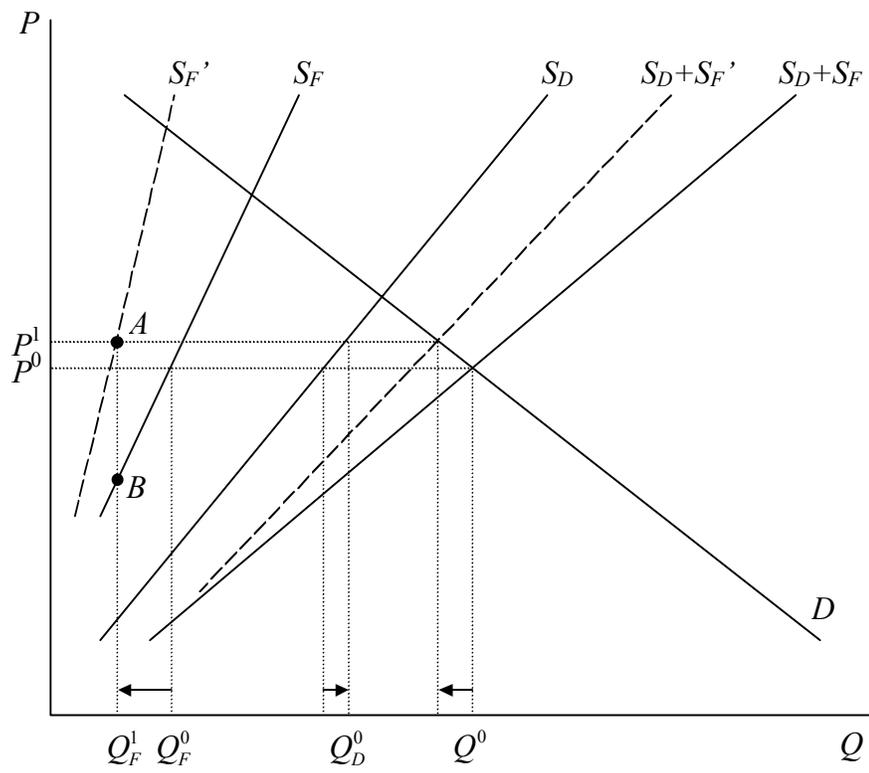
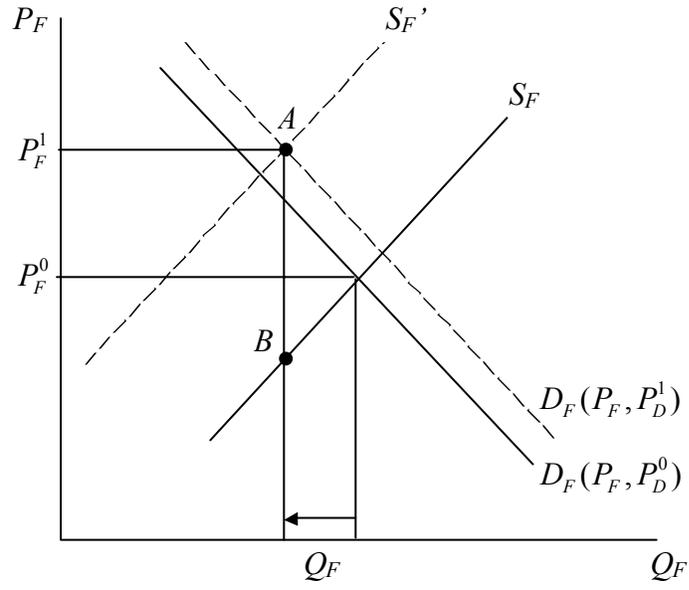


Figure 1

Foreign Services



Domestic Services

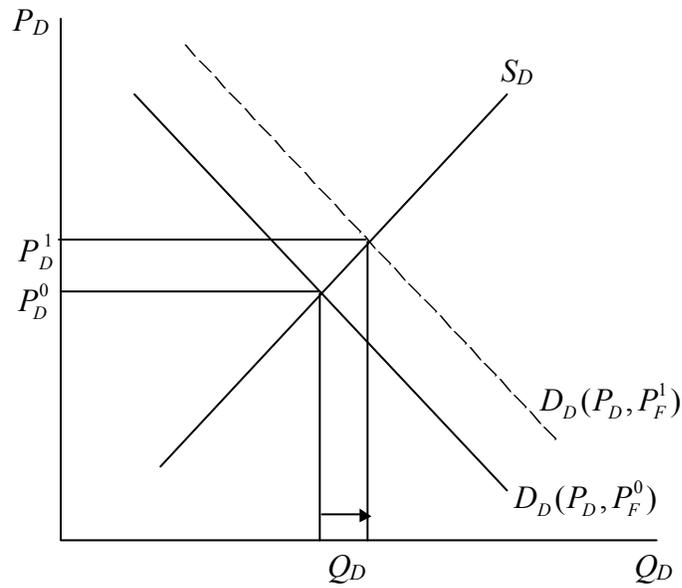


Figure 2

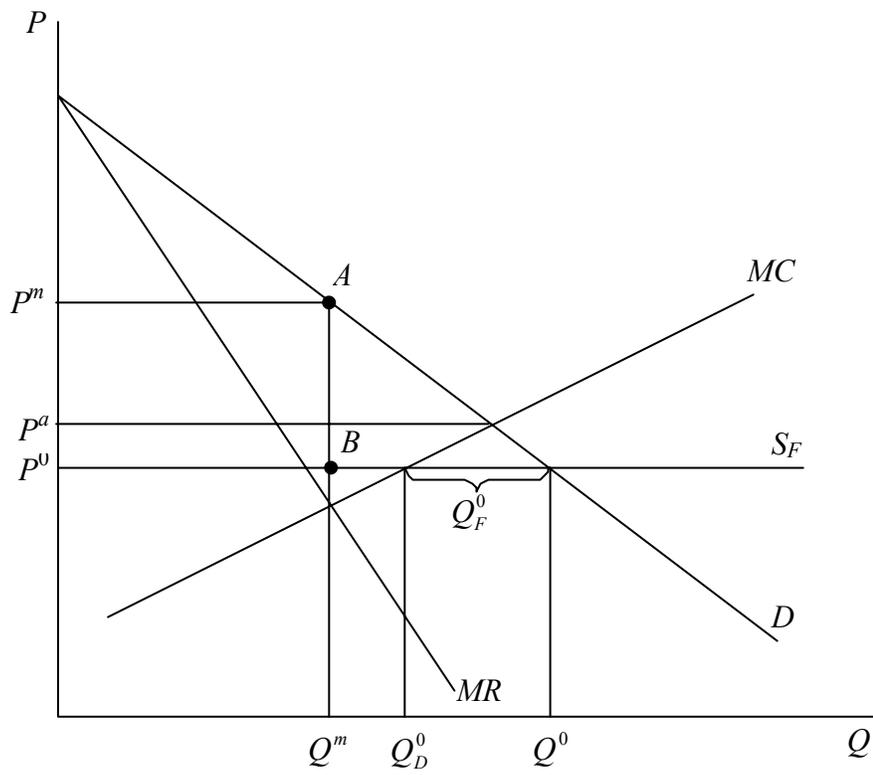
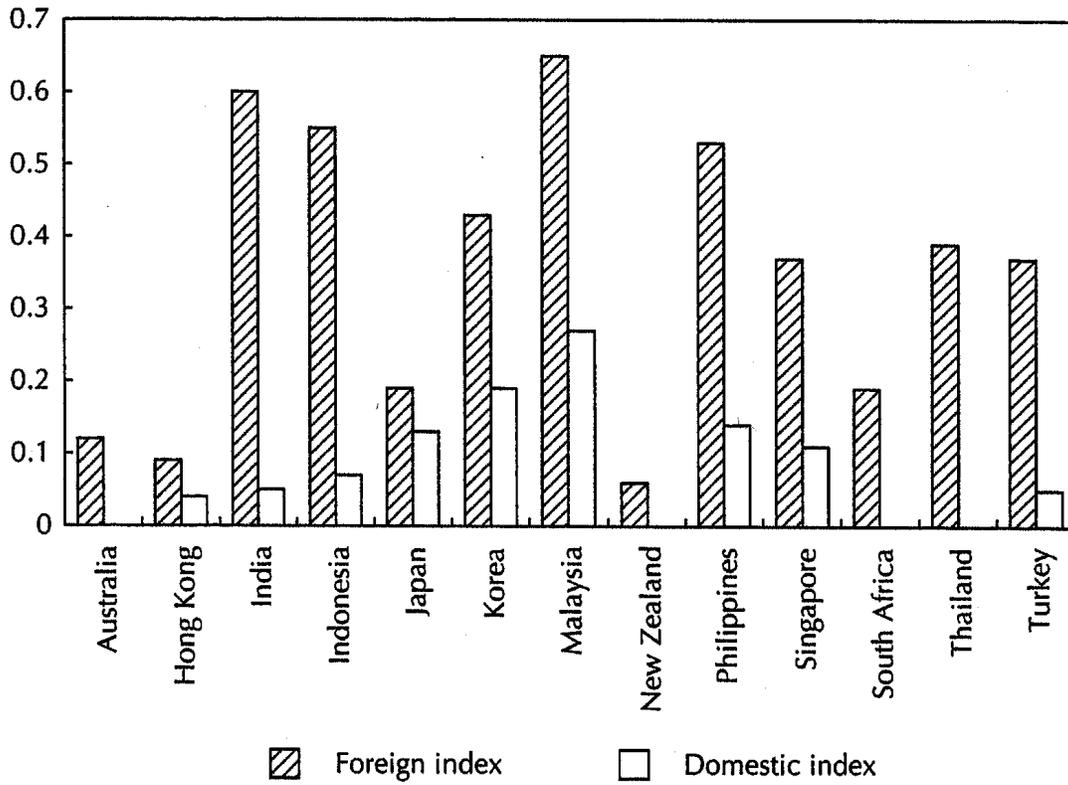


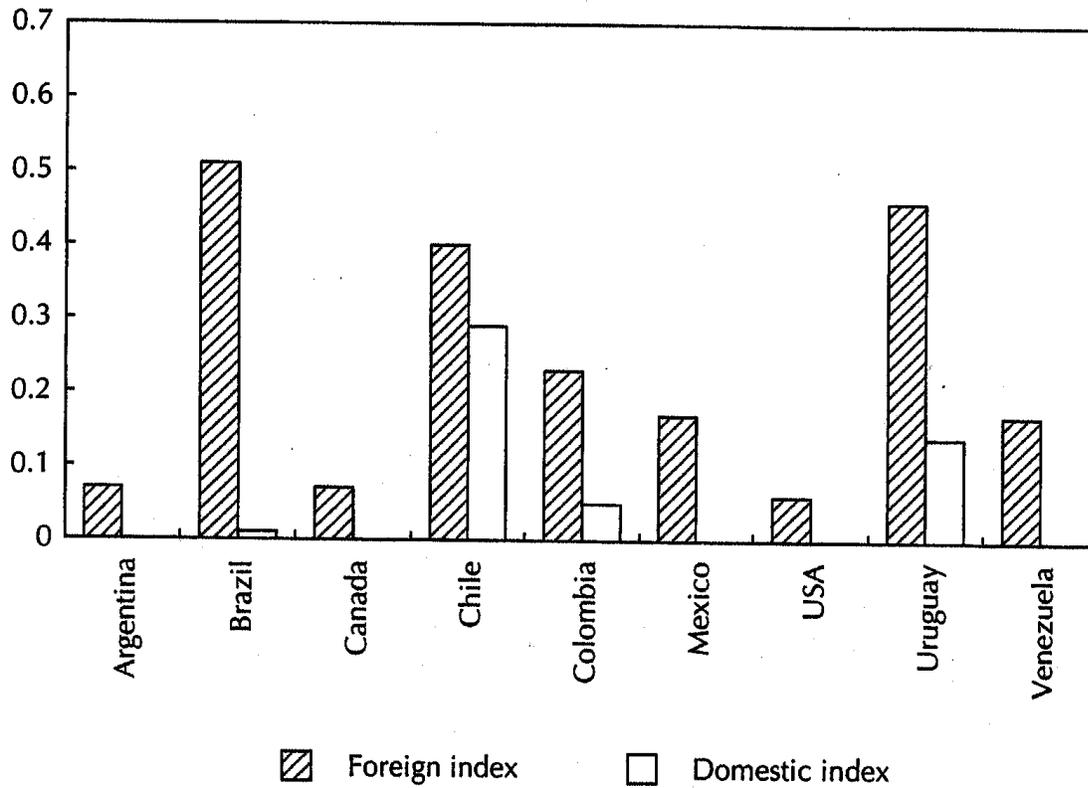
Figure 3

Figure 4
Restrictiveness Indexes for Selected Asia-Pacific Economies,
South Africa, and Turkey



Note: The higher the score the more restrictive an economy; scores range from 0 to 1.
Source: McGuire and Schuele (2000, p. 211)

Figure 5
Restrictiveness Indexes for Selected Western Hemisphere Economies



Note: The higher the score the more restrictive an economy; scores range from 0 to 1.
Source: McGuire and Schuele (2000, p. 211)

Appendix 1

Study Questions

I. Introduction

1. What is the difference between a tariff and nontariff barrier (NTB)?
2. What is a tariff equivalent, and how is it measured?
3. What are the four modes of supply of traded services? To what extent can barriers to traded services be measured as tariff equivalents?
4. What are “frequency measures” of barriers to trade in services? Price and/or quantity measurements?

II. Conceptual Framework

1. How can the demand and supply of services be depicted under conditions of competition and perfect substitution? What is the effect of an impediment to the foreign supply of services and the determination of the tariff equivalent of the impediment?
2. What are the effects when the services provided are imperfect substitutes? What are the effects when there are impediments to entry of firms?

III. Characteristics of Services Barriers

1. Why are services barriers more akin to NTBs than tariffs?
2. What are the two dimensions of the government regulation of services, and how may the supply curve for services be affected?
3. In the case of banking services, what are the principal foreign and domestic services restrictions that may be present, and how may the different degrees of restriction be scored and weighted? How can the discrimination against foreign banks be measured? What is an “index of restrictiveness,” and how is it calculated?
4. What are the main types and most prevalent characteristics of barriers to FDI in services?

IV. Methods of Measurement of Services Barriers

Frequency Studies and Indexes of Restrictiveness

1. What are direct and indirect measurements of barriers to trade in goods and services? How may price comparisons be used?
2. What are the steps involved in carrying out frequency studies and constructing indexes of restrictiveness for specific services sectors or across multiple sectors? How are indexes of restrictiveness scored, weighted, and used in assessing economic performance?

3. How may commitments in the GATS be used in constructing frequency measurements and indexes of restrictiveness? What is the “positive list” approach? What are the drawbacks of using data on GATS commitments? How are the data on actual FDI restrictions in the APEC countries weighted? Which services sectors appear to be the most subject to FDI restrictions? Which APEC countries?
4. What is the distinction between foreign and domestic restrictiveness indexes? Which countries appear to have the greatest degree of discrimination against foreign banks?
5. How useful are restrictiveness indexes, and how can they be used in assessing the impacts of services barriers?

Price-Impact and Quantity-Impact Measurements

1. How did Hoekman calculate “guesstimates” of the tariff equivalents of services barriers? What are the limitations of Hoekman’s methodology?
2. How can restrictiveness indexes be used in econometric estimation of the price effects of the restrictions? What additional information is needed to construct these estimates?
3. How can the quantitative impact of barriers on services trade be calculated and the associated tariff equivalents?

Gravity-Model Estimates

1. What is a gravity model, and how can it be used to determine the levels of services trade barriers across countries? What are the advantages and limitations of gravity-model estimates of services barriers?

Financial-Based Measurements

1. What are financial-based measurements, and how can they be used to determine the levels of services trade barriers across countries? What are the advantages and limitations of these measurements?

V. Measuring the Economic Consequences of Liberalizing Services Barriers

1. What are the three approaches to the CGE modeling of services liberalization?
2. What are the characteristics and assumptions of the Brown and Stern CGE model of services liberalization? How do they measure services barriers?
3. What are the computational scenarios that Brown and Stern investigate, and what are the results? What are the effects of international capital mobility and an increase in the world’s capital stock?

Appendix 2

Exercises

Note: These exercises use the hypothetical data presented in the accompanying tables below, which deal with four products in two industries in three countries. Table A1 describes the restrictions that apply to firms operating in these industries, while tables A2-A5 present data on their domestic and foreign sales, the price prevailing in their domestic markets, the wage rates paid to labor in each industry and economy, and national income in each economy.

1. Which of the restrictions in Table A1 appear to be imposed on the establishment of firms, and which deal with their operations? Which of the restrictions apply only to foreign firms, and which to all firms?
2. Construct an index of restrictiveness for each product and each economy. (You will need to use your own judgment to assign scores to each of the restrictions listed. To maximize the chance that you will assign the same values that appear in the answers, below, limit your scores to 0.0, 0.5, and 1.0. For those industries with two types of restriction, give them equal weight in your index.)
3. Use total sales (domestic plus foreign, from Tables A2 and A3 below) to weight your indexes from question 2 in order to construct restrictiveness indexes for each industry-economy pair, and also for each economy for the industries combined.
4. Assuming that the main determinant of prices is the wage rate of labor, use the data in the accompanying tables to estimate (with ordinary least squares, available in spreadsheet programs such as Excel) the following equation:

$$\ln p_{ijc} = a_{ij}^0 + a_i^1 \ln w_{ic} + a_i^2 r_{ijc} + \varepsilon_{ijc}$$

where p_{ijc} is price of product j in industry i , economy c , w_{ic} is the wage of labor in industry i of economy c , r_{ijc} is the restrictiveness index of product j in industry i , economy c , and ε_{ijc} is a random disturbance. Note that while the wage is assumed to be the same across products within an industry and to have the same effect (in logs) on product prices in the same industry, the intercept of the equation, a_{ij}^0 , varies across products.

5. Use your estimates from question 4 of the price effects of trade barriers to calculate the tariff equivalents that correspond to the restrictiveness indexes in question 2 for each product and economy.
6. Assuming that the main determinant of sales in an economy is income, use the data in the accompanying tables to estimate (with ordinary least squares) the following equation:

$$\ln s_{ijc} = b_{ij}^0 + b_i^1 \ln y_c + b_i^2 r_{ijc} + \mu_{ijc}$$

where s_{ijc} is sales of product j (domestic and foreign together) in industry i , economy c , y_c is national income in economy c , and μ_{ijc} is a random disturbance. Note again that the intercepts, b_{ij}^0 , are permitted to vary across products.

7. Normally, one might use estimates of quantity effects such as were found in question 6, together with indexes of restrictiveness, as the basis for deriving tariff equivalents. This would require independent estimates of demand elasticities. In this case however, since we have estimates of tariff equivalents already from the price effects measured in question 4, we may ask instead what elasticity would convert the quantity effects into tariff equivalents that agree with these estimates. That is, find for each industry what the demand elasticities would have to be in order for the tariff equivalents of the quantity effects in question 6 to agree with those derived in question 5 from the price effects.

Table A1
Hypothetical Restrictions on Firms in 2 Industries and 3 Countries

Industry	Product	Type of Restriction	Economy A	Economy B	Economy C
Industry 1	Product 1	Foreign ownership	No restriction on foreign ownership	Foreign ownership limited to 49%	No foreign ownership permitted
	Product 2	Licensing	License requires \$10,000 fee and 30-day waiting period	No license required	License automatic for domestic firms; subject to safety inspection for foreign firms.
		Foreign ownership	No restriction on foreign ownership	No restriction on foreign ownership	Foreign ownership limited to 75%
Industry 2	Product 3	Local content	25% local content required for FDI	50% local content required for FDI	No local content requirement for FDI
		Government procurement	Foreign firms prohibited from selling to government	Domestic suppliers preferred over foreign suppliers unless 10% cheaper	Foreign and domestic firms compete in best-price auction for sales to government
	Product 4	Locations	Foreign firms prohibited from opening more than one location	Foreign firms prohibited from opening more than ten locations	Foreign firms prohibited from locating within 500 meters of competing domestic firm

Table A2
Domestic Sales by Product and Economy

Industry	Product	Economy A	Economy B	Economy C
Industry 1	Product 1	9900	13700	7400
	Product 2	11800	14300	7400
Industry 2	Product 3	14000	17600	8500
	Product 4	15300	19200	9900

Table A3

Foreign Sales by Product and Economy

Industry	Product	Economy A	Economy B	Economy C
Industry 1	Product 1	5700	3700	0
	Product 2	2100	5300	1500
Industry 2	Product 3	700	900	1700
	Product 4	0	1900	400

Table A4

Price by Product and Economy

Industry	Product	Economy A	Economy B	Economy C
Industry 1	Product 1	8.83	9.89	12.29
	Product 2	50.64	42.51	51.44
Industry 2	Product 3	0.92	0.99	0.88
	Product 4	19.67	19.12	19.30

Table A5

National Income and Hourly Industry Wage by Economy

	Economy A	Economy B	Economy C
Income (\$b)	14.00	18.00	9.00
Wage in Industry 1 (\$/hr)	7.24	6.98	7.36
Wage in Industry 2 (\$/hr)	10.62	11.41	10.98

Exercises – Answers

1. The restrictions on Foreign Ownership, Licensing, and Locations seem primarily to limit the establishment of firms, while those on local content and government procurement deal with operations. Only the restriction on licensing applies also to domestic firms, and even it deals differently with foreign firms than with domestic ones.
2. We have assigned the following scores to the restrictions listed in Table A1:

Restriction Scores					
Industry	Product	Type of Restriction	Economy A	Economy B	Economy C
Industry 1	Product 1	Foreign ownership	0.0	0.5	1.0
	Product 2	Licensing	1.0	0.0	0.5
		Foreign ownership	0.0	0.0	0.5
Industry 2	Product 3	Local content	0.5	1.0	0.0
		Government procurement	1.0	0.5	0.0
	Product 4	Locations	1.0	0.0	0.5

Most of these are straightforward, given the stated constraint of using only scores 0.0, 0.5, and 1.0. Assignments reflect the judgments that, for the licensing requirement on product 2, a fee and waiting period is more onerous than a safety inspection; and that, for the location restrictions on product 4, restriction to a single location is more limiting than prohibiting proximity to domestic firms, while restriction to ten locations is not likely to be binding. More knowledge of these products and industries might reverse these judgments.

To construct restrictiveness indexes for each industry, the scores for different types of restriction within a product are simply averaged, yielding the following:

Restrictiveness Scores				
Industry	Product	Economy A	Economy B	Economy C
Industry 1	Product 1	0.00	0.50	1.00
	Product 2	0.50	0.00	0.50
Industry 2	Product 3	0.75	0.75	0.00
	Product 4	1.00	0.00	0.50

3. Then, to get indexes for the two industries and for the countries as a whole, these are averaged using total sales (domestic sales plus foreign sales) as weights:

Indexes of Restrictiveness			
Industry	Economy	Economy	Economy
	A	B	C
Industry 1	0.41	0.05	0.52
Industry 2	0.82	0.37	0.10
Economy	0.61	0.14	0.38

Although the use of total sales as weights is somewhat arbitrary, note that the use of foreign sales alone would be undesirable, since it would assign zero weight to restrictions that prevent foreign sales entirely, such as in Economy C in Industry 1.

4. Transforming the price and wage data from tables A4-5 to logarithms and inserting the restrictiveness indexes from question 2 above as well as dummy variables for products, the data for the regression are:

Industry 1	Product 1			Product 2		
	Economy A	Economy B	Economy C	Economy A	Economy B	Economy C
	ln Price	2.18	2.29	2.51	3.92	3.75
ln Wage	1.98	1.94	2.00	1.98	1.94	2.00
Product 1	1	1	1	0	0	0
Product 2	0	0	0	1	1	1
Restrictiveness Index	0.00	0.50	1.00	0.50	0.00	0.50

Industry 2	Product 3			Product 4		
	Economy A	Economy B	Economy C	Economy A	Economy B	Economy C
	ln Price	-0.08	-0.01	-0.13	2.98	2.95
ln Wage	2.36	2.43	2.40	2.36	2.43	2.40
Product 3	1	1	1	0	0	0
Product 4	0	0	0	1	1	1
Restrictiveness Index	0.75	0.75	0.00	1.00	0.00	0.50

For each industry separately, regressing the first row on the four rows below it yields the estimated coefficients shown below. (Because of the small number of observations here compared to the independent variables, the fit on these equations is perfect.)

Industry	a^1	a^2
1	0.93	0.31
2	1.04	0.10

As indicated in the price equation that was estimated, a^1 is the elasticity of price with respect to the wage, while a^2 is the effect of a unit change in the restrictiveness index, and thus the effect of going from completely free trade ($r=0$) to completely restricted trade ($r=1$), on the logarithm of price.

5. The coefficient a^2 is therefore (as an approximation) the percentage change in price associated with a unit change in the restrictiveness index. Thus the tariff equivalents of the actual values of the index are calculated by multiplying this estimated a^2 coefficient, for the corresponding industry, by the restrictiveness indexes for each product and economy:

Tariff Equivalents				
Industry	Product	Economy A	Economy B	Economy C
Industry 1	Product 1	0.0%	15.3%	30.7%
	Product 2	15.3%	0.0%	15.3%
Industry 2	Product 3	7.8%	7.8%	0.0%
	Product 4	10.4%	0.0%	5.2%

6. As in the answer to question 4, the data for this quantity regression are as follows:

Industry 1	Product 1			Product 2		
	Economy A	Economy B	Economy C	Economy A	Economy B	Economy C
In Sales	9.66	9.76	8.91	9.54	9.88	9.09
In Income	2.64	2.89	2.20	2.64	2.89	2.20
Product 1	1	1	1	0	0	0
Product 2	0	0	0	1	1	1
Restrictiveness Index	0.00	0.50	1.00	0.50	0.00	0.50

Industry 2	Product 3			Product 4		
	Economy A	Economy B	Economy C	Economy A	Economy B	Economy C
In Sales	9.60	9.83	9.23	9.64	9.96	9.24
In Income	2.64	2.89	2.20	2.64	2.89	2.20
Product 3	1	1	1	0	0	0
Product 4	0	0	0	1	1	1
Restrictiveness Index	0.75	0.75	0.00	1.00	0.00	0.50

The regressions produce the following estimates:

Industry	b^1	b^2
1	0.99	-0.28
2	0.96	-0.08

Here, b^1 is the income elasticity of total sales, while b^2 is the quantity effect of a unit change in the trade restrictiveness index.

7. As in the answer to question 5, we could calculate the (approximate) percentage change in quantity due to a given trade restrictiveness index, r , by multiplying it by b^2 . If we knew the elasticity of demand for the industry, η , we could convert this quantity impact into a price impact and thus a tariff equivalent by dividing by η , as discussed in the text. Thus the tariff equivalent would be rb^2/η . Now the tariff equivalents in question 5 were calculated as ra^2 . The elasticity that makes these estimates the same is therefore found by equating these two expressions, $rb^2/\eta=ra^2$, or $\eta=b^2/a^2$. Thus:

$$\begin{aligned} \text{Industry 1: } & \eta_1 = -0.28/0.31 = 0.9 \\ \text{Industry 2: } & \eta_2 = -0.08/0.10 = 0.8 \end{aligned}$$