A General Measure of Trade Policy Orientations: Gravity-Model-Based Estimates for 82 Nations, 1960 to 1992

Michael J. Hiscox
Department of Government
Harvard University
hiscox@fas.harvard.edu

Scott L. Kastner
Department of Political Science
University of California, San Diego
skastner@weber.ucsd.edu

September 2002

Draft: Comments welcome.

We thank Dani Rodrik for helpful comments and suggestions.

A General Measure of Trade Policy Orientations:
Gravity-Model-Based Estimates for 82 Nations, 1960 to 1992

Abstract

We derive a general, cross-national measure of trade policy orientations by using fixed country-year effects in a gravity model estimated with data on bilateral trade flows across 82 nations between 1960 and 1992. The approach provides an attractive alternative to existing methods for estimating general levels of trade restrictions for a wide array of nations over a substantial period of time. Existing indicators are either gravely biased or demand immense amounts of detailed data (or both). Our measure is theoretically grounded, easy to calculate with available data, consistent with the accepted contrasts drawn between notoriously closed and open economies in different periods, and it moves closely in line with well-documented policy reforms made recently in a variety of nations. At the same time the measure differs markedly from the most commonly used indexes of trade policy in a variety of important ways and cases, suggesting, for example, that those indexes dramatically overstate the degree of change in U.S. trade policy over the last three decades and the differences between U.S. and Japanese policy openness. Use of the new measure may thus have an important impact on results in several key fields of research — including studies of the effects of trade openness on growth and income inequality, and analyses of the politics of protectionism.

I. Introduction

Accurate comparisons of how trade policies differ across nations are vital for research in several major fields. They are critical, for instance, to work examining the effects of trade openness on economic growth (e.g., Edwards 1992; Lee 1993; Krueger 1995, 1997; Sachs and Warner 1995; Harrison 1996; Frankel and Romer 1999; Rodriguez and Rodrik 1999) and patterns of income inequality (e.g., Freeman 1995; Harrison and Hansen 1999). Such measurements are essential too for all the research on the political-economic origins of protection (e.g., Ray 1981; Conybeare 1983; Ray and Marvel 1984; Magee, Brock, and Young 1989; Mansfield and Busch 1995; Dutt and Mitra 2002) and the political and institutional implications of trade openness (e.g., Katzenstein 1985; Rogowski 1987; Rodrik 1995; Garrett 1998; Rodrik 1997). Unfortunately, it has proven extremely difficult to develop convincing measures of trade policy orientations that can be used in cross-national studies (see Pritchett 1996; O'Rourke 1997). The measures that are commonly employed — including averages of tariff rates, counts of non-tariff barriers, and openness ratios (the ratio of an economy's total trade to its gross domestic product) — have profound limitations that are now routinely acknowledged, with much frustration and some despair, by researchers in the various fields.

We derive a general, cross-national measure of trade policy orientations by using fixed country-year effects in a gravity model estimated with data on bilateral trade flows across 82 nations between 1960 and 1992. This approach provides an attractive alternative to existing methods for estimating general levels of trade restrictions for a wide array of nations over a substantial period of time. The measure is theoretically grounded, easy to calculate with available data, consistent with accepted contrasts drawn between notoriously closed and open economies in different periods, and it moves closely in line with well-documented policy reforms made recently in a variety of nations (as we show for the cases of Korea, Chile, China, India, Mexico, and Argentina). At the same time, our measure differs markedly from the most commonly used indexes of trade restrictions in a variety of important ways and cases. In particular, it does not understate policy openness in economies less predisposed to trade for natural

reasons having to do with geography and resource endowments, but it also does not overstate policy openness in countries that favor non-tariff forms of protection over tariffs. By our measure, for instance, U.S. trade policy in the 1980s looks remarkably similar to that of Japan and France, two of its favorite, and supposedly more protectionist, rivals. Standard measures of policy also seem to dramatically overstate the degree of overall change in U.S. trade policy over the last three decades. We argue that this new comparative measure of trade policy orientations should be extremely useful for future research on growth, income inequality, and the politics of protectionism.

In the next section we briefly review the measures of trade restrictions used in previous empirical research in different fields. Section III discusses the method we use to calculate an alternative, general measure of trade policy orientations based upon estimation of a gravity model, and describes the data we have compiled on bilateral trade flows and their predictors for a large sample of nations over the period 1960-1992. Section IV presents the results of the estimations and reports the measures of trade distortions for a sample of nations, comparing these with alternative measures, commonly accepted contrasts between highly closed and highly open economies, and well-documented instances of trade policy reform in several nations.

II. Existing Measures of Trade Restrictions

Existing measures of the degree to which governments restrict trade generally fall into two types, as Baldwin (1989) has observed: measures of the *incidence* of trade restrictions and measures of their effects on *outcomes*. Incidence-type measures assess the height or coverage of various tariff and non-tariff trade distortions. Outcome-type measures assess the difference between some observed prices or quantities and the outcomes that would be predicted in the absence of trade restrictions. Both types of approach encounter serious problems and, as Pritchett (1996) has shown, the various estimates of trade policy restrictions that they have produced to date are not highly (or even positively) correlated with one another. This places severe constraints on researchers examining a range of important issues. Greenaway, Morgan, and Wright (2002) have recently demonstrated that the use of such diverse measures of trade

policy orientation accounts for much of the inconclusiveness in the recent empirical analysis of the effects of trade liberalization on economic growth.

A. The Incidence of Tariff and Non-Tariff Barriers

A variety of efforts have been made to compile data on tariff levels across nations in different periods (e.g., League of Nations 1927; Crawford 1934; Little, Scitovsky, and Scott 1970; Balassa 1965, 1971). Both UNCTAD (1988) and the World Bank (2000) have recorded data on tariffs for a range of nations in separate years in the 1980s and 1990s. For country comparisons, analysts have typically relied upon simple or import-weighted averages of tariff rates across commodity categories (e.g., Lee 1993). A popular short cut to calculating the import-weighted average tariff simply uses annual receipts from all customs and import duties as a percent of the annual value of imports (e.g., OECD 1985; Nye 1991; World Bank 2001). Unfortunately, the average tariff is not a very reliable comparative measure of trade restrictions since it cannot simply be assumed that the same tariff levied on different products and in different economies will have the same restrictive effect (i.e., that import elasticities are identical across all products and economies and the structure of protection in each economy is inconsequential). In practical terms, compiling data on tariffs across thousands of product categories for each nation is a major research undertaking seldom attempted for many nations or years, and even when the data is compiled there is no easy solution to the problem of how to weight tariffs across categories (Balassa 1971, 19).[1]

Most importantly, of course, tariff-based measures ignore *non-tariff* forms of protection, which have become increasingly important as policy instruments for governments in both advanced and developing economies (Bhagwati 1988; Baldwin 1993). Indeed, non-tariff barriers (NTBs) appear to be far more important than tariffs in limiting the flow of imports to developing nations (Edwards 1992, 39), although accurately measuring the effects of NTBs is extremely difficult. Data compiled in recent years by UNCTAD (1988) on the number of NTBs imposed on tariff-line items has been used to calculate the

[1] Weighting tariffs by import value is problematic since imports are a function of tariff levels (the higher the tariff on a good the less it will count in the average) and ignores the important differences between

percentage of items covered by NTBs and "coverage ratios" (percentages of imports affected) for a number of economies (e.g., Nogues, Olechowski, and Winters 1986; Laird and Yeats 1990; Pritchett 1996; Harrigan 1993). But these measures lump together many different types of policy instruments — such as import quotas, subsidies, and customs regulations — which can have very different effects on trade and are applied in many different ways (see Pritchett 1996), and still do not incorporate all the methods by which governments impede trade.[2] And it is not clear whether or how such measures ought to be combined with measures of tariffs, since measuring "tariff equivalents" of NTBs is not straightforward at all (Leamer 1988; Laird and Yeats 1990, 121).

Recently Anderson and Neary (1994, 1998) have constructed a "trade restrictiveness index" (TRI) and a "mercantilist index of trade policy" (MTRI) in an attempt to help solve some of these problems. They use a computable general equilibrium model to calculate the uniform tariff that would have the same static welfare effect (the TRI) or the same effect on the volume of trade (the MTRI) as the structure of tariffs and import quotas actually in place in an economy in a given year. Unfortunately, the indexes inherit all the limitations of the very simple model of the economy that is employed in their calculation — O'Rourke (1997) has found that the TRI is extremely sensitive to the exact specification of the model's demand side. In addition, these indexes can only estimate the effects of quotas with great uncertainty and cannot account for other NTBs at all, and they require comparable, commodity-level data on trade flows, tariffs, and quotas for each nation.

Finally, there have been several attempts in recent years to construct cross-country codings of different types of trade policies based upon subjective "expert" evaluations of tariffs and NTBs. These include the World Bank's (1987) measure of "outward orientation," which classified the policies of 41 nations for the period 1973-1985 into four categories (ranging from "very inwardly oriented" to "very

---

protective duties and those imposed purely for revenue purposes (Irwin 1993). Alternative weighting schemes are equally problematic.

[2] The UNCTAD list of NTBs excludes exchange-rate manipulations, for instance, along with health, safety, and environmental regulations, government procurement policies, and the administration of unfair trade laws.

outwardly oriented") based upon evaluations of overall effective rates of protection, the use of direct controls such as quotas, the use of export incentives, and the degree of overvaluation of exchange rates. Sachs and Warner (1995), the Heritage Foundation (Johnson, Holmes, and Kirkpatrick 1998), and Morley, Machato, and Pettinato (1999) have constructed similar types of subjective indexes. All these measures have obvious limitations stemming from the exact coding criteria used and the difficulties in making judgments about how to assess the relative impact of different types of policies in different economies (see Harrison and Hanson 1999).

B. The Effects of Trade Restrictions on Outcomes

Given the severe problems associated with measuring and comparing tariffs and NTBs, several analysts have relied instead upon outcome-based indicators of trade restrictions. Some have focused on price outcomes. Edwards (1992) has used the average black-market premium on foreign exchange as a measure of trade restrictions, assuming that nations with more restrictions on imports (and fixed exchange rates) generally have overvalued currencies. Dollar (1992) has estimated real prices for a basket of goods across nations as a function of GDP per capita and population density, and taken the residuals from the regression as an indicator of trade protection (assuming that higher prices indicate higher trade barriers). But alternative sources of variation in black-market currency prices and goods prices pose major problems for these measures, and reliable comparative data on prices of both types are quite limited (Summers and Heston 1989; Pritchett 1996; Falvey and Gemmel 1999).

It is more common to focus instead on trade flow outcomes to make inferences about policy orientations across countries. The simplest approach is to use the ratio of total trade (exports plus imports) to total output for each economy as a measure of trade policy "openness." This has the advantage of being easily calculable from available data for a broad range of nations over long periods of time, and it may be an appropriate indicator of an economy's overall exposure to international markets, but it is quite a poor measure of comparative trade policy orientation. A great deal of the cross-national variation in the extent to which nations trade is due to geographical factors, such as their distance from major markets, and their

size. As numerous applications of the "gravity model" have shown, small nations that are close to trading partners tend to engage in more trade than do larger nations that are more geographically isolated (e.g., Linneman 1966; Aitken 1973). In addition, nations with factor endowments that are very different from those of nearby partners are likely to trade more than those with endowments very similar to their neighbors.

There have been very few attempts to adjust openness measures to take into account cross-national differences in geographical variables and resource endowments. Most notably Leamer (1988) has estimated net exports for 53 nations in 182 commodity categories in 1982 as a function of each nation's relative endowments of different types of factors of production and computed a measure of trade openness for each nation by summing the deviations between predicted and actual net exports across commodity categories. The approach is extremely data intensive, however, and even so the model produces such large residuals when used to predict export flows that Leamer himself finds it difficult to attribute them wholly to trade barriers (1988, 189).[3] Pritchett (1996) has tried a slightly different approach, estimating the ratio of trade to GDP as a function of population, area, and GDP per capita for 93 nations in 1985, using the residuals as a measure of trade openness. Spilimbergo, Londono, and Szekely (1999) have created a similar measure by estimating total trade as a percentage of GDP for a panel of 34 nations between 1965 and 1992 using population, income, distance from major markets, and the distinctiveness of each nation's factor endowments relative to world endowments, on the right-hand side. While these are useful extensions of Leamer's approach that account for more of the variables (apart from policy) that explain trade flows, it seems a major mistake to apply the gravity model to predict aggregate openness ratios for each country rather than applying it to bilateral trade flows where it has proven to be very effective.[4] This is the approach we describe in the next section.

[3] Brown (1988) and Pritchett (1996) have catalogued a range of apparent anomalies in the Leamer indexes; for instance, Hong Kong appears as the most interventionist nation, while Turkey is the least interventionist.

[4] Indeed, Pritchett (1996) notes some troubling results when using this technique; for instance, the top 6 most open economies in 1985 include Benin, Belize, Guyana, and Brazil.

III. Using the Gravity Model to Estimate Trade Policy Orientations

The basic gravity model posits that the volume of trade between two nations is an increasing function of the incomes of those nations and a decreasing function of the distance between them, although other variables, including whether the countries share a common border and/or a common language are often added to the model (e.g., Linneman 1966; Aitken 1973; Frankel, Stein, and Wei 1995). The model has proved to be an extremely effective framework for gauging what patterns of trade are normal or natural among nations (Frankel and Wei 1993, 3; Baier and Bergstrand 2001, 3-4).[5] By implication, the model should also be able to help us in identifying abnormal or distorted patterns of trade and estimating the extent to which these are due to the trade policies of particular nations. The basic form of the gravity model can be expressed in log-linear form as

$$(1) \qquad \ln M_{ij} = \alpha + \beta \ln Y_i + \gamma \ln Y_j - \delta \ln D_{ij} ,$$

where M_{ij} represents total trade flow into country i from country j, Y_i and Y_j denote national incomes (outputs), D_{ij} is the distance between the economic centers of each country, and α, β, γ, and δ are positive parameters. This equation is estimated for a cross-section of country pairs in a specific year or pooled over a number of years. While it is still common to criticize the model for lacking theoretical underpinnings (e.g., Leamer and Levinsohn 1995), recent work has actually provided the basic gravity equation with a firm foundation in trade theory (e.g., Anderson 1979; Bergstrand 1985; Bergstrand 1989). In particular, Deardorff (1998) has shown that the root equation from which the log-linear form (1) follows — $M_{ij} = \alpha Y_i^{\beta} Y_j^{\gamma} D_{ij}^{-\delta}$ — can be derived from Heckscher-Ohlin and Ricardian models of trade as well as models based upon imperfect competition and increasing returns to scale.[6]

---

[5] First applied by Tinbergen (1962), Poynohon (1963), and Linneman (1966) the model has been applied for a variety of purposes since by a range of authors such as Aitken (1973), Sattinger (1978), Frankel (1993), Eaton and Tamura (1994), and Frankel and Romer (1999). For a review of many of the results, see Oguledo and MacPhee (1994).

[6] As Grossman (1998) has made clear, the "force of gravity" is generated by specialization, which may have multiple supply-side sources. When economies are specialized, citizens of country i will want to buy products that are only available (or more abundantly available) from country j. The more income that residents of i have, the more of j's goods they will be able to buy; and the more things firms in country j

To use the basic gravity model to provide estimates of policy-induced distortions in trade flows, we can add dummy variables for each importing country in each year for which the model is estimated. This has the effect of relaxing the restriction that the intercept of the gravity equation must be the same for all importing countries (in each year). Country *i*'s annual income is a constant for each importing country-year, but we need to control for the separate effects of income on imports and not have them subsumed in the country-year intercepts when the model is estimated. To this end we assume that the own income elasticity of imports is approximately one, which fits well with results from numerous multi-country, multi-year estimations of the gravity model to date (e.g., Aitken 1973; Bergstrand 1985; McCallum 1995; Wall 1999) and is consistent with theoretical expectations (Grossman 1998, 39).[7] The practical effect of this constraint is that, like other notable gravity model studies that have applied the same assumption implicitly (e.g., Pritchett 1996; Frankel and Wei 1993; Frankel and Romer 1999), we use trade as a proportion of income as the dependent variable. The regression equation can now be written as

$$(2) \qquad \ln (M_{ijt} / Y_{it}) = \alpha_{it} + \beta \ln Y_{jt} - \delta \ln D_{ij} + \varepsilon_{ijt} ,$$

where α_{it} is the importing country-year intercept for country i in year t, and ε_{ijt} is an error term. A similar approach has been used to gauge the effects of regional trade agreements on trade flows by using dummy variables for pairs of nations in the same regional bloc as a proxy for regionally specific discriminatory policies (e.g., Aitken 1973; Frankel and Wei 1993). The set of estimated coefficients, α_{it}, from a regression using (2) provides a way to evaluate the distorting effects of each importing country's policies in each year when compared to the mean for the entire sample. The country-year dummy variables stand in for the (unmeasured) relative openness of trade policy orientations.

A key problem here is that we cannot distinguish between the effects of changes in trade policies and other changes, specific to particular importing countries in particular years, that also affect trade

---

produce, the more things consumers in *i* will want to buy. The outputs of both nations thus should enter into the determination of the trade flow with positive coefficients.

flows and are not accounted for in the model. The Heckscher-Ohlin (HO) model of trade suggests that inter-industry flows should vary with the character of each nation's factor endowments relative to trading partners, while models of trade based upon imperfect competition and increasing returns indicate that intra-industry flows are related to the wealth (per-capita incomes) of both the importing and exporting countries. We have amended the basic regression equation to better account for these sources of variation in trade flows. The amended equation is

$$(3) \qquad \ln (M_{ijt} / Y_{it}) = \alpha_{it} + \beta \ln Y_{jt} - \delta \ln D_{ij} + \lambda \ln L_{ijt} + \kappa \ln K_{ijt} + \pi \ln W_{jt} + \varepsilon_{ijt} ,$$

where L_{ij} and K_{ij} are measures of the difference between country i's and country j's endowments of land and capital (per capita), W_{jt} is the wealth of the exporting country j (per capita income) and λ, κ, and π are positive constraints. In line with the HO model of trade, we expect that trade flows are increasing in differences in factor endowments; although, as Leamer and Levinsohn (1995, 1383) point out, the difference in per capita incomes will have a negative effect on trade flows according to the Linder (1961) hypothesis relating trade to similarities in demand. Trade should be increasing in the wealth of the exporting country if the technology embodied in exported goods makes them attractive ceteris paribus.[8] This type of fortified or amended gravity model has been used in a range of previous studies indicating that the endowments and wealth variables do significantly improve the goodness of fit (e.g. Frankel and Wei 1993; Eaton and Tamura 1994; Spilimbergo, London, and Szekely 1999). An important qualification here is that, unlike the basic gravity equation (2), amended forms like (3) have not been derived fully

[7] In fact, the most straightforward theoretical derivations of the gravity model (e.g., Anderson 1979; Deardorff 1998) imply unit income elasticities.

[8] The income per capita in country i is constant for each importing country-year, of course, so it is difficult to control for its effects here. It is inappropriate to assume that the elasticity of imports with respect to income per capita in the importing country is unitary. When we ran regressions (excluding country-year fixed effects) and included this variable in equation (3) we found that the coefficient varied substantially across time for the entire sample and was generally negative for developed (OECD) economies and positive (but closer to zero than unity) for developing nations.

from microeconomic foundations; they simply apply a set of proven, theoretically informed predictors of bilateral trade flows.[9]

Another problem with using country-year dummies to gauge the trade policy orientations of the importing countries is that we may be "blaming the victim" for abnormally low levels of bilateral trade flows, when trade restrictions imposed by exporting nations are actually at fault. A country whose closest neighbors and natural trading partners are all highly protectionist is unlikely to import as much as an identical counterpart surrounded by highly open economies that do not tax their export sectors. There seems to be no ready solution to this problem short of introducing alternative measures of the trade policy orientations of exporting nations to help control for these types of effects (which would thus render the results subject to all the previously discussed flaws in existing measures). We proceed here under the assumption that, since bilateral trade policies tend to be set with a high degree of reciprocity in practice, it is reasonable to share the "blame" (or credit) for distortions in trade flows between the importing and exporting countries.

The data set is a panel of bilateral trade flows to and from 82 countries for the years from 1960 through 1992. The 82 countries are all the countries for which reliable bilateral trade data are available for all 33 years. To calculate the dependent variables for the analysis we use the value of imports to country *i* from country *j* in year *t* (M_{ijt}) in constant (1992) dollars. The nominal trade data come from the *Expanded Trade and GDP Data Set* compiled by Gleditsch (2000). The primary source for this data is the International Monetary Fund's *Direction of Trade Statistics*, which began reporting bilateral trade flows

[9] To control for an even wider variety of factors that affect bilateral trade flows, we also experimented with gravity model estimations using dyadic fixed effects. This type of model, applied by Cheng and Wall (1999), effectively controls for all the dyad-specific omitted variables that are too difficult to measure directly — such as the particular preferences of consumers in country *i* for products from country *j*, historical and cultural ties between nations, and geographical barriers to trade not accounted for by a simple measure of distance — and so significantly improves the fit of the model. We then used the annual difference between actual and predicted imports, aggregated across all trading partners, to estimate each importing nation's trade policy orientation à la Leamer (1988). The problem we found with this approach is that the effects of durable trade policy orientations (e.g. relatively high import barriers in India) are subsumed in the estimated dyadic effects (e.g. low levels of trade between India and China), and thus do not register in the residuals that are used as an index of policy "openness."

in 1958, though Gleditsch used alternative sources (including Statistics Canada's *World Trade Database*) to fill in missing values in some bilateral series.[10] Gleditsch also uses leads and lags to replace data that is missing at either the beginning or the end of each bilateral series. We excluded dyads that required a lead or a lag of five or more years during the period 1960-1992.[11] As a result, the data set that we use is not "square": some countries have more trade partners than others. The minimum number of partners for any one country is 37 (for Chad and Jordan), the OECD nations typically have complete data on all 81 potential partners in the set, and the average number of partners across importing nations is 62.9. In general, data for developed countries are more complete than for developing countries. To address concerns that this imbalance might introduce bias into the results, we conducted a series of tests to check for their robustness to changes in the composition of the data set (these tests are discussed below).

The data on nominal GDP, converted into real GDP for country *i* and *j* (Y_{it} and Y_{jt}) in 1992 dollars, also come from Gleditsch (2000), for which the primary source is the *Penn World Tables* and secondary sources include the CIA's *World Factbook*.[12] The distance measure we use (D_{ij}) is the direct-line distance in kilometers between the major airports in countries *i* and *j*, reported in the *World Handbook of Political and Social Indicators III* (Taylor and Jodice 1986). Data on arable land come from the CIA's *World Factbook*, and are combined with population data from the World Bank's *World Development Indicators* to yield annual measures of land-to-labor ratios for each country.[13] Following Eaton and Tamura (1994) and Spilimbergo, Londono, and Szekely (1999), we use the difference in these ratios (the proportion of the largest-to-smallest for countries *i* and *j*) to control for divergence in national

[10] We changed all 0 values to $25,000. The smallest number printed in the IMF statistics is $100,000. Assuming trade of value $50,000 and above is rounded up to $100,000, and observations in the range $0-50,000 are uniformly distributed, the expected value for observations listed as 0 is $25,000.

[11] Not only were we wary of including a great deal of imputed data, but the degree of "missingness" in several dyadic trade series raises concerns about the reliability of the data actually reported for those series. In series with 4 or less years of missing values, we replaced the leads and lags used by Gleditsch with linear extrapolations.

[12] For the few countries for which GDP data were missing at the beginning or end of the time series we applied the same rules as for the trade data, replacing lags and leads by extrapolation and excluding from the set any countries for which data were under-reported between 1960-92.

endowments of land (L_{ijt}). Finally, the data on real GDP and population are used to calculate annual income per capita for each country in 1992 dollars. Like Eaton and Tamura (1994) we use the difference in incomes per capita (the proportion of the largest-to-smallest for countries *i* and *j*) to account for national endowments of capital (K_{ijt}). Real incomes per capita in each exporting country are used for measures of wealth (W_{jt}).[14]

IV. Results

a. Estimations

The results from the two least squares estimations of the gravity model, using the basic and amended forms of gravity model (shown in equations (2) and (3) above), are summarized in Table 1. Both versions of the gravity model perform well in that the estimated coefficients for all the variables have the expected signs. In the basic form of the model, the elasticity of imports with respect to exporting country income is estimated at 1.2, and drops to 0.9 in the amended form of the model once other factors are controlled — both are consistent with previous findings (see Grossman 1998). The estimated effects of distance on trade are large, as reported in several previous studies (e.g., Bergstrand 1989; McCallum 1995). According to both models a halving of the distance between a set of countries will result in about 2.5 times more trade, all else equal. This is likely reflecting a range of factors besides transportation costs, including imperfect information and localized tastes, which make trade less attractive at a distance (Grossman 1998, 30). It may also reflect one common aspect of the trade policy orientations of all countries: the tendency to grant discriminatory trade preferences to intra-regional partners.

[TABLE 1 HERE]

Adding additional variables in the amended model improves the goodness of fit, and the estimated coefficients for each of the new variables correspond broadly with theoretical expectations. The

[13] Missing population data were filled in using the *Cross-National Time Series Dataset* compiled by Banks (1974).

[14] Spilimbergo, Londono, and Szekely (1999) use data on capital per worker and education to construct measures of physical and human capital endowments, but these are not available for a broad range of countries or for many of the years between 1960 and 1992.

coefficient on the log of the ratio (largest-to-smallest) of land per capita is positive and significant, in line with standard HO theory: a 10 percent rise in the proportional difference in national endowments of land between trading partners produces an estimated increase of 2.4 percent in imports, all else equal. The coefficient on the log of the ratio (largest-to-smallest) of income per capita, which we use as a measure of differences in national endowments of capital, is also positive and significant as anticipated in the HO model. All else equal, a 10 percent rise in the proportional difference in capital endowments between countries will generate an estimated 0.5 percent increase in imports.[15] Finally, matching similar findings in previous work (e.g., Bergstrand 1989; Eaton and Tamura 1994) and expectations about the taste and technology origins of intra-industry trade, the elasticity of imports with respect to income per capita in trading partners is close to one.

For both models we extracted the estimated coefficients for the set of country-year dummy variables (α_{it}) using *Stata* 7.0.[16] These estimated coefficients are reported as differences from the sample mean intercept. Thus they represent the estimated logged amounts by which real imports are altered by unobservable aspects (i.e., policies) of the importing country *i* in year *t*, compared to the mean country-year, all else equal. Large positive values represent relatively open trade policy orientations, while large negative values represent relatively closed or protectionist policy orientations. Using the mean sample intercept as the "benchmark" for measuring the country-year effects is a reasonable convenience. But to render the results into a form that more closely resembles alternative measures of tariff and non-tariff barriers to trade, we have expressed these effects as differences from the sample maximum intercept — for both models this is the intercept for the Netherlands in 1964. We use this maximum intercept as a

[15] This runs counter to the Linder hypothesis, which would anticipate a negative coefficient. We experimented with versions of the model that used interaction terms to allow for this effect (and the effect of differences in land-labor ratios) to vary among wealthy (OECD) trading partners, but found that this barely improved the overall fit of the model and the estimated effect of the difference in capital-labor ratios for wealthy economies was still positive and slightly larger than for developing nations.

[16] Ideally we would be able to include confidence intervals around these estimates, though *Stata 7.0* does not provide such intervals when estimating an equation with a large dummy variable set. Since the estimates for most individual countries tend to change only gradually from year to year, however, rather than fluctuating wildly, we take this as a sign that the standard errors are generally relatively small.

"free trade" benchmark. We then express these deviations as positive percentages of the predicted ratio of imports to GDP when all variables are set to their sample means and the intercept is set to its "free" trade maximum. All relative comparisons between the scores from country to country and year to year remain the same after these transformations, of course, but the results have a more intuitive interpretation: they represent the percentage reduction in imports in each country year that is due to the deviation of trade policy from the "free-trade" benchmark policies of the Netherlands in 1964.

Table 2 presents these estimated country-year fixed effects (labeled BCFE and ACFE for the basic and amended models, respectively) for the 82 countries in the sample in 1960 and 1990, and compares them with the most commonly applied alternative measures of trade policy orientations in 1990.[17]

[TABLE 2 HERE]

One immediate issue is the degree of similarity between BCFE and ACFE. Across the entire set of years and countries, the correlation coefficient between the two measures is 0.99. Although the amended model explains slightly more variation in trade flows than does the basic model, choosing between them poses no great problem in terms of affecting the comparisons between country-year fixed effects. In general, then, since the basic model arguably has the firmest theoretical foundation, we rely more on BCFE below as a general indicator of comparative trade policy orientations.

b. Comparisons with Alternative Indexes of Trade Policy

Both of the new estimates compare very favorably with alternative measures of trade policy orientations. Table 3 reports coefficients of correlation between BCFE and ACFE and the most commonly used measures of trade openness or protection over all samples for which these alternatives are available. As shown in panel (a), BCFE and ACFE are correlated positively with revenues from import duties as a percentage of imports, as expected, since the latter is a crude measure of average duties; and these the relationships are much stronger than the association between import duties and total trade as a

percentage of GDP, a widely applied measure of openness. Panel (b) shows data just for 1990, a year in which average rates of tariffs have been assembled for a decent number of nations by the World Bank. BCFE and ACFE are both correlated positively with average tariffs (and again with average import duties), and negatively with trade as a proportion of GDP. Data on other, more inventive, measures of trade policy orientation are available for individual years only and are reported in panel (c). BCFE and ACFE are positively related to Dollar's (1992) index of price distortions for 1980, as expected, although only weakly and the Dollar index is itself not correlated strongly with trade shares or import duties. BCFE and ACFE are negatively associated with Leamer's (1988) index of trade openness in 1982. Strangely, Leamer's index is itself positively correlated with import duties. Finally, BCFE and ACFE are both correlated in a strong positive fashion with Lee's (1993) calculations of own-import weighted averages of duties on intermediate inputs and capital goods.

[TABLE 3 HERE]

The two measures are both consistent with the traditional contrasts drawn between notoriously "closed" and "open" economies. This is perhaps easier to see if we arrange the countries by their average BCFE for 1980 to 1990 (see Table 4). The least open countries (with the highest scores) are the "usual suspects" — including India, Myanmar, China, and Pakistan. The Latin American economies (with the exceptions being Chile and Panama) have much lower scores than the East Asian economies (with Indonesia and the Philippines being exceptions). The most open economies include the smallest European nations —Belgium and the Netherlands. The policy orientation of the United States appears highly open in relative terms, though far less different than the policy stances in supposedly closed "rivals" like Japan and France than might have been imagined.

[TABLE 4 HERE]

Comparing these period averages with similar data on commonly used alternative measures of policy orientations accentuates some key differences. Figure 1 plots country averages of BCFE against

[17] Files containing annual measures for all 82 countries, and all the data used to generate the results, can

averages of total trade as a share of GDP, which is often used as basic proxy for policy openness. One way to look at this scatter-plot is to regard countries in the lower left-hand quadrant as those unfairly painted as protectionist though they are naturally predisposed to trade less than others for exogenous reasons. These include the geographically largest economies (e.g., the United States and Australia) and others that are relatively isolated from trading partners by distance (e.g., Japan, New Zealand, Uruguay). On the other hand, looking to the right of the hypothetical regression line, using trade share as a sign of policy openness would seem to overstate the extent of trade liberalization in nations that are relatively small in geographic size (e.g., Malaysia, Jordan, the Congo).

[FIGURE 1 HERE]

Similar types of issues arise when we compare the BCFE averages for this period with country averages of import duties, a popular index of protection (see Figure 2). Again, one simple interpretation here is that countries in the upper left-hand quadrant may be being given too much credit for trade openness, when they are actually relying heavily on protectionist non-tariff barriers to imports. Most notable among these nations are China, Indonesia, Mexico, Brazil, Argentina, and Turkey. On the flip side of the coin, there are several nations (e.g., Gabon, Cote-d'Ivoire) whose heavy reliance on tariffs rather than NTBs may make them appear more closed than they actually are relative to other countries.

[FIGURE 2 HERE]

Interestingly, the correlation between BCFE and average import duties has changed over time in different ways among different sets of countries in very predictable ways. In the OECD economies, where NTBs have become more important as tools of trade policy relative to tariffs, the correlation between BCFE and average duties has fallen markedly, in absolute terms, over time: the correlation coefficient was .37 in 1980 but .15 in 1991 (n=21). Among developing nations, where many quantitative restrictions on trade were removed in the 1980s and 1990s, the correlation between BCFE and average duties has

---

be downloaded at: http://www.people.fas/harvard.edu/~hiscox/trade_policy_orientations.htm.

risen over time as tariffs have become a more important component of overall trade policy: the coefficient was .10 in 1980 but .37 in 1991 (n=43).[18]

c. Trends and Fluctuations Among Liberalizing Nations

It is very helpful to look at how our measures of trade policy orientations have changed over time for some individual countries; in particular, for countries that have undertaken notable, well-documented liberalizing reforms at different points in their recent histories. Adopting the distinctions used by Dollar and Kraay (2001) and the World Bank, we compare the experience of prominent members of three groups of developing nations: (1) the "early liberalizers," including Korea and Chile, which began reducing trade barriers dramatically from around the 1970s; and (2) the later, more gradual reformers, including China and India, which began reforms in the late 1970s and 1980s and have proceeded more slowly and with more set-backs; and (3) the latest "globalizers," including Mexico and Argentina, which took clear turns towards trade openness only beginning in the late 1980s or 1990s.

Figure 3 charts changes over time in BCFE, trade as a percent of GDP, and average import duties in these countries between 1960 and 1992. In Korea (a), the BCFE measure trends downward throughout the period under review, though three shifts toward greater openness stand out. The first downward plunge occurs after 1966, and corresponds quite well to a major liberalization program adopted at that time: in 1965 the government sharply reduced quantitative restrictions on imports, and in 1967 replaced a positive list system of allowable imports with a negative list system of prohibited categories (Kim 1991). A second decline occurs in the late 1970s, including a drop in 1978, the year in which quantitative import restrictions were relaxed further (Kim 1991), though the beginning of this decline predates the new liberalization program by about 2 years. A final decline in the BCFE measure occurs after 1985, which corresponds very well to the acceleration of trade liberalization that occurred during the second half of the 1980s (see Krueger 1997). This latest liberalization drive is reflected by a renewed decline in the measure of average import duties, but is not reflected at all in total trade as a share of GDP.

[18] We thank Dani Rodrik for suggesting that these different trends should be discernable.

[FIGURE 3 HERE]

The measures are more volatile for Chile (b). Dramatic reforms by the Pinochet government starting in 1974 are revealed clearly in the sharp fall in BCFE after 1976 (though the measure suggests a drop in openness prior to 1976[19]). Chile plunged into recession in the early 1980s, and the government backtracked on liberalization of trade by increasing average tariffs and imposing some surcharges on imports (UNCTAD 1992). De la Cuadra and Hachette (1991, 267-8) argue that these protectionist measures were "remarkably moderate," though the spike in BCFE in the early 1980s suggests a rather more severe policy reversal. The BCFE measure trends downward after 1985, however, which corresponds with the renewed efforts by the Chilean government to liberalize imports in those years by, for example, cutting tariff rates (UNCTAD 1992).

The trends in BCFE for China (c) fit reasonably well with the historical record of trade policy reform. China was during much of the 1960s and 1970s the most closed country in the dataset, which is consistent with the highly autarkic policies of Mao Zedong. The BCFE measure falls in the early to mid-1960s, which corresponds to the moderate liberalization of the import regime that was a response to the disaster of the Great Leap Forward (see Reardon 2002, ch. 3). A sharp rise in BCFE after 1966 reflects the dramatic shift back to autarky that accompanied the Great Cultural Revolution and the implementation of Mao's "Third Front" strategy (note that the trade to GDP ratio does not capture these policy changes of the 1960s at all). The next fall in the BCFE measure, starting in the early 1970s, fits with the effective abandonment of the Third Front strategy and a de-emphasis on self-sufficiency in those years (Reardon 2002). Another fall in 1978 corresponds to the onset of the post-Mao economic reforms. Although the index then remains stagnant over the 1980s, this may not be anomalous: the state did substantially reduce the scope of import planning in the early 1980s, but average tariffs were raised dramatically to

[19] This drop in openness may reflect a sharp increase in the real exchange rate. Though tariffs were lowered in the 1973-1975 period, most such reductions were redundant, and a UNCTAD study has suggested that they were more than offset by the rise in the real exchange rate (UNCTAD 1992, 37).

compensate — serious reforms of tariff rates and licensing requirements did not begin until 1992, after the end of our study (Lardy 2002).

Overall, there has been far less policy reform in India (d) than in China. BCFE actually rises gradually throughout the 1960s and most of the 1970s, reflecting the extension of a pervasive web of protectionist policies in India. Trade policy reforms only began in India around 1980, and were accelerated only in 1985. Among these reforms was the decision to change import limitations on some goods with tariffs (GATT 1993, 17). After an initial drop (followed by retrenchment), the BCFE measure begins a slow fall after 1983 that appears to fit well with the timing of the reforms (the decline in the measure of average duties after 1987 is also consistent with this timing). More substantial reforms were not initiated until the 1990s under Prime Minister Narasimha Rao (Bhagwati 1993), too late to show up in our data.

Policy reforms in the final group of late "globalizers" barely show up in our measures, since most have been enacted in the 1990s and our data end in 1992. But Mexico did begin to lower tariffs and remove import quotas in the mid 1980s (and joined GATT in 1986), and these changes are reflected very clearly in the steady downward trend in BCFE beginning in 1987. Mexico attempted two previous trade policy liberalizations, the first after 1971 and the second after 1977 (Flores Quiroga 1996); both clearly show up in the BCFE trend (but not, it should be noted, in the overall trade to GDP ratio). The reversion to protectionism that followed each of these aborted reform attempts also shows up in the BCFE measure. In Argentina (f), a downswing in BCFE after 1976 reflects the liberalization program of Martinez de Hoz under a new military government: tariffs and quantitative restrictions on imports were both lowered in the second half of the 1970s (see Cavallo and Cottani, 1991). The BCFE measure also captures the abandonment of reforms and the fall back into protectionism following the onset of the debt crisis in the early 1980s. It was only in the late 1980s that a new round of much deeper liberalization began when the government slashed tariffs and eliminated import licensing (GATT 1992). These last reforms are reflected

clearly in the BCFE measure, and also in the indicator of average duties, but not in Argentina's trade as a share of GDP.

d. Trends in U.S. Trade Policy?

Finally, it is very interesting to consider the same set of trend data for the United States (see Figure 4). While total U.S. trade as a percentage of GDP rose steadily over the entire period, and average duties fell gradually, both indicators appear to overstate the extent of overall change in trade policy openness. Over the full length of the period, in fact, there appears to be a gradual upward trend in BCFE. There are some fluctuations: a rise in BCFE in the late 1960s, coinciding with the introduction of new NTBs in the textile and steel industries, and downturns again in the late 1970s and early 1980s. The data suggests that fears of "new protectionism" in the United States and other advanced economies, and concerns about the pervasive effects of non-tariff forms of trade barriers, cannot be dismissed amidst all the clamoring over globalization. The picture for the U.S. is perhaps the best evidence yet for Bhagwati's famous "law of constant protection" — the argument that new NTBs are readily substituted for tariffs in order to limit the political costs governments anticipate from negotiated cuts in duty rates (Bhagwati 1988, 53).

[FIGURE 4 HERE]

e. Robustness Checks

The most important potential concerns with the approach we have used to derive the new measures are related to the composition of the data set and the specification of the model. One concern that has been raised in gravity-model estimations of trade flows has to do with pooling data for both advanced and developing economies (Bayoumi and Eichengreen 1997, 143). The issue is that relationships between right-hand-side variables and trade flows may differ between these types of economies. Adding to the possible problems here, our set combines data from these different types in an uneven way, as discussed above, since IMF data on imports from more partners are available for the more

developed economies. There is also a concern that the results may be altered markedly by the inclusion of other omitted variables on the right-hand-side in the gravity model.

To test for the robustness of the main results, we performed a variety of tests using the BCFE measure derived above. First, we estimated equation (2) for seven individual countries separately (that is, using only the data on bilateral imports for each particular country between 1960 and 1992 in each regression), including yearly fixed effects. The countries we selected were the first seven in our sample alphabetically: Argentina, Australia, Austria, Belgium, Benin, Bolivia, and Brazil. (The list includes a good sample of both developed and developing countries.) We then correlated the yearly fixed effects obtained by estimating equation (2) for each country separately with the BCFE scores for those countries that we derived from country-year fixed effects in the full data set. Argentina was correlated at .98, Australia at .99, Austria at .98, Belgium at .83, Benin at .98, Bolivia at greater than .99, and Brazil at .92 (N=33 in all four cases, of course). If our original results were very sensitive to the composition of the data set, we would expect these correlation coefficients to be much lower: year-to-year changes in policy as we measure them using the full data set would be quite different from year-to-year changes measured when only one particular importing nation (with one particular set of trading partners) was examined. That the single-country estimations of temporal effects match so closely the corresponding results from the combined data is very encouraging.

This test suggests a similar approach to gauging whether our results are sensitive to any changes in the composition of the data set over time, perhaps due to rapid development in several nations. We estimated equation (2) separately for three individual years (1965, 1975, and 1985), this time using country fixed effects. We then correlated the country effects estimated in each of these years with the original BCFE scores derived from country-year effects in the full set. In all three cases, the correlations exceed .99 (N=82). If our results were very sensitive to changes in the time period examined, again, we would expect these correlations would be much lower: cross-country differences measured, at any

moment, using data for the entire period 1960-92 would diverge markedly from cross-country differences measured using only the data for that particular year.

Lastly, we performed a series of tests aimed at evaluating the robustness of the results to alternative models of trade. We estimated equation (2) and replicated the derivation of country-year fixed effects using only data on trade between non-OECD nations as a way to gauge whether the original model performed very differently for trade patterns among developing nations only. The measure was correlated with BCFE at .91 (N=1947); a rather strong relationship given that a large proportion of developing country imports come from OECD nations and have been removed from this analysis. We also experimented with a variety of alternative gravity-model specifications, adding variables to equation (2), such as dummies for whether the trading nations are contiguous and for whether they share the same official language, that have been used in previous research. We could find no alternative model that produced results that diverged significantly from our BCFE measure while also matching equation (2) in terms of goodness of fit.[20]

V. Implications

Existing cross-national indicators of trade policy orientation are either gravely biased or demand immense amounts of detailed data (or both), and they are not strongly correlated with one another. This creates enormous problems for researchers in a variety of fields. The new measure of trade policy orientations we report here has much to recommend it. It is well-grounded in terms of trade theory, easy to calculate with available data for a wide variety of economies over long periods of time, it fits the established, stylized facts about the most open and closed economies, and tracks especially well over time the policy reforms that have been made in many developing nations in recent decades. The new measure also differs sharply from commonly used indexes of protection and trade openness in important ways and in many important cases — for instance, in the measurement of differences between U.S. and Japanese trade policies in the 1980s, and the degree of change in U.S. policy since 1960. Employing the new

measure to a range of research problems, including studies of the effects of policy openness on growth and income inequality in developing nations, and studies of the political origins of protectionism, should produce new and interesting insights. At a minimum it could help to confirm results from previous empirical analyses that have been based upon alternative indicators of policy openness that, as the authors themselves routinely acknowledge, are highly dubious. At a maximum, using the new measure may overturn or reverse results from previous research.

[20] Full results from alternative specifications, and from other robustness checks, are available from the authors and at: http://www.people.fas/harvard.edu/~hiscox/trade_policy_orientations.htm.

References

Aitken, Norman D. 1973. The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis. *American Economic Review* 63 (5): 881-92.

Anderson, James. 1979. A Theoretical Foundation for the Gravity Equation. *American Economic Review* 69:106-116.

Anderson, James, and J. Peter Neary. 1994. Measuring the Restrictiveness of Trade Policy. *World Bank Economic Review* 8:151-69.

Anderson, James and J. Peter Neary. 1998. The Mercantilist Index of Trade Policy. Unpublished manuscript. 1998.

Baier, Scott, and Jeffrey H. Bergstrand. 2001. The Growth of World Trade: Tariffs, Transport Costs, and Income Similarity. *Journal of International Economics* 53: 1-27.

Balassa, Bela. 1965. Tariff Protection in Industrial Countries: An Evaluation. *Journal of Political Economy* 73:573-94.

Balassa, Bela. 1971. *The Structure of Protection in Developing Countries*. Baltimore: Johns Hopkins Press.

Baldwin, Robert. 1989. Measuring Nontariff Trade Policies. NBER Working Paper No. 2978. Cambridge MA.

Baldwin, Robert. 1993. The New Protectionism: A Response to Shifts in National Economic Power. In *Protectionism and World Welfare*, edited by D. Salvatore. Cambridge: Cambridge University Press.

Banks, Arthur S. *Cross-National Time Series, 1815-1973* [Computer file]. ICPSR, ed. Ann Arbor, MI: Inter-University Consortium for Political and Social Research [Producer and Distributor], 1976.

Bayoumi, T., and B. Eichengreen. 1997. Is Regionalism Simply a Diversion? In *Regionalism versus Multilateral Trade Arrangements*, T. Ito and A. Krueger eds. Chicago: University of Chicago Press.

Bhagwati, Jagdish. 1988. *Protectionism*. Cambridge: MIT Press.

Bhagwati, Jagdish. 1993. *India in Transition: Freeing the Economy*. Oxford: Clarendon.

Bergstrand, Jeffrey H. 1985. The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. *Review of Economic and Statistics* 67:474-81.

Bergstrand, Jeffrey H. 1989. The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade. *Review of Economics and Statistics* 71 (1): 143-53.

Brown, D. 1988. Comment. In *Trade Policy Issues and Empirical Analysis*. Robert Baldwin ed. Chicago: University of Chicago Press.

Cavallo, D. and J. Cottani. 1991. Argentina. In *Liberalizing Foreign Trade: The Experience of Argentina, Chile and Uruguay*, D. Papageorgiou, M. Michaely and A. M. Choksi, eds. Cambridge, MA: Basil Blackwell, 1-167.

Cheng, I.H., and Harvey J. Wall. 1999. Controlling for Heterogeneity in Gravity Models of Trade. Federal Reserve Bank of St. Louis Working Paper.

Conybeare, John. 1983. Tariff Protection in Developed and Developing Countries: A Cross-Sectional and Longitudinal Analysis. *International Organization* 37:441-67.

Crawford, J. 1934. Tariff Level Indices. *Economic Record* December:213-21.

Deardorff, Alan V. 1998. Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? In *The Regionalization of the World Economy*, Jeffrey A. Frankel ed. Chicago: University of Chicago Press.

De la Cuadra, S. and D. Hachette. 1991. Chile. In *Liberalizing Foreign Trade: The Experience of Argentina, Chile and Uruguay*, D. Papageorgiou, M. Michaely and A. M. Choksi, eds. Cambridge, MA: Basil Blackwell, 169-319.

Dollar, David. 1992. Outward-Oriented Developing Economies Really Grow More Rapidly: Evidence from 95 LDCs, 1976-85. *Economic Development and Cultural Change* (April): 523-44.

Dollar, David, and Aart Kraay, 2001. Trade, Growth, and Poverty. Unpublished paper. Development Research Group, The World Bank. Washington DC.

Dutt, Pushan, and Devasgish Mitra. 2002. Endogenous Trade Policy Through Majority Voting: An Empirical Investigation. *Journal of International Economics* 58: 107-133.

Eaton, Jonathan, and Akiko Tamura. 1994. Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns. *Journal of the Japanese and International Economies* 8: 478-510.

Edwards, S. 1992. Trade Orientation, Distortions, and Growth in Developing Countries. *Journal of Development Economics* 39: 31-57.

Falvey, Rod and Norman Gemmell. 1999. Factor Endowments, Nontradables Prices, and Measures of Openness. *Journal of Development Economics* 58 (1): 101-22.

Flores Quiroga, A. R. 1996. *The Political Economy of Mexican Trade Policy, 1970-1994*. Ph.D. Dissertation: University of California, Los Angeles.

Frankel, Jeffrey A. 1993. Is Japan Creating a Yen Bloc in East Asia and the Pacific? In *Regionalism and Rivalry: Japan and the United States in Pacific Asia*, ed. by Frankel and Miles Kahler. Chicago: Chicago University Press.

Frankel, Jeffrey A. and S. Wei. 1993. Trade Blocs and Currency Blocs. NBER Working Paper 4335. Cambridge MA.

Frankel, Jeffrey A. and David Romer. 1999. Does Trade Cause Growth? *American Economic Review* 89 (3): 379-99.

Frankel, Jeffrey A., E. Stein, and S. Wei. 1995. Trading Blocs and the Americas: The Natural, the Unnatural, and the Supernatural. *Journal of Development Economics* 47:61-95.

Freeman, Richard. 1995. Are Your Wages Set in Beijing? *Journal of Economic Perspectives* 9 (3):15-32.

Garrett, Geoffrey. 1998. *Partisan Politics in the Global Economy*. Cambridge: Cambridge University Press.

GATT. 1992. *Trade Policy Review: Argentina 1992* (volume 1). Geneva: General Agreement on Tariffs and Trade.

GATT. 1993. *Trade Policy Review: India 1993* (volume 1). Geneva: General Agreement on Tariffs and Trade.

Gleditsch, K. S. 2000. Expanded Trade and GDP Data Version 1. Unpublished manuscript, University of California, San Diego.

Greenaway, David, Wyn Morgan, and Peter Wright. 2002. Trade Liberalisation and Growth in Developing Countries. *Journal of Development Economics* 67: 229-244.

Grossman, Gene. 1998. Comment. In *The Regionalization of the World Economy*, Jeffrey A. Frankel ed. Chicago: University of Chicago Press; pp.29-31.

Harrigan, James. 1993. OECD Imports and Trade Barriers in 1983. *Journal of International Economics* 35:91-111.

Harrison, Ann. 1996. Openness and Growth: A Time-Series, Cross-Country Analysis for developing Countries. *Journal of Economic Development* 48 (2): 419-47.

Harrison, A. and G. Hanson. 1999. Who Gains from Trade Reform: Some Remaining Puzzles. *Journal of Development Economics* 59:125-154.

International Monetary Fund. 1998. *Direction of Trade Statistics Yearbook*. Washington DC: International Monetary Fund, 1998.

Irwin, D. 1993. Free Trade and Protection in Nineteenth-Century Britain and France Revisited. *Journal of Economic History* 53:146-52.

Johnson, Bryan, Kim Holmes, and Melanie Kirkpatrick. 1998. *1999 Index of Economic Freedom*. New York: Heritage Foundation and Dow Jones Corporation.

Katzenstein, Peter J. 1985. *Small States in World Markets: Industrial Policy in Europe*. Ithaca: Cornell University Press.

Kim, K.S. 1991. Korea. In *Liberalizing Foreign Trade: The Experience of Korea, the Philippines, and Singapore*, D. Papageorgiou, M. Michaely and A. M. Choksi, eds. Cambridge, MA: Basil Blackwell, 1-131.

Krueger, Anne O. 1995. *Trade Policies and Developing Nations.* Washington DC: Brookings Institution.

Krueger, Anne O. 1997. Trade Policy and Economic Development: How We Learn. *American Economic Review* 87: 1-22.

Krueger, Anne. O. 1997. Korean Industry and Trade over Fifty Years. In *The Korean Economy 1945-1995: Performance and Vision for the 21st Century*, D. S. Cha, K.S. Kim and D. H. Perkins, eds. Seoul: Korea Development Institute.

Laird, S. and A. Yeats. 1990. *Quantitative Methods for Trade-Barrier Analysis*. New York: New York University Press.

Lardy, N. R. 2002. *Integrating China into the Global Economy*. Washington DC: Brookings.

League of Nations. 1927. *Tariff Level Indices, 1927*. Geneva: League of Nations.

Leamer, Edward. 1988. Measures of Openness. In *Trade Policy Issues and Empirical Analysis*. R. Baldwin (ed). Chicago: University of Chicago Press.

Leamer, Edward and James Levinsohn. 1995. International Trade Theory. In *Handbook of International Economics*, volume III, edited by G. Grossman and K. Rogoff. New York: Elsevier.

Lee, Jong-Wha. 1993. International Trade, Distortions, and Long-Run Economic Growth. *IMF Staff Papers* 40 (2): 299-328.

Linder, S. B. 1961. *An Essay on Trade and Transformation*. New York: Wiley.

Linneman, Hans. 1966. *An Econometric Study of International Trade Flows*. Amsterdam: North-Holland.

Little, I., T. Scitovsky, and M. Scott. 1970. *Industry and Trade in Some Developing Countries*. London: Oxford University Press.

Magee, S., W. Brock, and L. Young. 1989. *Black Hole Tariffs and Endogenous Policy Theory*. New York: Cambridge University Press.

Mansfield, Edward, and Marc Busch. 1995. The Political Economy of Nontariff Barriers: A Cross-National Analysis. *International Organization* 49:723-49.

McCallum, John. 1995. National Borders Matter: Canada-U.S. Regional Trade Patterns. *American Economic Review* 85 (3): 615-23.

Morely, S., A. Machado, S. Pettinato. 1999. Indexes of Structural Reform in Latin America. *Reformas Economicas* Series 12. Santiago: CEPAL.

Nogues, J., A. Olechowski, and A. Winters. 1986. The Extent of Nontariff Barriers to Industrial Countries' Imports. *World Bank Economic Review* 1: 181-199.

Nye, J. 1991. The Myth of Free-Trade Britain and Fortress France: Tariffs and Trade in the Nineteenth Century. *Journal of Economic History* 51:23-46.

Oguledo, Victor, and Craig MacPhee. 1994. Gravity Model: A Reformulation and Application to Discriminatory Trade Arrangements. *Applied Economics* 40: 315-37.

Organization for Economic Cooperation and Development. 1985. *Costs and Benefits of Protection*. Paris: OECD.

O'Rourke, K. 1997. Measuring Protection: A Cautionary Tale. *Journal of Development Economics* 53:169-83.

Poyhonen, Pentti. 1963. A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archiv* 90 (1): 93-100.

Pritchett, Lant. 1996. Measuring Outward Orientation in LDCs: Can it be Done? *Journal of Development Economics* 49: 307-35.

Ray, E. 1981. The Determinants of Tariff and Nontariff Restrictions in the United States. *Journal of Political Economy* 89:105-21.

Ray, E. and H. Marvel. 1984. The Pattern of Protection in the Industrial World. *Review of Economics and Statistics* 66:452-58.

Reardon, L. C. 2002. *The Reluctant Dragon: Crisis Cycles in Chinese Foreign Economic Policy*. Seattle and London: University of Washington Press.

Rodrik, Dani. 1995. Why Do More Open Economies Have Bigger Governments? *Journal of Political Economy*, 106 (5) 1998:997-1032.

Rodrik, Dani. 1997. *Has Globalization Gone Too Far?* Washington DC: Institute for International Economics.

Rodriguez, F., and D. Rodrik. 1999. Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence. NBER Working Paper No.7081. Cambridge MA: NBER.

Rogowski, Ronald. 1987. Trade and the Variety of Democratic Institutions. *International Organization*, 41 (2):203-24.

Sachs, J. and A. Warner. 1995. Economic Reform and the Process of Global Integration. *Brookings Papers on Economic Activity* 1:1-117.

Sattinger, Michael. 1978. Trade Flows and Differences between Countries. *Atlantic Economic Journal* 6 (July): 22-29.

Spilimbergo, A., J.L. Londono and M. Szekely. 1999. Income Distribution, Factor Endowments, and Trade Openness. *Journal of Development Economics* 59: 77-101.

Summers, Robert, and Alan Heston. 1989. A New Set of International Comparisons of Real Product and Price Levels Estimates for 130 Countries, 1950-85. *Review of Income and Wealth* 34 (March): 1-25.

Taylor, C. L. and D. A. Jodice. 1986. *World Handbook of Political and Social Indicators III: 1948-1982* [Computer file]. Compiled by C. L. Taylor, Virginia Polytechnic Institute and State University. 2nd ICPSR ed. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [producer and distributor].

Tinbergen, Jan. 1962. *Shaping the World Economy*. New York: The Twentieth Century Fund.

UNCTAD. 1988. *Handbook of Trade Control Measures of Developing Countries Supplement: A Statistical Analysis of Trade Control Measures of Developing Countries, 1987*. New York: United Nations.

UNCTAD. 1992. *Trade Liberalization in Chile: Experiences and Prospects*. Trade Policy Series No. 1. New York: United Nations.

Wall, Howard J. 1999. Using the Gravity model to Estimate the Costs of Protection. *Review of the Federal Reserve Bank of St. Louis* Jan/Feb.: 33-40.

World Bank. 1987. *World Bank Development Report*. Washington DC: The World Bank.

World Bank. 2000. *World Bank Development Report*. Washington DC: The World Bank.

World Bank. 2001. *World Development Indicators—CD-ROM* [Computer file]. Washington DC: The World Bank.

TABLE 1: Estimations of Gravity Model s of Bilateral Imports*

	Basic Model	Amended Model
Income of exporting country	1.22 (394.72)	0.90 (254.56)
Distance between countries	-1.34 (-187.16)	-1.33 (-191.12)
Difference in land-labor ratios		0.24 (30.77)
Difference in capital-labor ratios		0.05 (7.74)
Wealth of exporting country		0.92 (148.75)
Constant (mean intercept)	-11.34 (-167.61)	-15.94 (-224.36)
F-Statistic for country-year Intercepts (2706 categories)	10.12	11.44
Adjusted R-squared	0.55	0.61
Observations	170,082	170,082

* Dependent variable is log(imports/GDP). All explanatory variables also logged (see text for full descriptions of each); both least squares regressions also include 2705 country-year dummy variables (individual coefficients not shown); *t* statistics are in parentheses.

TABLE 2: Gravity Model-Based Estimates of Trade Policy Orientations

	Estimates:				Average	Import	Total
	BCFE[a]	ACFE[a]	BCFE[a]	ACFE[a]	Tariff[b]	Duties[c]	Trade[c]
Country	1960	1960	1990	1990	1990	1990	1990
Developed nations:							
Australia	21.53	22.15	32.08	34.06	14.2	7.86	34.46
Austria	30.79	26.23	36.93	32.92		1.73	79.03
Belgium	4.40	3.46	5.72	4.97		0.01	134.01
Canada	25.79	24.55	30.03	30.65	8.8	2.84	52.15
Denmark	18.43	14.11	29.09	26.20		0.09	66.58
Finland	28.32	23.18	32.38	29.42		1.47	47.62
France	13.66	9.55	19.63	16.65		0.02	45.13
Germany, Fed. Rep.	16.54	13.63	17.45	15.14			
Greece	27.35	22.39	27.98	24.39		0.11	44.88
Iceland	13.02	9.51	29.41	27.56	3.8	10.44	67.09
Ireland	23.85	19.23	32.11	28.65			111.49
Israel	17.71	15.17	33.45	32.41		1.66	80.08
Italy	20.05	16.45	20.48	17.62		0.02	40.05
Japan	17.91	17.75	21.97	22.33	6.9	2.65	20.65
Netherlands	16.42	13.86	25.56	25.22			103.68
New Zealand	2.72	2.18	10.15	9.76	14.5	4.65	54.54
Norway	16.58	12.72	33.04	29.46	5.7	0.85	74.73
Portugal	28.60	23.83	19.33	16.63		2.19	75.18
Spain	36.14	30.61	21.02	18.19		2.89	37.5
Sweden	15.37	11.19	30.90	27.32		1.01	59.46
Switzerland	24.91	22.91	22.72	21.35	4.4	3.61	72
United Kingdom	12.73	10.56	25.70	23.11			51.47
United States	17.30	14.19	20.68	19.44	6.3	3.37	21.19
Developing nations:							
Argentina	33.46	30.01	49.38	47.31	20.5	9.13	14.99
Benin	43.62	38.22	32.83	29.86	42		52.29
Bolivia	18.08	15.75	33.14	31.93	16	5.9	46.7
Brazil	40.67	35.21	43.92	39.88	32.2	10.54	15.16
Burkina Faso	39.14	34.99	34.10	32.01		17.13	38.37
Cameroon	29.24	26.08	35.27	33.18		17.22	37.5
Central African Rep.	32.70	29.21	33.70	32.23			42.39
Chad	37.91	34.91	33.52	33.65			42.43
Chile	25.70	21.60	26.34	24.60	15		65.97
China (PRC)	56.76	51.60	51.31	48.15	40.3	7.99	31.85
Columbia	34.36	30.09	48.00	45.43	27	18.16	35.84
Congo, Dem. Rep.	33.16	28.24	35.77	33.26	24.7	22.8	58.71
Congo, Rep.	29.11	24.14	37.44	34.96			99.48
Costa Rica	45.26	39.01	28.76	25.11		11.4	75.96

Country	BCFE[a] 1960	ACFE[a] 1960	BCFE[a] 1990	ACFE[a] 1990	Tariff[b] 1990	Duties[c] 1990	Trade[c] 1990
Cote d'Ivoire	18.94	16.13	25.95	26.04	25.8	33.6	58.8
Dominican Rep.	24.22	19.84	31.13	28.42		17.7	77.52
Ecuador	27.03	22.51	38.38	35.51	37.1	13.37	60.12
Egypt	29.00	26.29	43.22	41.91	33.5	19.03	52.76
El Salvador	17.91	14.25	30.34	28.12	16		49.78
Ethiopia	29.31	26.13	39.06	38.83		21.46	20.26
Gabon	27.38	23.86	28.20	26.16		24.18	76.9
Ghana	24.84	19.93	39.97	36.56	17	16.06	42.73
Guatemala	26.13	22.20	34.38	32.39	16		45.87
Guinea	28.63	24.51	28.18	27.27	13	6.17	61.51
Haiti	33.59	30.59	35.69	34.61			45.24
Honduras	23.57	21.23	28.80	27.66			76.13
India	46.70	40.90	51.60	47.08	81.8	42.18	16.89
Indonesia	35.33	31.05	37.78	35.40	20.6	6.29	49.87
Iran	44.69	39.36	44.09	41.02		39.63	45.52
Iraq	36.62	31.89	29.18	27.34			
Jordan	23.50	17.15	28.74	25.08	12.2	11.32	154.65
Korea	39.24	36.26	28.35	27.47	13.3	7.88	59.35
Liberia	10.25	7.79	12.59	13.32			
Madagascar	26.44	21.73	37.42	35.14			
Malaysia	49.85	45.20	28.46	27.60	17	4.81	150.62
Mali	40.24	34.72	33.85	30.96			50.88
Mauritius	31.91	27.80	26.47	25.25	33		95.57
Mexico	49.46	44.52	45.04	42.43	11.1	5.98	38.31
Morocco	22.80	18.76	34.03	30.58			
Myanmar	18.83	16.14	55.02	53.12		35.68	7.46
Nicaragua	21.21	17.97	28.82	27.00	8	12.14	71.29
Niger	36.36	32.79	33.81	32.16			36.97
Nigeria	44.62	39.41	44.80	41.13	35.7		72.24
Pakistan	30.82	26.91	45.69	41.22	64.8	32.22	38.91
Panama	4.81	2.25	10.21	9.20		4.24	72.23
Paraguay	20.56	18.43	32.39	31.03	15.9	5.55	51.07
Peru	28.75	24.94	37.16	35.90	26	11.48	23.56
Philippines	29.88	25.82	35.84	33.88	27.8	14.52	60.8
Saudi Arabia	34.92	30.23	29.94	26.57	12.2		82.35
Senegal	40.37	35.23	34.98	31.28	15		55.77
Somalia	38.14	32.82	36.37	34.37			47.53
South Africa	16.46	12.80	54.65	50.64	11	6.39	43.05
Sri Lanka	16.43	14.60	35.32	34.70	28.3	18.02	68.24
Thailand	37.66	32.62	32.17	29.04	39.8	11.67	75.78
Togo	17.31	16.24	20.45	20.42			78.81
Tunisia	28.71	23.29	35.02	30.92	27.4	19.98	94.16

Country	BCFE[a] 1960	ACFE[a] 1960	BCFE[a] 1990	ACFE[a] 1990	Tariff[b] 1990	Duties[c] 1990	Trade[c] 1990
Turkey	43.48	39.16	40.41	38.46		5.66	30.85
Uruguay	18.63	15.47	32.73	31.64	23	13.5	46.27
Venezuela	33.85	29.40	40.34	37.98	19	9.25	59.63

a. Country-year fixed effects estimated from basic (BCFE) and amended (ACFE) models. These effects are reported here as positive differences from the "free trade" benchmark: i.e. deviations from the highest country-year intercept (the Netherlands 1964) expressed as a positive percentage of predicted imports with all variables in each model set to the sample means and using the intercept for the Netherlands in 1964.

b. Source: World Bank: http://www1.worldbank.org/wbiep/trade/TR_Data.html

c. Import duties as percent share of imports and total trade as a percent of GDP. Source: World Bank, *World Development Indicators* CD-ROM 2000.

TABLE 3: Coefficients of Correlation between Measures of Trade Policy Orientations*

a. Measures Available for Multiple Years 1960-92:

	BCFE	ACFE	Duties	Trade
BCFE	1.00			
ACFE	0.99 (2,706)	1.00		
Duties	0.45 (1,124)	0.45 (1,124)	1.00	
Trade	-0.45 (2,431)	-0.44 (2,431)	-0.21 (1,109)	1.00

b. Measures Available for 1990:

	BCFE	ACFE	Tariff	Duties	Trade
BCFE	1.00				
ACFE	0.99 (82)	1.00			
Tariff	0.54 (44)	0.50 (44)	1.00		
Duties	0.52 (57)	0.51 (57)	0.79 (36)		
Trade	-0.47 (77)	-0.49 (77)	-0.20 (44)	-0.22 (57)	1.00

c. Measures Available for Individual Years:

	BCFE	ACFE	Duties	Trade
Dollar Price Distortion 1980	0.07 (62)	0.05 (62)	0.30 (50)	0.05 (58)
Leamer Trade Openness 1982	-0.22 (60)	-0.24 (60)	0.15 (48)	0.70 (57)
Lee Own Import-Weighted Duties 1985	0.53 (62)	0.52 (62)	0.76 (50)	-0.36 (60)

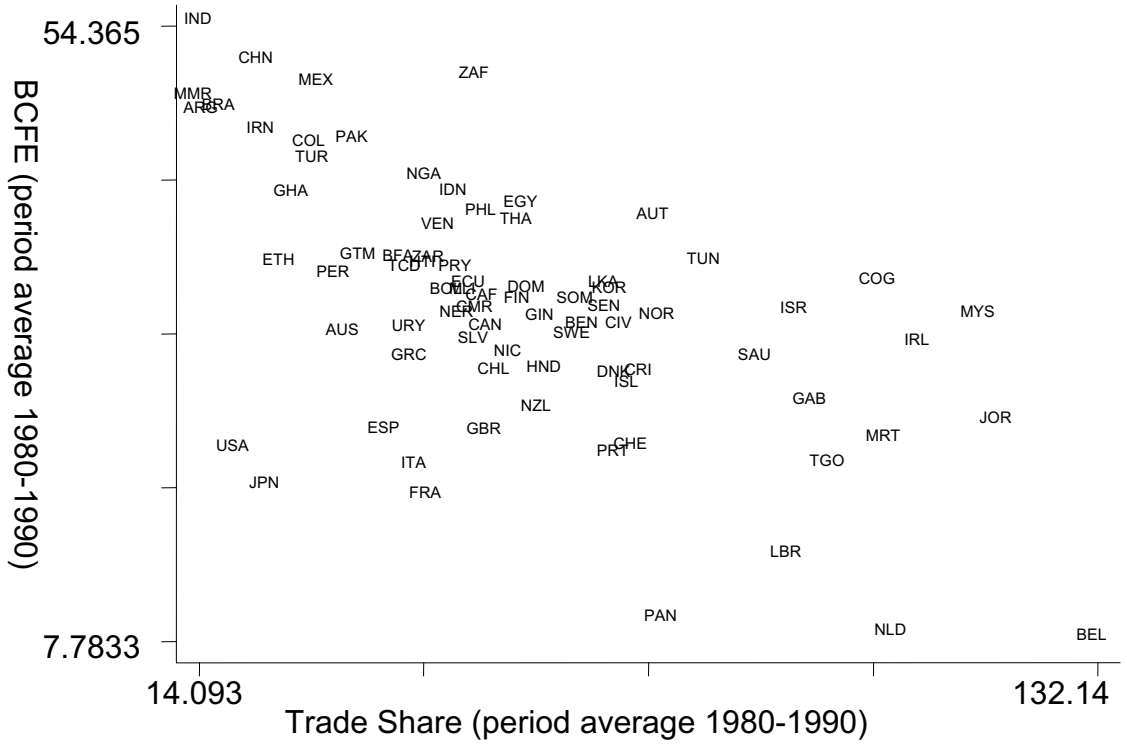
* Number of observations in parentheses. See Table 2 and text for descriptions of individual measures.

Table 4: Country Averages for BCFE, 1980-1990 (sorted by openness)*

Country	BCFE	Country	BCFE	Country	BCFE
BEL	7.78331	SWE	30.57856	ETH	36.12841
NLD	8.088894	AUS	30.84318	TUN	36.24387
PAN	9.232888	IRQ	31.01167	ZAR	36.3349
LBR	13.98431	URY	31.15766	BFA	36.41867
DEU	16.54942	CAN	31.21552	GTM	36.60256
FRA	18.49475	BEN	31.35599	MAR	38.25609
JPN	19.2605	CIV	31.39583	VEN	38.91643
ITA	20.78629	GIN	31.99509	THA	39.2967
TGO	20.90913	NOR	32.03785	MDG	39.55829
PRT	21.69213	MYS	32.21605	AUT	39.63337
USA	22.08059	NER	32.21775	PHL	39.89175
CHE	22.22025	ISR	32.44974	EGY	40.55425
MRT	22.80759	CMR	32.58455	GHA	41.37973
GBR	23.31214	SEN	32.65151	IDN	41.41727
ESP	23.43058	FIN	33.28474	NGA	42.69384
JOR	24.21354	SOM	33.29871	TUR	43.9354
NZL	25.10432	CAF	33.51871	COL	45.18888
GAB	25.58889	MLI	33.91924	PAK	45.424
ISL	26.9189	BOL	33.92974	IRN	46.0993
DNK	27.65567	KOR	34.0038	ARG	47.65297
CRI	27.81033	DOM	34.132	BRA	47.87139
CHL	27.88608	ECU	34.49294	MMR	48.72538
HND	28.06229	LKA	34.52364	MEX	49.76686
SAU	28.98724	COG	34.73499	ZAF	50.32092
GRC	28.99969	PER	35.2181	CHN	51.40221
NIC	29.25974	PRY	35.64189	IND	54.36586
IRL	30.07295	TCD	35.71974		
SLV	30.2507	HTI	36.00111		

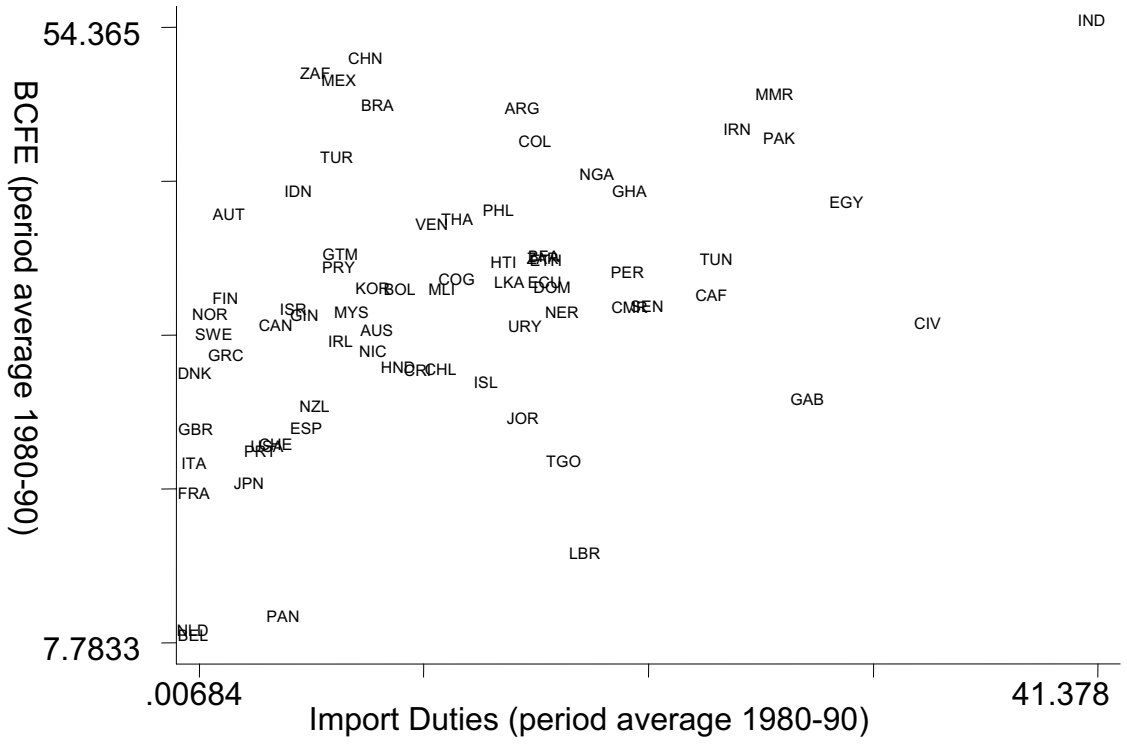
*See appendix for key to World Bank 3-letter country codes

FIGURE 1: Country Averages of BCFE and Trade as a Share of GDP, 1980-1990*



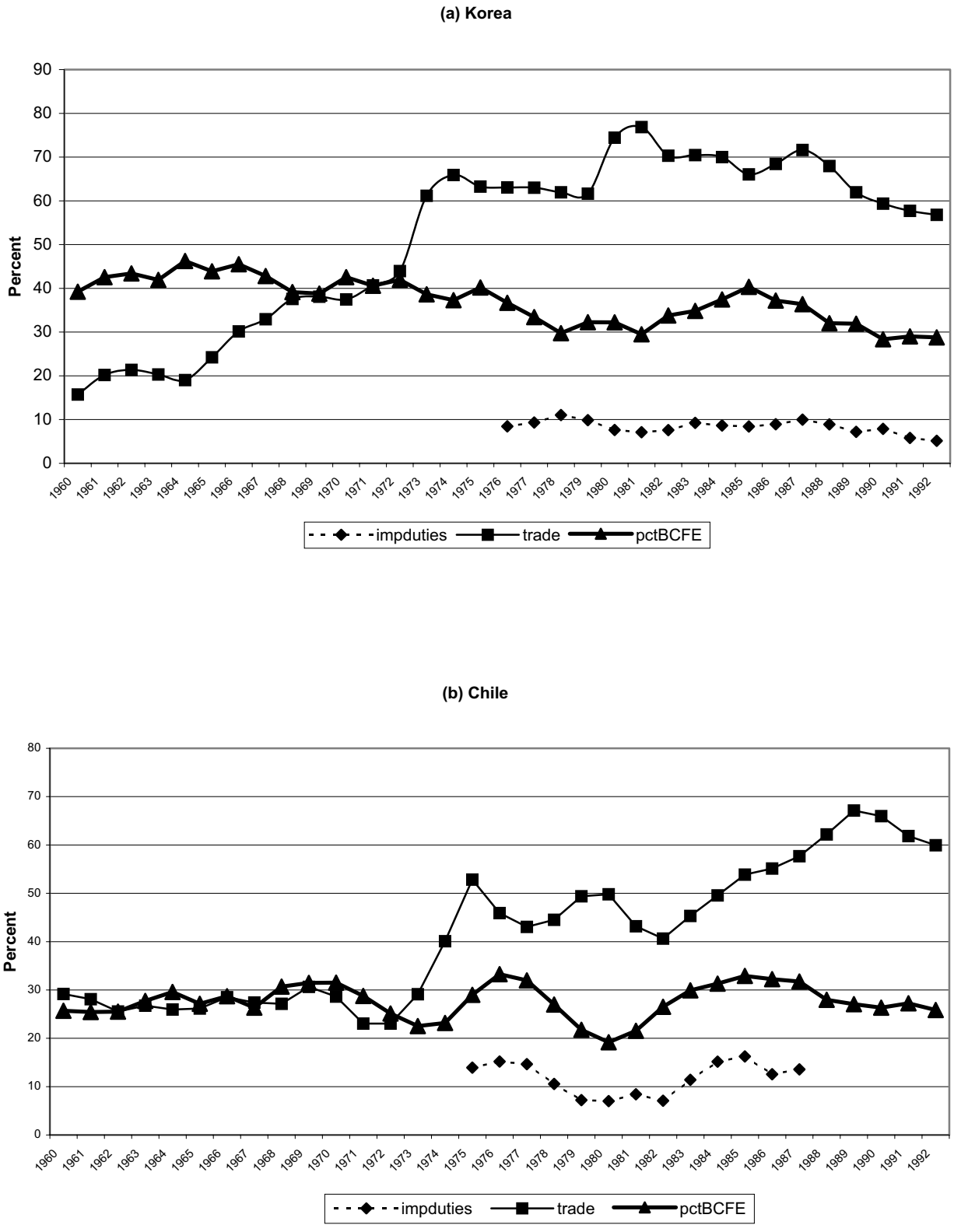
* See appendix for key to World Bank 3-letter country codes.

FIGURE 2: Country Averages of ACFE and Import Duties as a Percent of Imports, 1980-1990*

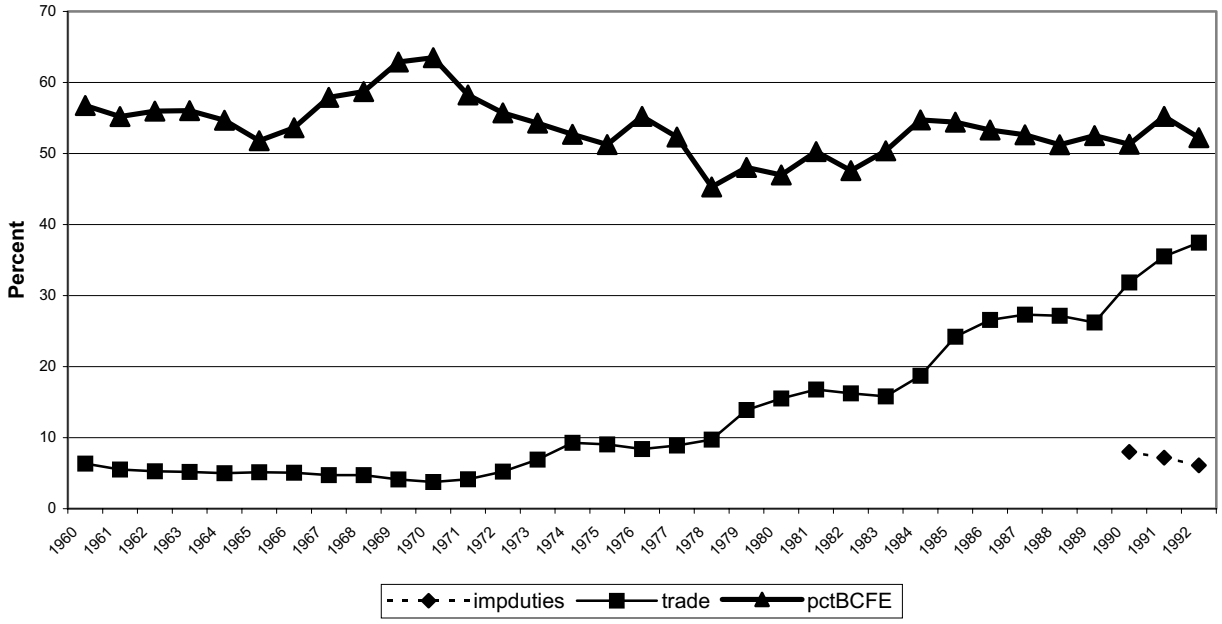


* See appendix for key to World Bank 3-letter country codes.

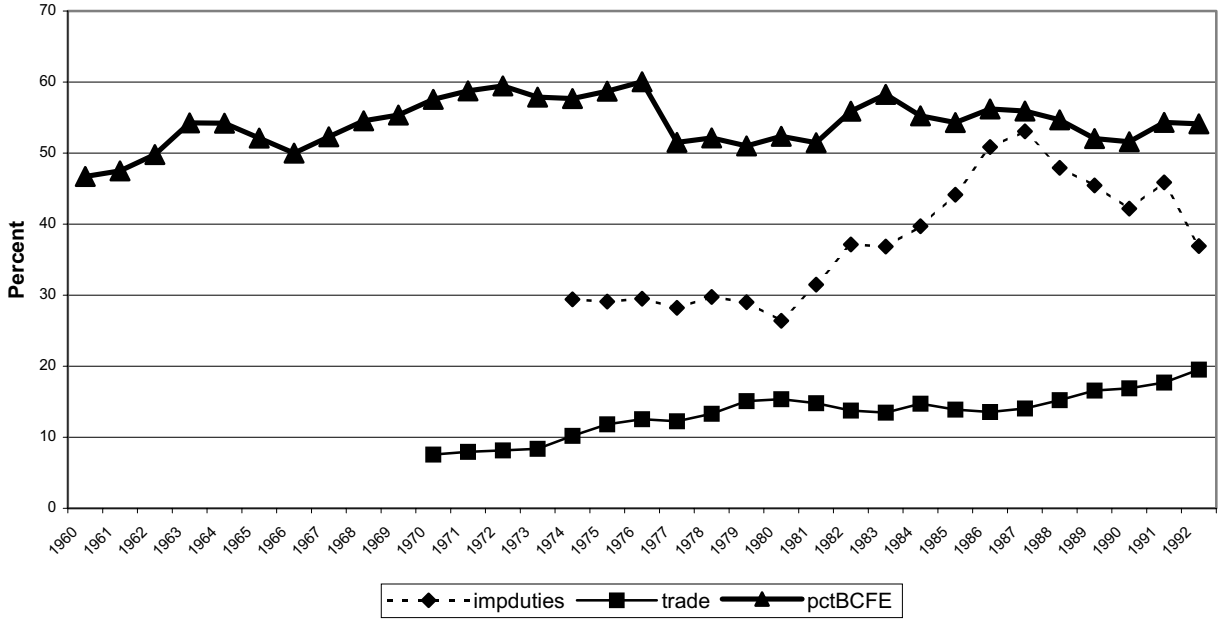
FIGURE 3: Changes in Measures of Openness over Time for Individual Countries, 1960-1992



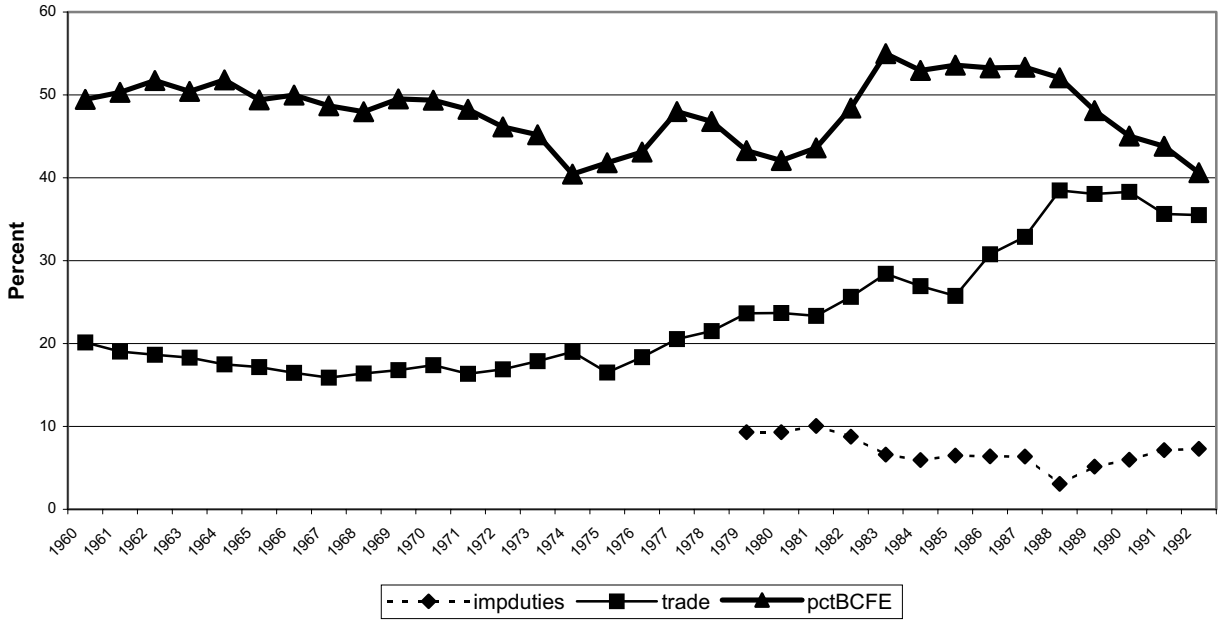
(c) China



(d) India



(e) Mexico



(f) Argentina

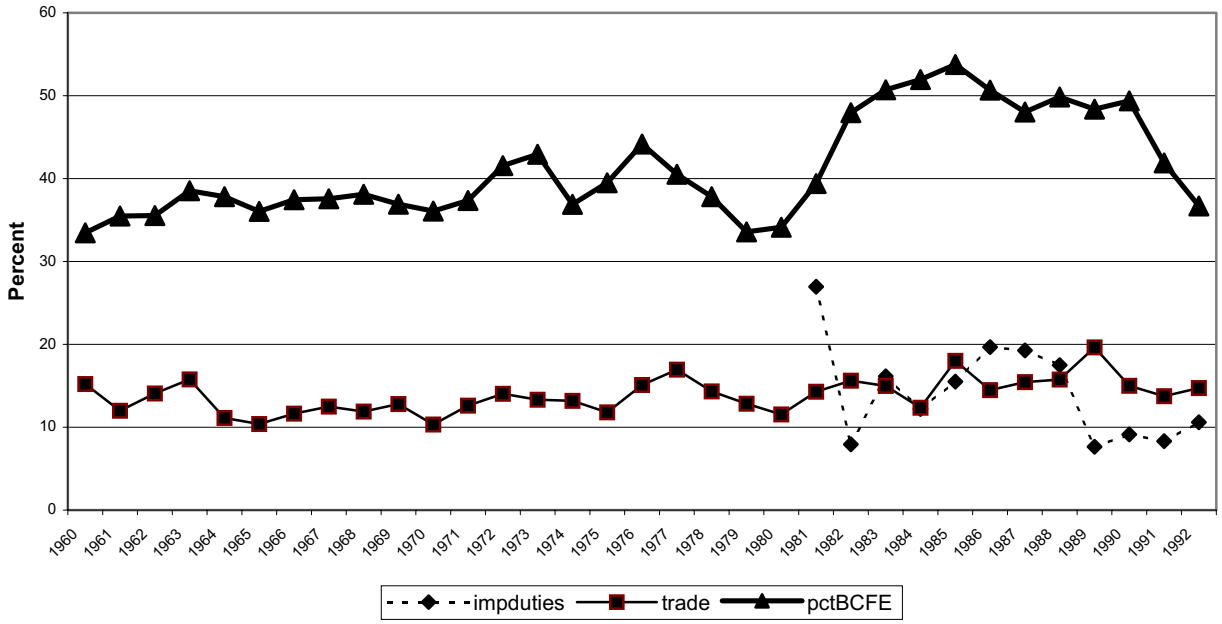
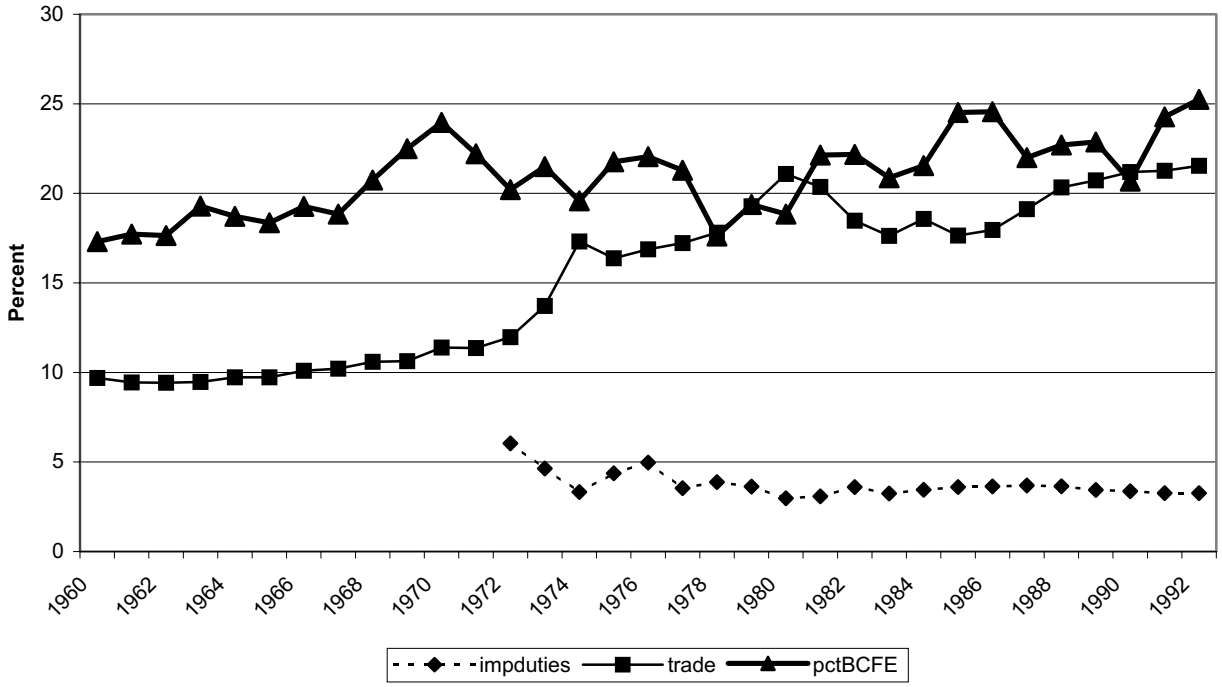


FIGURE 4: Changes in Measures of Openness over Time for the United States, 1960-1992



Appendix: World Bank country codes

ARG	Argentina	ECU	Ecuador	ISL	Iceland	PAK	Pakistan
AUS	Australia	EGY	Egypt	ISR	Israel	PAN	Panama
AUT	Austria	ESP	Spain	ITA	Italy	PER	Peru
BEL	Belgium	ETH	Ethiopia	JOR	Jordan	PHL	Philippines
BEN	Benin	FIN	Finland	JPN	Japan	PRT	Portugal
BFA	Burkina Faso	FRA	France	KOR	Korea,	PRY	Paraguay
BOL	Bolivia	GAB	Gabon		Republic	SAU	Saudi Arabia
BRA	Brazil	GBR	United	LBR	Liberia	SEN	Senegal
CAF	C African		Kingdom	LKA	Sri Lanka	SLV	El Salvador
	Republic	DEU	West	MDG	Madagascar	SOM	Somalia
CAN	Canada		Germany	MEX	Mexico	SWE	Sweden
CHE	Switzerland	GHA	Ghana	MLI	Mali	TCD	Chad
CHL	Chile	GIN	Guinea	MMR	Myanmar	TGO	Togo
CHN	China	GRC	Greece	MAR	Morocco	THA	Thailand
CIV	Cote d'Ivoire	GTM	Guatemala	MRT	Mauritania	TUN	Tunisia
CMR	Cameroon	HND	Honduras	MYS	Malaysia	TUR	Turkey
COG	Congo, Rep.	HTI	Haiti	NER	Niger	URY	Uruguay
COL	Colombia	IDN	Indonesia	NGA	Nigeria	USA	United States
CRI	Costa Rica	IND	India	NIC	Nicaragua	VEN	Venezuela
DNK	Denmark	IRL	Ireland	NLD	Netherlands	ZAF	South Africa
DOM	Dominican	IRN	Iran	NOR	Norway	ZAR	Congo, Dem.
	Republic	IRQ	Iraq	NZL	New Zealand		Republic