Empirical Analysis of Barriers to International Services Transactions and the Consequences of Liberalization

Alan V. Deardorff
Robert M. Stern
University of Michigan
Purpose

To understand the barriers that may interfere with trade in services, and to see how they may be measured, especially in the form of “tariff equivalents.”
Outline

• Types of services
• Effects and types of barriers
• Methods of measurement of barriers
  – Frequency indexes
  – Price-based measures
  – Quantity-based measures
  – Other methods (gravity, financial)
• Measuring consequences of liberalization
• Conclusion: Guidelines and Principles
Types of Services

Modes of Service Delivery:

• Mode 1: Separated, or cross-border
• Mode 2: Consumers move (tourism, etc.)
• Mode 3: Producers move (FDI)
• Mode 4: Movement of natural persons
Table 1
International Services Transactions by Modes of Supply, 1997

<table>
<thead>
<tr>
<th>Mode of Supply</th>
<th>Category</th>
<th>Value ($bn)</th>
<th>Cumulative share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode 1</td>
<td>Commercial services (exc. travel)</td>
<td>890</td>
<td>41.0</td>
</tr>
<tr>
<td>Mode 2</td>
<td>Travel/Tourism</td>
<td>430</td>
<td>19.8</td>
</tr>
<tr>
<td>Mode 3</td>
<td>Gross output of foreign affiliates</td>
<td>820</td>
<td>37.8</td>
</tr>
<tr>
<td>Mode 4</td>
<td>Compensation of employees</td>
<td>30</td>
<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,170</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Karsenty (2000).
Mode 1
Cross-border Services

Example: French company providing telephone service in Mexico

• Barriers:
  – Restrictions on access to phone lines
  – Discriminatory taxes on operations
  – Regulations on consumer access

• Tariff equivalent: tax on sales that, replacing all other impediments, would have the same effects.
Mode 2
Consumer-movement Services

Examples:
- Tourism (visit to Taj Mahal),
- Education (MBA from Wharton School)

• No “world price” is possible
• Barriers:
  - Restrictions on travel to country where service is offered
  - Regulations on domestic usefulness of foreign-earned degrees
Mode 3
Producer-movement Services

Examples: Almost anything provided through commercial presence and/or FDI

• Price comparisons possible but not meaningful, due to differences in costs

• Barriers:
  – Restrictions on establishment
  – Regulations on operations
Mode 4
Movement of Natural Persons

Examples: Temporary cross-border movement of managers, construction workers, etc.; guest workers.

• Most occurs within industries providing other goods or services

• Barriers:
  – Availability and costs of visas

• Tariff equivalent may be inferred from wage differentials
Effects of Barriers

Conceptual Framework

• Three models (partial equilibrium):
  – Homogeneous service, perfect competition
  – Differentiated service
  – Imperfect competition

• Role of barriers in each:
  – Raises cost, and/or
  – Restricts quantity
    …of foreign service providers
Effects of Barriers

Model 1:

• Homogeneous service
  – Identical services provided by domestic and foreign firms
  – Single price in domestic market

• Perfect competition
  – Large numbers of both domestic and foreign providers
Figure 1: Homogeneous Service, Perfect Competition

\[ D = \text{Domestic demand for the service} \]
Figure 1: Homogeneous Service, Perfect Competition

$S_D = \text{Domestic supply}$
Figure 1: Homogeneous Service, Perfect Competition

\[ S_F = \text{Foreign supply} \]
Figure 1: Homogeneous Service, Perfect Competition

$S_D + S_F = \text{Total supply to domestic demanders}$
Figure 1: Homogeneous Service, Perfect Competition

Equilibrium price and quantities
Figure 1: Homogeneous Service, Perfect Competition

Effect of service barrier reducing foreign supply
Figure 1: Homogeneous Service, Perfect Competition

Effect of service barrier on total supply
Figure 1: Homogeneous Service, Perfect Competition

Effect of service barrier on price
Figure 1: Homogeneous Service, Perfect Competition

Effects of service barrier on quantities
Figure 1: Homogeneous Service, Perfect Competition

\[ t_{eq} = \text{tariff equivalent of service barrier} \]
Effects of Barriers: Model 1

Implications of Model 1:

• Effects of barrier
  – Raises price
  – Increases domestic sales

• Tariff equivalent
  – Larger than price increase
  – Not easy to observe
Effects of Barriers: Model 1

Special Case of Model 1:

- If foreign supply is infinitely elastic (i.e., constant cost)...

- Then tariff equivalent equals
  - Rise in price on domestic market
  - Difference between domestic price and foreign price
Figure 1a: Homogeneous Service, Perfect Competition, Foreign Cost Constant

\[ t_{eq} = \text{tariff equivalent of service barrier} \]
Effects of Barriers

Model 2:

• Differentiated service
  – Services provided by domestic and foreign firms are different
  – Demand for each depends on prices of both

• Perfect competition
  – Large numbers of both domestic and foreign providers
Figure 2: Differentiated Service, Perfect Competition

Demand depends on $P_F$

Supply and demand for domestic service
Figure 2: Differentiated Service, Perfect Competition

Supply and demand for foreign service
Figure 2: Differentiated Service, Perfect Competition

Barrier shifts $S_F$, raising $P_F$
Figure 2: Differentiated Service, Perfect Competition

Rise in $P_F$ shifts $D_D$, raising $P_D$
Figure 2: Differentiated Service, Perfect Competition

Rise in $P_D$ shifts $D_F$, further raising $P_F$
Figure 2: Differentiated Service, Perfect Competition

Final effects of service barrier on prices
Figure 2: Differentiated Service, Perfect Competition

Effects of service barrier on quantities
Figure 2: Differentiated Service, Perfect Competition

$D_D(P_D, P^1_F)$

$D_D(P_D, P^0_F)$

$D_F(P_F, P^1_D)$

$D_F(P_F, P^0_D)$

$t_{eq} = \text{tariff equivalent of service barrier}$
Effects of Barriers: Model 2

Implications of Model 2 (like Model 1):

• Effects of barrier
  – Raises prices of both domestic and foreign services
  – Increases domestic sales

• Tariff equivalent
  – Larger than price increase of foreign service
  – Not easy to observe
    • unless foreign cost is constant
Effects of Barriers

Model 3:
- Homogeneous service, like Model 1
- Imperfect competition
  - Single domestic firm
    - with increasing marginal cost
  - Large number of potential foreign providers
    - with common, constant marginal cost
      \[ P^U \] (their unrestricted price)
- Barrier may
  - Add cost \( c \) to this price, and/or
  - Limit entry (even if nondiscriminatory)
Figure 3: Homogeneous Service, Single Domestic Firm

Monopoly equilibrium without trade
Figure 3: Homogeneous Service, Single Domestic Firm

Equilibrium with free access of competitive foreign service
Figure 3: Homogeneous Service, Single Domestic Firm

A small barrier on foreign service sales raises their cost,…
Figure 3: Homogeneous Service, Single Domestic Firm

\[ \text{...increases sales of domestic firms,...} \]
Figure 3: Homogeneous Service, Single Domestic Firm

...and reduces sales of foreign firms.
Figure 3: Homogeneous Service, Single Domestic Firm

\[ t_{eq} = \text{tariff equivalent of small cost added to foreign service} \]

\[ c_1 < P^a - P^U \]
Figure 3: Homogeneous Service, Single Domestic Firm

A larger barrier, with higher cost $c_2$, excludes imports but still limits price.
Figure 3: Homogeneous Service, Single Domestic Firm

$t_{eq} = \text{tariff equivalent of cost added to foreign service}$

$c_2: P^m - P_U > c_2 > P^a - P_U$
Figure 3: Homogeneous Service, Single Domestic Firm

$t_{eq} = \text{tariff equivalent of cost added to foreign service}$

$c_3: P_m - P_U > c_3 > P_a - P_U$
With even more restrictive barrier, \( c_4 > P_m - P^U \), domestic firm simply charges the monopoly price, \( P_m \).
Figure 3: Homogeneous Service, Single Domestic Firm

\[ t_{eq} = \text{tariff equivalent of cost } c_4 > P^m - P^U, \]

or of (nondiscriminatory) prohibitive entry barrier
Effects of Barriers: Model 3

Implications of Model 3 (like Model 1):

• Effects of barrier
  – Raises prices of domestic service even after imports stop
  – First increases, then decreases domestic firm sales

• Tariff equivalent
  – Equals price increase of foreign service (assuming constant cost)
  – Observable (with constant costs) if foreign firms provide identical service abroad. (Questionable)
Types of Services Barriers

General Characteristics of Services Barriers

• Most are regulations, rather than border measures

• May be imposed
  – on establishment (shifting foreign supply left), or
  – on ongoing operations (shifting foreign supply up)

• May be
  – non-discriminatory, or
  – discriminatory
Types of Services Barriers

Specific Characteristics of Services Barriers

• Need to look at particular industries, with detailed knowledge of industry structure and operations.

• Examples…
## Example: Banking Services (McGuire & Schuele 2000)

<table>
<thead>
<tr>
<th>Restriction category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restrictions on commercial presence:</strong></td>
<td></td>
</tr>
<tr>
<td>Licensing of banks</td>
<td>0.200</td>
</tr>
<tr>
<td>Based inversely on the maximum number of new banking licenses issued with only prudential requirements</td>
<td></td>
</tr>
<tr>
<td>Direct investment</td>
<td>0.200</td>
</tr>
<tr>
<td>Based inversely on the maximum equity participation permitted in an existing domestic bank</td>
<td></td>
</tr>
</tbody>
</table>
## Banking Services (cont.)

<table>
<thead>
<tr>
<th>Restriction category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restrictions on commercial presence (cont.):</strong></td>
<td></td>
</tr>
<tr>
<td>Joint venture arrangements</td>
<td>0.100</td>
</tr>
<tr>
<td>New bank entry only through joint venture with a domestic bank</td>
<td></td>
</tr>
<tr>
<td>Permanent movement of people</td>
<td>0.020</td>
</tr>
<tr>
<td>Based inversely on years that executives, specialists and/or senior managers can stay</td>
<td></td>
</tr>
</tbody>
</table>
### Banking Services (cont.)

<table>
<thead>
<tr>
<th>Restriction category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other restrictions</strong></td>
<td></td>
</tr>
<tr>
<td>Raising funds by banks</td>
<td>0.100</td>
</tr>
<tr>
<td>Banks restricted from accepting deposits from public and/or raising funds from domestic capital markets</td>
<td></td>
</tr>
<tr>
<td>Lending funds by banks</td>
<td>0.100</td>
</tr>
<tr>
<td>Banks restricted in types or sizes of loans</td>
<td></td>
</tr>
<tr>
<td>Other business of banks – insurance and securities services</td>
<td>0.200</td>
</tr>
<tr>
<td>Banks excluded from insurance, securities services</td>
<td></td>
</tr>
<tr>
<td>Expanding the number of banking outlets</td>
<td>0.050</td>
</tr>
<tr>
<td>Inversely on the number of outlets permitted.</td>
<td></td>
</tr>
</tbody>
</table>
### Banking Services (cont.)

<table>
<thead>
<tr>
<th>Restriction category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other restrictions (cont.):</strong></td>
<td></td>
</tr>
<tr>
<td>Composition of the board of directors</td>
<td>0.020</td>
</tr>
<tr>
<td>Inversely on foreigners percentage of board permitted</td>
<td></td>
</tr>
<tr>
<td>Temporary movement of people</td>
<td>0.010</td>
</tr>
<tr>
<td>Inversely on the number of days temporary entry permitted</td>
<td></td>
</tr>
<tr>
<td><strong>Total weighting or highest possible score</strong></td>
<td>1.000</td>
</tr>
</tbody>
</table>
Example: Barriers to FDI (UNCTAD 1996)

*Restrictions on market entry*

- Bans on foreign investment in certain sectors
- Quantitative restrictions (e.g., limit of 25 per cent foreign ownership in a sector)
- Screening and approval (sometimes involving national interest or net economic benefits tests)
- Restrictions on the legal form of the foreign entity
- Minimum capital requirements
- Conditions on subsequent investment
- Conditions on location
- Admission taxes
Barriers to FDI (cont.)

Ownership and control restrictions

- Compulsory joint ventures with domestic investors
- Limits on the number of foreign board members
- Government appointed board members
- Government approval required for certain decisions
- Restrictions on foreign shareholders’ rights
- Mandatory transfer of some ownership to locals within a specified time (e.g., 15 years)
Barriers to FDI (cont.)

Operational restrictions

- Performance requirements (e.g., export requirements)
- Local content restrictions
- Restrictions on imports of labor, capital and raw materials
- Operational permits or licenses
- Ceilings on royalties
- Restrictions on repatriation of capital and profits
Methods of Measurement of Services Barriers

• Direct measurements
  – Pro: One knows what is being measured
  – Con: Only includes known barriers
  – Types
    • Frequency Studies
    • Indexes of Restrictiveness

• Indirect measurements
  – Pro: Quantitative importance known
  – Con: May include frictions that are not policy impediments
  – Types
    • via prices
    • via quantities
Methods of Measurement of Services Barriers

Examples of Methods Used in Goods Markets

• Direct measurements
  – UNCTAD TRAINS database

• Indirect measurements
  – Comparison of price inside a country to
    • Price outside its border, or
    • World price
  – Comparison of quantity produced or trade to benchmark model
Methods of Measurement of Services Barriers

Difficulties of Adapting Methods Used in Goods Markets to Measurement in Services

• Regulations are pervasive.
  – Need to distinguish regulations with valid purposes from those without
  – Need to know their restrictiveness, not just their presence
  – Requires industry expertise

• Arbitrage is more difficult for services than for goods.

• Services are more likely to be differentiated by location
  – Example: Telephone service in Texas and Mexico. Prices differ due to wages, infrastructure
Methods of Measurement of Services Barriers

Methods of assigning weights to barriers:

1. Judgmental
   - Identify restrictions (see examples above)
   - Use judgment to assess their restrictiveness
   - Form index

2. Factor analysis

3. Use individual barrier scores in empirical analysis
Frequency Studies

- PECC (1995)  
  - based on GATS commitments
  - based on GATS commitments
  - GATS + APEC FDI
  - banking services
Frequency Studies


- Frequency ratios measure the extent of liberalization promised in GATS commitments
  = fraction of possible commitments actually made
- Index of restrictiveness = (1 – frequency ratio)
- Assumed tariff equivalents absent liberalization
  - 200% = no access
  - 20-50% = market access less constrained
- Tariff equivalent “guesstimates” based on GATS
  = benchmark tariff equivalent × (1–frequency ratio)
## Tariff Equivalent “Guesstimates” (Hoekman 1995)

<table>
<thead>
<tr>
<th>Economy</th>
<th>ISIC 5 Construct</th>
<th>ISIC 6 Wholes &amp; Retail</th>
<th>ISIC 7 Transp, Stor &amp; Com</th>
<th>ISIC 8 Business &amp; Fin. Serv</th>
<th>ISIC 9 Social &amp; Pers Serv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>40.0</td>
<td>34.4</td>
<td>182.2</td>
<td>45.2</td>
<td>42.9</td>
</tr>
<tr>
<td>EU</td>
<td>10.0</td>
<td>10.0</td>
<td>182.0</td>
<td>27.2</td>
<td>23.6</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>32.0</td>
<td>31.5</td>
<td>149.8</td>
<td>39.0</td>
<td>42.9</td>
</tr>
<tr>
<td>Japan</td>
<td>5.0</td>
<td>4.6</td>
<td>142.0</td>
<td>28.9</td>
<td>32.3</td>
</tr>
<tr>
<td>Mexico</td>
<td>24.0</td>
<td>21.3</td>
<td>152.3</td>
<td>40.9</td>
<td>29.8</td>
</tr>
<tr>
<td>Singapore</td>
<td>12.0</td>
<td>34.4</td>
<td>138.8</td>
<td>35.9</td>
<td>33.7</td>
</tr>
<tr>
<td>Turkey</td>
<td>5.0</td>
<td>34.4</td>
<td>31.6</td>
<td>35.4</td>
<td>35.9</td>
</tr>
<tr>
<td>US</td>
<td>5.0</td>
<td>4.6</td>
<td>111.4</td>
<td>21.7</td>
<td>31.7</td>
</tr>
</tbody>
</table>
Frequency Studies

Hardin, Holmes (1997, 2000) - FDI

• Supplement GATS commitments with actual FDI restrictions from APEC

• Use judgmental system of weighting to reflect efficiency costs (e.g., higher weight on foreign equity limits)
## Components of an Index of FDI Restrictions (Holmes & Hardin 2000)

<table>
<thead>
<tr>
<th>Type of restriction</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign equity limits on all firms</td>
<td></td>
</tr>
<tr>
<td>No foreign equity permitted</td>
<td>1.000</td>
</tr>
<tr>
<td>Less than 50 per cent foreign equity permitted</td>
<td>0.500</td>
</tr>
<tr>
<td>More than 50 per cent and less than 100 per cent foreign equity permitted</td>
<td>0.250</td>
</tr>
</tbody>
</table>
## Components (cont.)

<table>
<thead>
<tr>
<th>Type of restriction</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign equity limits on existing firms, none on greenfield</td>
<td></td>
</tr>
<tr>
<td>No foreign equity permitted</td>
<td>0.500</td>
</tr>
<tr>
<td>Less than 50 per cent foreign equity permitted</td>
<td>0.250</td>
</tr>
<tr>
<td>More than 50 per cent and less than 100 per cent foreign equity permitted</td>
<td>0.125</td>
</tr>
</tbody>
</table>
## Components (cont.)

<table>
<thead>
<tr>
<th>Type of restriction</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening and approval</td>
<td></td>
</tr>
<tr>
<td>Investor required to demonstrate net economic benefits</td>
<td>0.100</td>
</tr>
<tr>
<td>Approval unless contrary to national interest</td>
<td>0.075</td>
</tr>
<tr>
<td>Notification (pre or post)</td>
<td>0.050</td>
</tr>
</tbody>
</table>
Components (cont.)

<table>
<thead>
<tr>
<th>Type of restriction</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control and management restrictions</td>
<td></td>
</tr>
<tr>
<td>All firms</td>
<td>0.200</td>
</tr>
<tr>
<td>Existing firms, none for greenfield</td>
<td>0.100</td>
</tr>
<tr>
<td>Input and operational restrictions</td>
<td></td>
</tr>
<tr>
<td>All firms</td>
<td>0.200</td>
</tr>
<tr>
<td>Existing firms, none for greenfield</td>
<td>0.100</td>
</tr>
</tbody>
</table>
## FDI Restrictiveness Indexes
### Selected Countries and Sectors

(Holmes & Hardin 2000)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>China</th>
<th>Hong Kong</th>
<th>Mexico</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>0.360</td>
<td>0.015</td>
<td>0.289</td>
<td>0.005</td>
</tr>
<tr>
<td>Communic.</td>
<td>0.819</td>
<td>0.350</td>
<td>0.739</td>
<td>0.345</td>
</tr>
<tr>
<td>Construction</td>
<td>0.400</td>
<td>0.000</td>
<td>0.450</td>
<td>0.000</td>
</tr>
<tr>
<td>Distribution</td>
<td>0.275</td>
<td>0.050</td>
<td>0.325</td>
<td>0.000</td>
</tr>
<tr>
<td>Education</td>
<td>0.525</td>
<td>0.000</td>
<td>0.450</td>
<td>0.000</td>
</tr>
<tr>
<td>Financial</td>
<td>0.450</td>
<td>0.233</td>
<td>0.554</td>
<td>0.200</td>
</tr>
<tr>
<td>Health</td>
<td>0.275</td>
<td>0.000</td>
<td>0.408</td>
<td>0.000</td>
</tr>
<tr>
<td>Transport</td>
<td>0.455</td>
<td>0.093</td>
<td>0.283</td>
<td>0.025</td>
</tr>
</tbody>
</table>
McGuire and Schuele (2000) – Banking Services

- Use GATS commitments together with reports and documentation on actual financial-sector restrictions
- Difference in foreign and domestic indexes indicates extent of discrimination
- Finding: countries with less restricted banking sectors tend to have higher GNP per capita
Selected Restrictiveness Indexes
(McGuire and Schuele 2000)

![Bar chart showing selected restrictiveness indexes for various countries.](chart.png)

- Australia
- Hong Kong
- India
- Indonesia
- Japan
- Korea
- Malaysia
- New Zealand
- Philippines
- Singapore
- South Africa
- Thailand
- Turkey

Legend:
- Foreign index
- Domestic index
More Restrictiveness Indexes (McGuire and Schuele 2000)

[Bar chart showing index values for different countries, with foreign index and domestic index indicated]
Other Frequency Studies

- Mattoo (1998) – financial services
- Marko (1998) – telecommunications
- McGuire (1998) – financial services
- Colecchia (2000) – accountancy services
- Kalirajan (2000) – distribution services
- Kemp (2000) – educational services
- Nguyen-Hong (2000)
  – accountancy, architectural, and engineering services
- Warren (2000a) – telecommunications
- Doove, Gabbitas, Nguyen-Hong, and Owen (2001)
  – air transport
Price-Impact Measurements

Methods:

• Informed Guess (Hoekman 1995.1996)
  – (see above)

• Regress prices on frequency indexes
  – Use price data together with frequency measures already discussed
Price-Impact Measurements

Example from Doove et al. (2001), air travel:

\[ \dot{p} = \alpha + \beta BRI + \gamma E + \epsilon \]

where

\( \dot{p} = \) price of air travel over particular route

\( BRI = \) index of restrictiveness for that route

\( E = \) vector of environmental variables
### Air Travel: Restriction Indexes and Price Impacts (Doove et al. 2001)

<table>
<thead>
<tr>
<th></th>
<th>Bilateral Restriction Index</th>
<th>Price Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Business</td>
</tr>
<tr>
<td>Chile</td>
<td>0.61</td>
<td>125.2</td>
</tr>
<tr>
<td>India</td>
<td>0.77</td>
<td>164.4</td>
</tr>
<tr>
<td>Japan</td>
<td>0.73</td>
<td>121.1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.71</td>
<td>199.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.82</td>
<td>224.7</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.56</td>
<td>98.8</td>
</tr>
<tr>
<td>UK</td>
<td>0.30</td>
<td>46.3</td>
</tr>
<tr>
<td>USA</td>
<td>0.40</td>
<td>52.9</td>
</tr>
</tbody>
</table>
Price-Impact Measurements

Pros and Cons of Regression Approach

• Requires more data than just on barriers
• Regression results from some countries can be applied to others
• Need not start with zero-one index; may use other variables to proxy for restrictions
Other Price-Impact Studies

- Johnson, Gregan, Gentle, and Belin (2000)
  - international air services
- Kalirajan (2000) – food distributors
  - banks
- Trewin (2000) – telecommunications services
- Doove, Gabbitas, Nguyen-Hong, and Owen (2001)
  - international air passenger transport
Quantity-Impact Measurements

Method:

• Regress quantities of service supplied or sold on
  – Other determinants
  – Frequency indexes

• Convert quantity effect to price effect for tariff equivalent
Quantity-Impact Measurements

- Example from Warren (2000b) for telephony:

\[ Q_i^m = \alpha + \beta_1 Y_i + \beta_2 Y_i^2 + \beta_3 PD_i + \beta_4 [P_i^m] + \epsilon_i \]

where

- \( Q_i^m \) = cellular subscribers per 100 inhabitants
- \( Y_i \) = GDP per capita
- \( PD_i \) = population density
- \( [P_i^m] \) = policy variable (index of market access, etc.)
Quantity-Impact Measurements

Conversion of quantity impact to price impact:

1. Use assumed or estimated elasticity of demand,

\[ \eta \equiv \frac{\%\Delta Q}{\%\Delta P} \]

2. Then

\[ \%\Delta P = \frac{\%\Delta Q}{\eta} \]
## Tariff Equivalents of Telecommunication Barriers

*(Warren 2000b)*

<table>
<thead>
<tr>
<th>Country</th>
<th>Domestic</th>
<th>Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>1.68 %</td>
<td>1.68 %</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1.26 %</td>
<td>1.26 %</td>
</tr>
<tr>
<td>Finland</td>
<td>0.00 %</td>
<td>0.00 %</td>
</tr>
<tr>
<td>Japan</td>
<td>0.26 %</td>
<td>0.26 %</td>
</tr>
<tr>
<td>Korea</td>
<td>4.30 %</td>
<td>8.43 %</td>
</tr>
<tr>
<td>Mexico</td>
<td>6.24 %</td>
<td>14.43 %</td>
</tr>
<tr>
<td>Singapore</td>
<td>2.10 %</td>
<td>2.72 %</td>
</tr>
<tr>
<td>Turkey</td>
<td>19.59 %</td>
<td>33.53 %</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.00 %</td>
<td>0.00 %</td>
</tr>
<tr>
<td>United States</td>
<td>0.20 %</td>
<td>0.20 %</td>
</tr>
</tbody>
</table>
Gravity-Model Estimates

• Regress (in logs) bilateral trade in a category of service on
  – GDP of exporter
  – GDP of importer
  – Distance between countries
  – Other variables

• Infer trade barriers from residuals relative to a free-trade benchmark
Gravity-Model Estimates

• Francois (1999)
• Fit gravity model for services trade for US and its major trading partners
  – Additional variables:
    • per capita incomes
    • Western hemisphere dummy
• Used Hong Kong-Singapore as free-trade benchmark
• Converted quantity estimates to tariff equivalents
## Service Tariff Equivalents

Gravity-Model Based

*(Francois 1999)*

<table>
<thead>
<tr>
<th>Countries/regions</th>
<th>Business/financial</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>8.2</td>
<td>9.8</td>
</tr>
<tr>
<td>Western Europe</td>
<td>8.5</td>
<td>18.3</td>
</tr>
<tr>
<td>Japan</td>
<td>19.7</td>
<td>29.7</td>
</tr>
<tr>
<td>China</td>
<td>18.8</td>
<td>40.9</td>
</tr>
<tr>
<td>Other Newly Indus. Countries</td>
<td>2.1</td>
<td>10.3</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6.8</td>
<td>9.6</td>
</tr>
<tr>
<td>India</td>
<td>13.1</td>
<td>61.6</td>
</tr>
<tr>
<td>Brazil</td>
<td>35.7</td>
<td>57.2</td>
</tr>
<tr>
<td>Other Latin America</td>
<td>4.7</td>
<td>26.0</td>
</tr>
<tr>
<td>Turkey</td>
<td>20.4</td>
<td>46.3</td>
</tr>
</tbody>
</table>
Gravity-Model Estimates

Caveats

• Useful at best for identifying *relative* levels of protection

• Gravity model lacks theoretical foundation at sectoral level

• Method
  – Relies heavily on accuracy of theoretical model
  – Has upward bias if theory is weak
  – May confound comparative advantage with apparent barrier
Financial-Based Measurements

Based on presumption that barriers to competition in services increase operating margins.

Method:
• Use data on Gross Operating Margins, defined as

\[ GOM \equiv \frac{\text{(Total sales revenue – Total average costs)}}{\text{Total average costs}} \]

• Infer trade barriers from excess of \( GOM \) over country with lowest \( GOM \).
Financial-Based Measurements

Hoekman (2000)

• Measured GOM for
  – firms listed on national stock exchanges, 1994-96
  – Agriculture, manufacturing, and services

• Found GOM in services to be generally
  – High
  – With large variation across countries
# Selected Average Gross Operating Margins (%) (Hoekman 2000)

<table>
<thead>
<tr>
<th>Country</th>
<th>Agriculture</th>
<th>Manufacturing</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>39.1</td>
<td>40.8</td>
<td>44.0</td>
</tr>
<tr>
<td>China</td>
<td>30.6</td>
<td>28.1</td>
<td>49.5</td>
</tr>
<tr>
<td>European Union</td>
<td>22.9</td>
<td>23.8</td>
<td>31.6</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>25.9</td>
<td>12.8</td>
<td>18.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>41.8</td>
<td>34.3</td>
<td>41.3</td>
</tr>
<tr>
<td>Japan</td>
<td>38.4</td>
<td>26.4</td>
<td>28.7</td>
</tr>
<tr>
<td>Mexico</td>
<td>38.4</td>
<td>39.3</td>
<td>37.2</td>
</tr>
<tr>
<td>United States</td>
<td>36.6</td>
<td>21.2</td>
<td>42.3</td>
</tr>
</tbody>
</table>
### GOM in Selected Services (%) (Hoekman 2000)

<table>
<thead>
<tr>
<th>Country</th>
<th>Bus Svc</th>
<th>Const</th>
<th>Fin</th>
<th>Health</th>
<th>Trnspt/Util</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>n.a.</td>
<td>68.7</td>
<td>55.2</td>
<td>n.a.</td>
<td>46.8</td>
</tr>
<tr>
<td>China</td>
<td>n.a.</td>
<td>45.9</td>
<td>34.0</td>
<td>n.a.</td>
<td>46.9</td>
</tr>
<tr>
<td>EU</td>
<td>32.1</td>
<td>19.3</td>
<td>51.6</td>
<td>22.3</td>
<td>32.6</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>6.5</td>
<td>12.9</td>
<td>25.4</td>
<td>n.a.</td>
<td>31.0</td>
</tr>
<tr>
<td>Indonesia</td>
<td>81.1</td>
<td>22.9</td>
<td>53.6</td>
<td>n.a.</td>
<td>45.3</td>
</tr>
<tr>
<td>Japan</td>
<td>31.6</td>
<td>14.2</td>
<td>40.5</td>
<td>40.1</td>
<td>20.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>n.a.</td>
<td>25.7</td>
<td>33.3</td>
<td>n.a.</td>
<td>51.0</td>
</tr>
<tr>
<td>US</td>
<td>56.2</td>
<td>20.2</td>
<td>56.3</td>
<td>37.0</td>
<td>43.4</td>
</tr>
</tbody>
</table>
Financial-Based Measurements

Conclusions: Hoekman (2000)

“…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.”
Measuring Consequences of Liberalization

• Uses of CGE (Computable General Equilibrium) models

• Approaches used for services liberalization:
  – cross-border services trade liberalization
  – modeling of FDI
  – links between multinational corporations’ (MNCs) parents and affiliates
Measuring Consequences of Liberalization

Brown and Stern (2001) model MNCs

- Assume:
  - Differentiated product, allocated to various host-country locations
  - Monopolistically competitive firms, free entry
  - Capital internationally mobile, with variable risk premium

- Barriers
  - Are increased cost of locating investment in host country
  - Based on Hoekman (2000) price-cost margins relative to Hong Kong
Measuring Consequences of Liberalization

Brown and Stern (2001)

• Scenarios:
  A. Remove barriers, perfect international capital mobility, fixed world capital stock
  B. Remove barriers, imperfect international capital mobility (risk premium elasticity=0.1), fixed world capital stock
  C. Remove barriers, imperfect international capital mobility, increase world capital stock by 3%
### Selected Welfare Effects of Elimination of Services Barriers (%GDP) (Brown and Stern 2000)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>−2.0</td>
<td>−1.6</td>
<td>2.7</td>
</tr>
<tr>
<td>China</td>
<td>3.8</td>
<td>3.2</td>
<td>6.0</td>
</tr>
<tr>
<td>EU</td>
<td>0.5</td>
<td>0.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>6.6</td>
<td>5.4</td>
<td>13.4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>15.6</td>
<td>13.1</td>
<td>16.9</td>
</tr>
<tr>
<td>Japan</td>
<td>−2.0</td>
<td>−1.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Korea</td>
<td>−2.8</td>
<td>−2.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>−4.3</td>
<td>−3.2</td>
<td>0.2</td>
</tr>
<tr>
<td>US</td>
<td>0.5</td>
<td>0.3</td>
<td>3.1</td>
</tr>
</tbody>
</table>
Measuring Consequences of Liberalization

Brown and Stern (2001)

• Results:
  – Effects are sizable and vary markedly across countries
  – Gains and losses depend mostly on whether a country attracts capital
  – Imperfect capital mobility (scenario B) reduces welfare effects
  – Rise in world capital stock (scenario C, motivated by rise in return to capital in other scenarios) raises welfare more broadly
Guidelines and Principles

*Principles:*

1. Most barriers to trade and investment in services take the form of *regulations*, rather than measures at the border.
Guidelines and Principles

(Principles)

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.
Guidelines and Principles

(Principles)

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.
Guidelines and Principles

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.
Guidelines and Principles

(Procedures)

2. Ideally, this information should be collected by systematic surveys of governments and/or firms. However, it may also be possible to infer it indirectly from documents prepared for other purposes, such as the commitments that governments made to the GATS in the Uruguay Round and subsequent negotiations.
Guidelines and Principles

(Procedures)

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.
Guidelines and Principles

(Procedures)

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.
Guidelines and Principles

(Procedures, 5 cont.)

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. …
Guidelines and Principles

(Procedures, 5 cont.)

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.
Guidelines and Principles

(Procedures)

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.