MARKET ACCESS, OPENNESS AND GROWTH

John Romalis

Market Access, Openness and Growth
John Romalis
NBER Working Paper No. 13048
April 2007
JEL No. F13,F43

ABSTRACT

This paper identifies a causal effect of openness to international trade on growth. It does so by using tariff barriers of the United States as instruments for the openness of developing countries. Trade liberalization by a large trading partner causes an expansion in the trade of other countries. Trade expansion induced by greater market access appears to cause a quantitatively large acceleration in the growth rates of developing countries. Eliminating existing developed world tariffs would increase developing country trade to GDP ratios by one third and growth rates by 0.6 to 1.6 percent per annum.

John Romalis
University of Chicago
Graduate School of Business
5807 South Woodlawn Avenue, Ste. 421
Chicago, IL 60637
and NBER
jromalis@gsb.uchicago.edu

1 Introduction

The correlation between openness to international trade and both income and growth depicted in Figures 1 and 2 has triggered a lively debate as to whether international trade causes better growth outcomes. On one 'side' of the debate are advocates of free trade such as Arvind Panagariya (2004) who argue that countries perform better with outward orientation than with import substitution. On the other side are those who take a more skeptical view of the evidence on the relationship between trade and growth, most systematically expressed in Rodriguez and Rodrik (2000) and Rodrik *et al.* (2004). The skeptical view is that the quality of institutions "trumps" anything else and that integration has essentially no independent effect on growth. This paper provides some evidence against the skeptical view by showing that increased developing-country openness caused by declining developed world tariffs raised developing-country growth.

An endogeneity problem traditionally hinders investigations of the effect of trade on growth. Trade openness is likely to be in part caused by growth or by other factors that may have a direct effect on growth such as the quality of institutions. Openness measures based on trade shares therefore suffer from the likelihood that countries experiencing fast growth rates for reasons other than trade may more rapidly expand their trade (Jeffrey Frankel and David Romer, 1999). Use of trade policy measures does not overcome the problem, because countries that adopt more liberal international trade policies may also adopt other market-friendly policies.

This paper uses measures of access to developed country markets to identify whether increased exposure to international trade causally affects countries' growth rates. The measures are derived from US Most Favored Nation (MFN) tariff rates, which declined substantially in the post-war period in line with declines in the tariffs of other developed countries. The paper recognizes that how internationally integrated a country is depends both on its policies and on the policies of its trading partners. Countries can become more integrated by liberalizing their own trade policies, but such liberalizations may not be independent of other policy changes or economic prospects. But countries also become more exposed to trade when their trading partners liberalize their trade regimes. Demand shifts produced by developed country liberalization expose developing countries to more trade, but do not entail

adverse effects on often shaky developing country public finances or on their terms of trade. This may have an important effect on growth outcomes.

Developed country liberalization may provide useful instruments for regressions of developing country growth on trade. Since developed country liberalization is a consequence of decisions taken outside of developing countries it is less susceptible to the endogeneity problems that arise when developing countries themselves liberalize trade as part of a package of reforms. Liberalizations by developed countries may be unaffected by the economic polices of developing countries that for most of the post-war period remained on the fringe of world trade negotiations. These liberalizations are arguably exogenous to most developing countries. To benefit from US MFN tariff reductions, developing countries merely had to remain off a list of disfavored communist countries together with a handful of other disfavored regimes.[1] Critically, trade liberalizations by large countries should only affect developing countries through their impact on actual or potential international transactions. US MFN tariff data may provide good instruments for the openness of developing countries in regressions of growth on openness.

Figure 3 captures some of the history of market access since 1960 as measured by the evolution of US most-favored-nation (MFN) tariffs. The simple average of US tariffs by product has been calculated from detailed tariff data from 1974 to 2000 and extended back to 1960 using aggregate USITC (2004) data on the ratio of import duties to imports. Because US MFN tariff reductions were negotiated during trade negotiations with other developed economies, US tariff reductions coincided with similar tariff reductions by other developed economies.[2] The openness of developing countries measured by current-price trade to GDP ratios and exports to GDP ratios expanded as developed world tariffs fell (Figures 3 and 4). Some of the measured expansion of trade to GDP ratios in the 1970s may have been due to the temporary increase in commodity prices - openness measured at constant prices does not greatly increase until later (Figure 5).

What is evident from Figures 3 to 5 is that a large increase in developing-country

---

[1] While some communist countries received the US MFN tariff, most were subjected to a much higher tariff. Other developed countries were much less prone to imposing punitive import taxes on imports from communist countries.

[2] See Figure 1 in Michael A. Clemens and Jeffrey G. Williamson (2004).

trade since the late 1980s has been associated with relatively modest reductions in the average US MFN tariff. A non-linear relationship between tariffs has been studied before, and one of the leading explanations of this relationship is that very low tariffs facilitate vertical specialization whereby countries specialize in particular stages of a good's production (Kei-Mu Yi, 2003). Small reductions in tariffs can cause a surge in international trade. Figure 6 shows that the proportion of US MFN tariffs that might be labeled as "low" increased substantially in the 1980's and 1990's, including a large proportion of items that were scheduled to become tariff-free by 2005. The proportion of low tariffs also seems to be associated with the growth in developing country openness. This suggests an alternative set of instruments for developing-country openness - the proportions of US MFN tariffs that fall into arbitrary ranges.

This paper considers whether developed country trade liberalization (proxied by US MFN tariffs) induced an expansion in the openness of developing countries. It concludes that it did. This paper also asks whether that induced trade expansion caused an acceleration in the growth rates of developing countries. This paper also concludes that it did.

The theoretical effect of increased trade on developing country growth is ambiguous since, for example, poor countries might end up more specialized in commodities that experience slow productivity growth (Alwyn Young, 1991), or research in the developing country might be dampened (Gene Grossman and Elhanan Helpman, 1991). But there are many channels through which access could increase growth. James Tybout (2001) presents evidence that trade causes the markets for the most efficient plants to expand and that exposure to foreign competition improves intra-plant efficiency. Liberalization by wealthy countries may facilitate technological transfers to poor countries and it enlarges the market that the typical developing country firm operates in, potentially though not necessarily spurring innovation (Grossman and Helpman, 1991). Daron Acemoglu *et al.* (2002) suggest that greater access to trade may facilitate growth by inducing the adoption of institutions that protect property rights. Increased market access is also equivalent to a positive terms of trade shock to poor countries. Acemoglu and Jaume Ventura (2001) suggest that an increase in the terms of trade may encourage factor accumulation and growth by increasing factor prices. Christian Broda (2002) shows empirically that shocks to the terms of trade have prolonged effects on a country's GDP. Economic geography literature suggests

4

that market access may give rise to agglomeration benefits, leading to higher income levels (see for instance Paul Krugman and Anthony Venables (1995) for theory and Mary Amiti and Lisa Cameron (2004) for empirical confirmation).

Empirical studies of the effect of trade on growth are usually either cross-country studies using aggregate data, or within-country studies using plant- or firm-level data. This paper has two main differences from most existing cross-country studies of the effect of trade on growth. Firstly, it exploits an exogenous variation in the openness of developing countries - variation caused by demand shifts following developed-country trade liberalization. The paper is therefore most similar to Frankel and Romer (1999) who use geography as an instrument for trade in a cross-country regression of income levels on openness - market access might be viewed as a trade-policy equivalent of geography. But since market access has more time variation than does geography, this paper has greater flexibility to control for the effect on growth of persistent factors such as the quality of institutions using a panel of growth rates.

The conclusion of most of the cross-country studies is that countries with lower trade barriers grow faster. Dollar (1992) finds that growth in 95 developing countries over the period 1976-1985 is negatively correlated to two indices of how closed developing economies are to trade; an index of real exchange rate distortion and an index of real exchange rate variability. Sachs and Warner (1995) find that growth is positively related to an openness indicator based on a number of policies that affect international economic integration. Edwards (1998) regresses his estimates of total factor productivity growth on a range of pre-existing indicators of openness to trade, and finds that most indicators are strongly positively correlated with productivity growth, Greenaway *et al.* (2002) perform a similar analysis for GDP growth rates in developing countries, and find that growth responds with a lag to trade liberalization. Ben-David (1993) finds that trade liberalization reduces income dispersion amongst the liberalizing countries. Frankel and Romer (1999) find that countries that trade more due to favorable geography grow more quickly after World War II, a result that was extended to the early 20th century by Irwin and Tervio (2002). Dollar and Kraay (2001) find that more trade promotes growth but has no effect on income distribution, therefore trade increases the incomes of the poor. Rodriguez and Rodrik (2000) take issue with all of these papers, arguing that the measures of openness are often poor measures of trade barriers, or are highly correlated with other causes of economic

5

performance, or have no link to trade policy. Rodrik *et al.* (2004) find that more favorable geography affects income levels through the quality of institutions and not through trade integration.

Within-country studies note that gains from trade are driven by a reallocation of resources to relatively productive uses and examine whether greater openness causes such reallocations. Extensive plant- and firm-level evidence of this reallocation has been found and is surveyed in Tybout (2001). Tybout uses his own research and his survey of other evidence to conclude that trade rationalizes production by expanding the markets for the most efficient plants and by improving intra-plant efficiency. Exporting firms, which tend to be larger and more productive, expand, though large import-competing firms contract. Bolaky and Freund (2004) exploit the idea that reallocation is likely to be more feeble in heavily regulated economies and show that the positive relationship between trade and growth is stronger when conditioning on country regulation measures. A strand of literature commencing with Robert Feenstra *et al.* (1999) focuses on an idea central to some endogenous growth models by finding that productivity is enhanced by an increase in product (export) variety. Christian Broda and David Weinstein (2006) show the contribution of product (import) variety to US welfare.

This paper is organized as follows. Section 2 presents the empirical specification. Section 3 describes the data. Section 4 presents and discusses the empirical results. Section 5 concludes.

2   Empirical Strategy

Developed country tariffs have been substantially reduced in the post-war period after successive rounds of multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT). Of particular note is the substantial reduction in tariffs achieved at the conclusion of the "Kennedy Round" of trade negotiations in 1967. The reduction in US tariffs evident in Figure 3 was mirrored in other developed countries. As developed world tariffs began to decline, the trade of some developing countries quickly expanded. The empirical strategy is to examine whether the increase in openness induced by greater market access caused faster growth in developing

6

countries. I use US MFN tariff data as instruments for the openness of developing countries in a regression of growth on openness. The regression will pool IV regressions of growth on openness for individual countries, where the pooling assumption is that the causal effect of openness on growth - β in Equation 1 - is the same for each country. I choose the following simple specification for the growth equation:

$$\Delta \ln rgdppc_{ct} = D_c + D_t + \alpha_c t + \beta open_{ct} + \varepsilon_{1ct} \tag{1}$$

where $rgdppc$ is real per-capita GDP, $open$ is the ratio of trade to GDP, subscripts c and t respectively denote country and time, and D_c and D_t are full sets of country and year dummies respectively. Growth is simply modelled as the sum of a country fixed-effect, a year fixed-effect, a country-specific trend and a function of each country's openness to international trade. Even though the dependant growth rate variable is an annual growth rate, the specification allows a permanent increase in openness (above its trend) to have a permanent effect on growth rates. Openness to international trade depends on market access and is modelled according to:

$$open_{ct} = D_c + D_t + \gamma_c t + \delta_c access_t + \varepsilon_{2ct} \tag{2}$$

where $access$ is market access at time t that I proxy with US MFN tariffs. Since $access$ is going to be used as an instrument for $open$ it is not of immediate concern that the US MFN tariff is an imperfect measure of $access$, the important concern is the exogeneity of the US MFN tariff to developing country growth in the sample. The presence of the trend in the specification is motivated by the concern that country growth rates and openness to international trade may exhibit trends that are unrelated to market access developments. This is of concern since market access also displays a clear trend in Figures 3 to 6. A feature of the specification is that Equation 2 allows openness in each country to respond differently to market access. There are three main reasons for this. The trade of more open countries or countries closer to the US may be more sensitive to reductions in the US MFN tariff. Furthermore, not all tariffs have come down equally - some exporters will be more affected by the tariff reductions than others. Finally, the presence of preferential access for some developing country exports to developed country markets means that some exports

of developing countries can be harmed by MFN tariff reductions (Mary Amiti and John Romalis, 2006). The instruments are therefore summary measures of US MFN tariffs interacted with a full set of country dummies. Allowing different responses of openness to the US MFN tariff also enables the inclusion of year fixed-effects in the regression, which would otherwise completely absorb the instruments. The year fixed effects should help control for factors such as the business cycle.

Equation 1 is estimated by both OLS and IV using different annual measures of growth and openness sourced from the Penn World Tables 6.1 and the World Bank's World Development Indicators for a sample of up to 135 developing countries for the period 1960 to 2000.

2.1 Data

Income Data

I source 5 measures of real income from 1960 to 2000 from the Penn World Tables 6.1 (PWT). There are two measures of per capita GDP: $rgdpl$ is real GDP per capita constructed using a Laspeyres Index, and $rgdpch$ that is constructed using chained weights. I also use real GDP per equivalent adult $rgdpeqa$, real GDP per worker $rgdpwok$, and real GDP that has been adjusted for trading gains or losses stemming from movements in the terms of trade $rgdptt$. I define a country to be developed in 1960 if it had per capita GDP that was at least 50 percent of US levels - this is the variable y in the PWT. I added Japan to this list because of its role in multilateral trade negotiations.[3] All other countries are classed as developing. Only developing countries are included in the sample.

Openness

I obtain two measures of openness from the PWT: *openc* is the ratio of exports plus imports to GDP at current prices; *openk* is that ratio at constant prices. I add to these the ratio of exports to GDP at current prices sourced from the World Bank's World Development Indicators (WDI).

US MFN Tariffs

---

[3]This adjustment had minimal impact on the results.

US trade data from 1974 classified by country of origin and import program at the tariff-line level is available from the Center for International Data at UC Davis. From this data I calculate the Most Favored Nation (MFN) tariff for each product using the customs value of imports from countries enjoying MFN status and the tariffs collected on such imports. The data are extended back to 1960 using annual USITC (2004) data on the ratio of total duties collected to total imports. Almost all US tariffs from 1960 to 1974 were calculated on an MFN basis, apart from some automotive products from Canada and products from most communist countries. Movements in the ratio of duties to imports prior to 1974 will mostly reflect changes in MFN tariffs, but will also include some movement due to changes in trade composition. The ratio of total duties to total imports declined from 7.2 percent in 1960 to 3.8 percent in 1974. I then calculate several summary measures of the US MFN tariff schedule: the simple average MFN tariff; and the proportions of US MFN tariffs that fall into several arbitrary ranges - 0 percent; greater than 0 but less than 5 percent; greater than 5 but less than 10 percent; and greater than 10 but less than 20%.[4]

3   Results and Discussion

All regressions use annual data from 1960 to 2000 and only include developing countries.

OLS Results

Table 1 summarizes the OLS estimates of β in Equation 1 - the effect of openness on growth. Because openness may be endogenous to growth OLS need not identify β, and the results themselves give little ground for concluding anything about the relationship between openness and growth. The OLS estimates vary greatly depending on which measure of openness is used, and to a lesser extent they vary depending on the measure of growth used. When openness is measured by the current price ratio of exports plus imports to GDP there is usually no significant relationship between openness and growth, with the slight exception of when growth has been adjusted for movements in the terms of trade so that it measures real output rather than real

---

[4]There is no need to include the proportion of tariffs that exceed 20 percent since this proportion is simply 1 minus the sum of the other proportions.

income. A significant negative relationship is usually apparent when openness is measured by the constant-price ratios of trade to GDP, with the exception again being when growth is adjusted for the terms of trade. Finally, when openness is measured by current price exports to GDP, a significant positive relationship exists between openness and growth.

Table 2 reports OLS results from a slightly different specification where the log of the openness ratios have been used rather than their levels. The results are broadly similar to Table 1, though there has been some increase in the significance of some estimates obtained using trade to GDP ratios measured at current prices.

"First Stage" Results

Since Equation 2 allows the openness of each country to respond differently to the instrument it is not practical to report the actual first-stage results. Figures 3 to 6 provide a visual summary of the first stage - they exhibit a strong correlation between US MFN tariffs and developing country openness. These Figures differ from the regressions in two main respects though. The Figures have not been detrended, whereas the regressions include trends, and the figures are GDP-weighted while the regressions do not weight observations by GDP. A better summary is provided in Tables 3 and 4, which reports an average response of openness to market access measured by US MFN tariffs by running the following regression:

$$open_{ct} = D_c + \gamma_c t + \delta access_t + \varepsilon_{3ct} \tag{3}$$

Table 3 reports results where openness is measured as a ratio of each trade measure to GDP, while Table 4 reports results where openness is measured as the log of those ratios. A decrease in the average MFN tariff causes an expansion in developing country openness. There is some evidence that conditional on the average MFN tariff, an increase in the proportion of low tariffs also causes an expansion in developing country openness. The "first stage" results are stronger for the current-price openness measures than for the constant-price measure, consistent with Figures 3 to 6. The first stage results are also consistent with more detailed analysis of NAFTA in Romalis

(2005) showing that Mexican trade is very responsive to modest increases in access to US and Canadian markets.

Instrumental Variables Results

The IV results in Table 5 provide a stark contrast to the OLS results. The IV results generally suggest a significant positive relationship between openness and growth regardless of the measures of openness and growth used. The magnitude of the effect is also relatively consistent across the measures of openness, accounting for the fact that the ratio of exports to GDP is typically about half the ratio of trade to GDP. The effect is also large. For this sample of mostly very small developing countries, moving from being a closed economy to a relatively open one with a trade to GDP ratio of 1 adds between 2 to 5 percentage points to the annual growth rate. Over a period of 40 years this could amount to much of the difference between what Arvind Panagariya (2004) would label a growth 'debacle' and a growth 'miracle'.

Table 6 contains IV results from a slightly different empirical specification - the log of the openness measures have been used as the explanatory variable in place of their level. The results are similar to Table 5. The effect of openness is still large - a doubling of openness for this sample of countries increases the annual growth rate by about 1.5 to 2 percentage points.

Tables 7 to 10 report IV results obtained using alternative sets of instruments. In Tables 7 and 8 only the average US MFN tariff has been used to construct the instruments. The results are similar to Tables 5 and 6. One difference is that in Table 7 the point estimates increase when the constant price trade to GDP openness measure is used, so that these estimates are now very similar to the estimates obtained using the current price openness measures. The other difference in Table 7 is that the estimates are now usually only marginally significant when exports to GDP is used as the openness measure, while in Table 8 the estimates are usually insignificant when openness is measured as the log of trade to GDP at constant prices.

Tables 11 and 12 report IV results excluding high-openness, high-growth Hong Kong and Singapore to ensure that the results are not driven by these countries. Since the regressions include country fixed-effects there is no prior reason to believe

11

that the results are driven by Hong Kong and Singapore. This is confirmed by the results, which are very similar to those reported in Tables 5 and 6.

Implications

These results suggest that increases in developing country trade induced by better access to developed country markets could have a meaningful effect on economic outcomes in developing countries - at least for those willing and able to expand their trade. The simple correlation between US MFN tariffs and developing country openness evident in Figures 3 to 6 and the results in Tables 3 and 4 suggest that developing country trade responds to market access. Further reductions in tariffs and, perhaps more importantly, reductions in the non-tariff barriers that routinely afflict developing country exports would almost certainly lead to a substantial increase in the trade of developing countries - a simple policy prescription that will help some developing countries grow. There appears to have been some conversion of developed country governments towards this view in recent years, at least in relation to the 48 UN-designated Least Developed Countries (LDCs). One move in this direction is the EU's 'Everything But Arms' initiative approved in 2001 (UNCTAD 2001). The EU eliminated duties and quotas on "essentially all" products in March 2001, with the exception of bananas, rice and sugar. The US has made more modest reductions of duties under the African Growth and Opportunity Act and the Caribbean Basin Trade Partnership Act, but still levies tariffs or imposes quotas on thousands of products exported by developing countries.

The regression estimates enable a simple calculation of the impact that eliminating existing developed world tariffs would have on the openness and growth of developing countries. The first stage estimates enable a crude calculation of the effect of such tariff elimination on developing country openness. Although the instrument was US MFN tariffs, these tariffs were reduced in line with tariffs in the entire developed world as a result of trade negotiations under the GATT. US MFN tariffs are arguably proxying for developed world tariff reductions as a whole. Furthermore, the tariffs of other major developed countries are now very similar in magnitude to those in the US. Applying the first stage estimates to a simulated removal of developed world tariffs (proxied by the US tariff schedule) suggests that the trade to GDP ratio of

the typical developing country would increase by about one third.[5] Multiplying this increase in openness by the estimated effects of openness on growth in Tables 5 and 6 generally suggest an increase in growth of between 0.6 and 1.6 percent per annum. This is a large effect, but not implausibly large given that the median developing country in the sample had a GDP of just $9 billion in 2000, and therefore might have much to gain from being more open. The fact that the regression estimates have been obtained from forty years of growth data also suggest that this growth dividend could be very prolonged.

What the results do not say is through what channels market access increases developing country growth - for example whether it is through reallocation of resources to more productive uses, technological transfer, innovation, agglomeration, or terms of trade improvements leading to factor accumulation. While persistent institutions should be accounted for by the country fixed effects and country-specific trends, it is also possible that the results are driven by improved market access causing the quick reform of institutions to forms more favorable to growth. In the absence of extensive panel data on institutional quality it is impossible to exclude that possibility. In this case, access to developed country markets still appears to be a good thing for developing countries. But whatever the causal mechanism developing countries also need to play their part. Strictly interpreted, the results only suggest positive growth outcomes for countries that expand their trade when market access improves. Trade depends on all countries' barriers. While improved access to developed country markets can expand developing country trade, it can do little for an economy that is essentially closed.

4   Conclusion

This paper examined whether improved access to developed countries' markets raises developing country growth. The paper concludes that it does. Decreased developed country trade barriers increase developing world trade. This induced trade expansion causes an acceleration in the growth rate of developing countries. Developing countries that expanded their trade the most in response to improved access to developed-country markets saw their growth rates increase relative to other developing countries.

---

[5]The simple average trade to GDP ratio in 2000 was 0.90.

This suggests that developing country growth rates will accelerate if the developed world lowers its remaining trade barriers. Despite tariff reductions since 1960, trade policy in developed and developing countries still greatly restricts developing country trade, which may substantially harm growth in poor countries.

References

[1] Acemoglu D., S. Johnson and J. Robinson (2002), "The Rise of Europe: Atlantic Trade, Institutional Change and Economic Growth", *mimeo*, MIT, Nov. 25, 2002.

[2] Acemoglu, Daron and Jaume Ventura (2001), "The World Income Distribution", NBER Working Paper No. 8083.

[3] Amiti, Mary and Lisa Cameron (2004), "Economic Geography and Wages", CEPR Discussion Paper No. 4234, February 2004.

[4] Amiti, Mary and John Romalis (2006), "Will the Doha Round Lead to Preference Erosion?", IMF Working Paper No. 06/10, January 2006.

[5] Ben-David D. (1993), "Equalizing Exchange: Trade Liberalization and Income Convergence", *Quarterly Journal of Economics*, Volume 108(3), pp. 653-679.

[6] Bernard, Andrew B. and J. Bradford Jensen (2004), "Exporting and Productivity in the USA", *Oxford Review of Economic Policy*, Volume 20(3), pp.343-357.

[7] Bolaky, Bineswaree and Caroline Freund (2004), "Trade, Regulations, and Growth", World Bank Policy Research Working Paper No. 3255, March 24, 2004.

[8] Broda, Christian. (2002), "Terms of Trade and Exchange Rate Regimes in Developing Countries", *Journal of International Economics*, Volume 63(1), May 2004, pp.31-58.

[9] Broda, Christian and David Weinstein (2006), "Globalization and the Gains from Variety", *Quarterly Journal of Economics*, Volume 121(2), May 2006.

[10] Clemens, Michael A. and Jeffrey G. Williamson (2004), "Why did the Tariff–Growth Correlation Change after 1950?", *Journal of Economic Growth*, Volume. 9(1), pages 5-46.

[11] Dollar D. (1992), "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985", *Economic Development and Cultural Change*, 1992, 523-544.

[12] Dollar D. and A. Kraay (2001), "Trade, Growth and Poverty", mimeo, The World Bank, March 2001.

[13] Edwards S. (1998), "Openness, Productivity and Growth: What Do We Really Know?", *Economic Journal*, Volume 108 (March), pp. 383-398.

[14] Feenstra, Robert, Dorsati Madani, Tzu-Han Yang and Chi-Yuan Liang (1999), "Testing Endogenous Growth in South Korea and Taiwan," *Journal of Development Economics*, 60(2), December 1999, pp. 317-341.

[15] Frankel J. and D. Romer (1999), "Does Trade Cause Growth", *American Economic Review*, Volume 89(3), pp. 379-399.

[16] Greenaway D., W. Morgan and P. Wright (2002), "Trade Liberalization and Growth in Developing Countries", *Journal of Development Economics*, Volume 67, pp. 229-244.

[17] Grossman G. M. and E. Helpman (1991), *Innovation and Growth in the Global Economy*, Cambridge: MIT Press.

[18] Irwin D. and M. Tervio (2002), "Does trade raise income?: Evidence from the twentieth century", *Journal of International Economics*, Volume 58(1), pp.1-18.

[19] Panagariya, Arvind (2004), "Miracles and Debacles: In Defence of Trade Openness", *World Economy*, Blackwell Publishing, 27(8), pp. 1149-1171.

[20] Pavcnik, Nina (2002), "Trade liberalization, Exit, and Productivity improvements: Evidence from Chilean Plants", Review of Economic Studies, Volume 69, January 2002, pp. 245-76.

[21] Roberts M. and J. Tybout (1996), *Industrial Evolution in Developing Countries*, New York, Oxford University Press.

[22] Rodriguez F. and D. Rodrik (2000), "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence", mimeo, University of Maryland and John F. Kennedy School of Government.

[23] Romalis, John (2005), "NAFTA's and CUSFTA's Impact on International Trade", NBER Working Paper No. 11059.

[24] Sachs J. and A. Warner (1995), "Economic Reform and the Process of Global Integration", *Brookings Papers on Economic Activity*, 1995:1, pp. 1-118.

[25] Tybout, James R. (2003), "Plant- and Firm-Level Evidence on "New" Trade Theories", in James Harrigan and Kwan Choi (eds.), *Handbook of International Trade*, New York: Blackwell Publishing, pp. 388-415.

[26] Yi, Kei-Mu (2003), "Can Vertical Specialization Explain the Growth of World Trade?", *Journal of Political Economy*, Volume 111(1), pp. 52-102.

[27] Young A. (1991), "Learning by Doing and the Dynamic Effects of International Trade", *Quarterly Journal of Economics*, Volume 106(2), pp. 369-405.

[28] UNCTAD (2001), "Improving Market Access for Least Developed Countries", mimeo, May 2001.

[29] USITC (2004), "Value of U.S. Imports for Consumption, Duties Collected, and Ratio of Duties to Values, 1891-2003", February 2004.

Table 1: Summary of OLS Regression Results of Growth on Openness
(Openness Measured as Trade/GDP)

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.008 (0.008) N=4251 Countries=135	-0.035*** (0.006) N=4251 Countries=135	0.072*** (0.017) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.008 (0.008) N=4212 Countries=135	-0.034*** (0.006) N=4212 Countries=135	0.072*** (0.017) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.008 (0.008) N=4131 Countries=134	-0.034*** (0.006) N=4131 Countries=134	0.074*** (0.017) N=3674 Countries=133
Δ *ln* GDP per Worker	0.005 (0.008) N=3970 Countries=129	-0.042*** (0.006) N=3970 Countries=129	0.075*** (0.018) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.016* (0.009) N=4255 Countries=135	0.018*** (0.006) N=4251 Countries=135	0.156*** (0.019) N=3780 Countries=133

Notes: The table reports the coefficient on openness from OLS regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators.

Table 2: Summary of OLS Regression Results of Growth on Openness
(Openness Measured as *ln* Trade/GDP)

Openness Measure	Current Price PWT *ln* (X+M)/GDP	Constant Price PWT *ln* (X+M)/GDP	Current Price WDI *ln* X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.010* (0.005) N=4251 Countries=135	-0.015*** (0.005) N=4251 Countries=135	0.017*** (0.005) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.009* (0.005) N=4212 Countries=135	-0.014*** (0.005) N=4212 Countries=135	0.017*** (0.05) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.008 (0.005) N=4131 Countries=134	-0.014*** (0.005) N=4131 Countries=134	0.016*** (0.005) N=3674 Countries=133
Δ *ln* GDP per Worker	0.008 (0.005) N=3970 Countries=129	-0.018*** (0.005) N=3970 Countries=129	0.019*** (0.005) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.016*** (0.006) N=4255 Countries=135	0.014** (0.006) N=4251 Countries=135	0.037*** (0.005) N=3780 Countries=133

Notes: The table reports the coefficient on openness from OLS regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators.

Table 3: Summary of First Stage Results
(Openness Measured as Trade/GDP)

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Instrument			
MFN_Average	-1.183***	-0.581*	-0.412***
	(0.232)	(0.313)	(0.118)
MFN[0]	0.409***	0.365*	0.182**
	(0.150)	(0.202)	(0.075)
MFN(0,5]	0.274**	0.005	0.033
	(0.129)	(0.174)	(0.065)
MFN(5,10]	-0.295***	-0.804***	-0.148***
	(0.109)	(0.147)	(0.054)
MFN(10,20]	0.512**	0.771**	-0.104
	(0.232)	(0.312)	(0.116)
Country-Specific Trends	Yes	Yes	Yes
N	4255	4251	3780

Notes: Each openness measure reported in the top row has been regressed on summary statistics for US MFN tariffs for each year from 1961 to 2000. The summary statistics are the simple average MFN tariff and the proportion of tariff lines that fall into the specified ranges: MFN(a,b] is the proportion of US MFN tariff lines that are greater than a% but not over b%. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. Openness data comes from either the Penn World Tables 6.1 (PWT) or the World Development Indicators. See the data description for the construction of US MFN tariffs.

Table 4: Summary of First Stage Results
(Openness Measured as *ln* Trade/GDP)

Openness Measure	Current Price PWT *ln* (X+M)/GDP	Constant Price PWT *ln* (X+M)/GDP	Current Price WDI *ln* X/GDP
Instrument			
MFN_Average	-2.307***	-1.087***	-2.184***
	(0.339)	(0.348)	(0.414)
MFN[0]	0.484**	0.307	0.311
	(0.218)	(0.225)	(0.262)
MFN(0,5]	0.258	0.010	-0.115
	(0.188)	(0.194)	(0.229)
MFN(5,10]	-0.540***	-0.855***	-0.590***
	(0.159)	(0.163)	(0.190)
MFN(10,20]	0.649*	1.120***	0.198
	(0.338)	(0.347)	(0.409)
Country-Specific Trends	Yes	Yes	Yes
N	4255	4251	3780

Notes: Each openness measure reported in the top row has been regressed on summary statistics for US MFN tariffs for each year from 1961 to 2000. The summary statistics are the simple average MFN tariff and the proportion of tariff lines that fall into the specified ranges: MFN(a,b] is the proportion of US MFN tariff lines that are greater than a% but not over b%. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. Openness data comes from either the Penn World Tables 6.1 (PWT) or the World Development Indicators. See the data description for the construction of US MFN tariffs.

Table 5: Summary of IV Regression Results of Growth on Openness

Instruments: MFN_Average; MFN[0]; MFN(0,5]; MFN(5,10]; MFN(10,20]

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.044*** (0.011) N=4251 Countries=135	0.020** (0.008) N=4251 Countries=135	0.100*** (0.024) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.045*** (0.011) N=4212 Countries=135	0.017** (0.008) N=4212 Countries=135	0.100*** (0.024) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.046*** (0.011) N=4131 Countries=134	0.018** (0.008) N=4131 Countries=134	0.093*** (0.025) N=3674 Countries=133
Δ *ln* GDP per Worker	0.034*** (0.012) N=3970 Countries=129	-0.016* (0.009) N=3970 Countries=129	0.062** (0.027) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.059*** (0.012) N=4255 Countries=135	0.062** (0.027) N=4251 Countries=135	0.151*** (0.028) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 6: Summary of IV Regression Results of Growth on Openness

Instruments: MFN_Average; MFN[0]; MFN(0,5); MFN(5,10); MFN(10,20]

Openness Measure	Current Price PWT $ln(X+M)/GDP$	Constant Price PWT $ln (X+M)/GDP$	Current Price WDI $ln X/GDP$
Growth Measure			
Δ ln GDPPC (Laspeyres)	0.030*** (0.008) N=4251 Countries=135	0.019*** (0.007) N=4251 Countries=135	0.031*** (0.007) N=3776 Countries=133
Δ ln GDPPC (Chained)	0.030*** (0.008) N=4212 Countries=135	0.018** (0.007) N=4212 Countries=135	0.031*** (0.007) N=3744 Countries=133
Δ ln GDP per Equivalent Adult	0.029*** (0.008) N=4131 Countries=134	0.018** (0.007) N=4131 Countries=134	0.028*** (0.007) N=3674 Countries=133
Δ ln GDP per Worker	0.026*** (0.008) N=3970 Countries=129	0.003 (0.007) N=3970 Countries=129	0.018** (0.008) N=3521 Countries=128
Δ ln GDPPC Terms of Trade Adjusted	0.041*** (0.009) N=4255 Countries=135	0.042*** (0.019) N=4251 Countries=135	0.048*** (0.016) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 7: Summary of IV Regression Results of Growth on Openness

Instrument: MFN_Average

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.044*** (0.017) N=4251 Countries=135	0.036*** (0.012) N=4251 Countries=135	0.081* (0.044) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.042** (0.017) N=4212 Countries=135	0.036*** (0.012) N=4212 Countries=135	0.082* (0.044) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.042** (0.017) N=4131 Countries=134	0.038*** (0.012) N=4131 Countries=134	0.077* (0.044) N=3674 Countries=133
Δ *ln* GDP per Worker	0.049*** (0.017) N=3970 Countries=129	-0.008 (0.012) N=3970 Countries=129	0.066 (0.044) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.057*** (0.017) N=4255 Countries=135	0.061*** (0.013) N=4251 Countries=135	0.122** (0.050) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. The average US Most Favored Nation (MFN) tariff interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 8: Summary of IV Regression Results of Growth on Openness

Instrument: MFN_Average

Openness Measure	Current Price PWT ln(X+M)/GDP	Constant Price PWT ln (X+M)/GDP	Current Price WDI ln X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.039** (0.017) N=4251 Countries=135	0.021 (0.017) N=4251 Countries=135	0.031** (0.014) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.040** (0.017) N=4212 Countries=135	0.021 (0.017) N=4212 Countries=135	0.032** (0.014) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.044** (0.017) N=4131 Countries=134	0.028 (0.018) N=4131 Countries=134	0.029** (0.015) N=3674 Countries=133
Δ *ln* GDP per Worker	0.051*** (0.017) N=3970 Countries=129	0.007 (0.018) N=3970 Countries=129	0.029** (0.014) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.061*** (0.019) N=4255 Countries=135	0.071*** (0.019) N=4251 Countries=135	0.062*** (0.016) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. The average US Most Favored Nation (MFN) tariff interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 9: Summary of IV Regression Results of Growth on Openness
Instruments: MFN[0]; MFN(0,5]; MFN(5,10]; MFN(10,20]

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.048*** (0.012) N=4251 Countries=135	0.027*** (0.008) N=4251 Countries=135	0.104*** (0.026) N=3776 Countries=133
Δ *ln* GDPPC (Chained)	0.050*** (0.012) N=4212 Countries=135	0.024*** (0.008) N=4212 Countries=135	0.103*** (0.026) N=3744 Countries=133
Δ *ln* GDP per Equivalent Adult	0.051*** (0.012) N=4131 Countries=134	0.025*** (0.008) N=4131 Countries=134	0.098*** (0.026) N=3674 Countries=133
Δ *ln* GDP per Worker	0.035*** (0.013) N=3970 Countries=129	-0.015* (0.009) N=3970 Countries=129	0.062** (0.027) N=3521 Countries=128
Δ *ln* GDPPC Terms of Trade Adjusted	0.058*** (0.013) N=4255 Countries=135	0.062*** (0.009) N=4251 Countries=135	0.140*** (0.030) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 10: Summary of IV Regression Results of Growth on Openness

Instruments: MFN[0]; MFN(0,5); MFN(5,10); MFN(10,20]

Openness Measure	Current Price PWT ln(X+M)/GDP	Constant Price PWT ln (X+M)/GDP	Current Price WDI ln X/GDP
Growth Measure			
Δ ln GDPPC (Laspeyres)	0.032*** (0.008) N=4251 Countries=135	0.023*** (0.008) N=4251 Countries=135	0.029*** (0.008) N=3776 Countries=133
Δ ln GDPPC (Chained)	0.033*** (0.008) N=4212 Countries=135	0.022*** (0.008) N=4212 Countries=135	0.028*** (0.008) N=3744 Countries=133
Δ ln GDP per Equivalent Adult	0.032*** (0.009) N=4131 Countries=134	0.023*** (0.008) N=4131 Countries=134	0.025*** (0.008) N=3674 Countries=133
Δ ln GDP per Worker	0.027*** (0.009) N=3970 Countries=129	0.004 (0.008) N=3970 Countries=129	0.013 (0.008) N=3521 Countries=128
Δ ln GDPPC Terms of Trade Adjusted	0.039*** (0.009) N=4255 Countries=135	0.043*** (0.009) N=4251 Countries=135	0.042*** (0.009) N=3780 Countries=133

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 11: Summary of IV Regression Results of Growth on Openness Excluding Hong Kong and Singapore

Instruments: MFN_Average; MFN[0]; MFN(0,5]; MFN(5,10]; MFN(10,20]

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
Growth Measure			
Δ *ln* GDPPC (Laspeyres)	0.050*** (0.012) N=4175 Countries=133	0.023*** (0.008) N=4175 Countries=133	0.106*** (0.026) N=3701 Countries=131
Δ *ln* GDPPC (Chained)	0.052*** (0.012) N=4136 Countries=133	0.020** (0.008) N=4136 Countries=133	0.105*** (0.026) N=3669 Countries=131
Δ *ln* GDP per Equivalent Adult	0.053*** (0.012) N=4055 Countries=132	0.021** (0.008) N=4055 Countries=132	0.098*** (0.026) N=3599 Countries=131
Δ *ln* GDP per Worker	0.039*** (0.013) N=3894 Countries=127	-0.018** (0.009) N=3894 Countries=127	0.055* (0.027) N=3446 Countries=126
Δ *ln* GDPPC Terms of Trade Adjusted	0.066*** (0.013) N=4175 Countries=133	0.065*** (0.009) N=4175 Countries=133	0.151*** (0.028) N=3701 Countries=131

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 12: Summary of IV Regression Results of Growth on Openness Excluding Hong Kong and Singapore

Instruments: MFN_Average; MFN[0]; MFN(0,5]; MFN(5,10]; MFN(10,20]

Openness Measure	Current Price PWT ln(X+M)/GDP	Constant Price PWT ln (X+M)/GDP	Current Price WDI ln X/GDP
Growth Measure			
Δ ln GDPPC (Laspeyres)	0.030*** (0.008) N=4175 Countries=133	0.020*** (0.007) N=4175 Countries=133	0.031*** (0.007) N=3701 Countries=131
Δ ln GDPPC (Chained)	0.030*** (0.008) N=4136 Countries=133	0.018** (0.007) N=4136 Countries=133	0.031*** (0.007) N=3669 Countries=131
Δ ln GDP per Equivalent Adult	0.029*** (0.008) N=4055 Countries=132	0.019*** (0.007) N=4055 Countries=132	0.027*** (0.007) N=3599 Countries=131
Δ ln GDP per Worker	0.026*** (0.008) N=3894 Countries=127	0.002 (0.008) N=3894 Countries=127	0.017** (0.008) N=3446 Countries=126
Δ ln GDPPC Terms of Trade Adjusted	0.040*** (0.009) N=4175 Countries=133	0.043*** (0.008) N=4175 Countries=133	0.048*** (0.008) N=3701 Countries=131

Notes: The table reports the coefficient on openness from IV regressions of developing country growth rates on developing country openness to international trade – the coefficient β in Equation 1. Summary measures of US Most Favored Nation (MFN) tariffs interacted with country fixed effects have been used as the instruments for openness. Different measures of income growth and openness have been employed in each regression. The growth measure used in the regression is reported in the first column. The openness measure employed is reported in the top row. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5 and 10 percent levels respectively. I report the number of observations and the number of developing countries in the sample. Growth data comes from the Penn World Tables 6.1 (PWT), while openness comes from either the PWT or the World Development Indicators. See the data description for the construction of the US MFN tariff.

Table 13: Impact of Tariff Removal on Developing Country Openness and Growth

(Each cell is based on equivalent Table 3 and Table 5 estimates)

Openness Measure	Current Price PWT (X+M)/GDP	Constant Price PWT (X+M)/GDP	Current Price WDI X/GDP
	0.24	0.36	0.16
Growth Measure			
Δ ln GDPPC (Laspeyres)	1.1% p.a.	0.7% p.a.	1.6% p.a.
Δ ln GDPPC (Chained)	1.1% p.a.	0.6% p.a.	1.6% p.a.
Δ ln GDP per Equivalent Adult	1.1% p.a.	0.6% p.a.	1.5% p.a.
Δ ln GDP per Worker	0.8% p.a.	-0.6% p.a.	1.0% p.a.
Δ ln GDPPC Terms of Trade Adjusted	1.4% p.a.	2.2% p.a.	2.4% p.a.

Notes: The table reports estimates of the impact that eliminating developed world tariffs would have on the openness and annual growth rate of developing countries. The impact of complete removal of developed country tariffs on developing country openness is first estimated by applying the first-stage estimates in the corresponding column of Table 3 to the 2005 US MFN tariff schedule. These estimates are reported in the second row of Table 13. For example, the first-stage estimates obtained using current price trade to GDP ratios suggest that the average trade to GDP ratio would increase by 0.24. These estimated openness increases are then multiplied by the coefficients on openness from IV growth regression results reported in the corresponding columns of Table 5. For example, the estimates obtained by using trade to GDP ratios at current prices and per capita GDP growth measured using Laspeyres indexes suggest an increase in developing country growth rates of 1.1 percent per annum. The US MFN tariff schedule was obtained from the USITC's DataWeb at www.usitc.gov, and specific tariffs have been converted to ad-valorem equivalent tariffs using tariff-line level data on import unit values.

Table 14: Impact of Tariff Removal on Developing Country Openness and Growth

(Each cell is based on equivalent Table 4 and Table 6 estimates)

Openness Measure	Current Price PWT ln(X+M)/GDP	Constant Price PWT ln (X+M)/GDP	Current Price WDI ln X/GDP
	.39	.33	.43
Growth Measure			
Δ ln GDPPC (Laspeyres)	1.2% p.a.	0.6% p.a.	1.3% p.a.
Δ ln GDPPC (Chained)	1.2% p.a.	0.6% p.a.	1.3% p.a.
Δ ln GDP per Equivalent Adult	1.1% p.a.	0.6% p.a.	1.2% p.a.
Δ ln GDP per Worker	1.0% p.a.	0.1% p.a.	0.8% p.a.
Δ ln GDPPC Terms of Trade Adjusted	1.6% p.a.	0.6% p.a.	2.1% p.a.

Notes: The table reports estimates of the impact that eliminating developed world tariffs would have on the openness and annual growth rate of developing countries. The impact of complete removal of developed country tariffs on developing country openness is first estimated by applying the first-stage estimates in the corresponding column of Table 4 to the 2005 US MFN tariff schedule. These estimates are reported in the second row of Table 14. For example, the first-stage estimates obtained using current price trade to GDP ratios suggest that the average log trade to GDP ratio would increase by 0.39. These estimated openness increases are then multiplied by the coefficients on openness from IV growth regression results reported in the corresponding columns of Table 6. For example, the estimates obtained by using log trade to GDP ratios at current prices and per capita GDP growth measured using Laspeyres indexes suggest an increase in developing country growth rates of 1.2 percent per annum. The US MFN tariff schedule was obtained from the USITC's DataWeb at www.usitc.gov, and specific tariffs have been converted to ad-valorem equivalent tariffs using tariff-line level data on import unit values.

Figure 1: Trade and Income
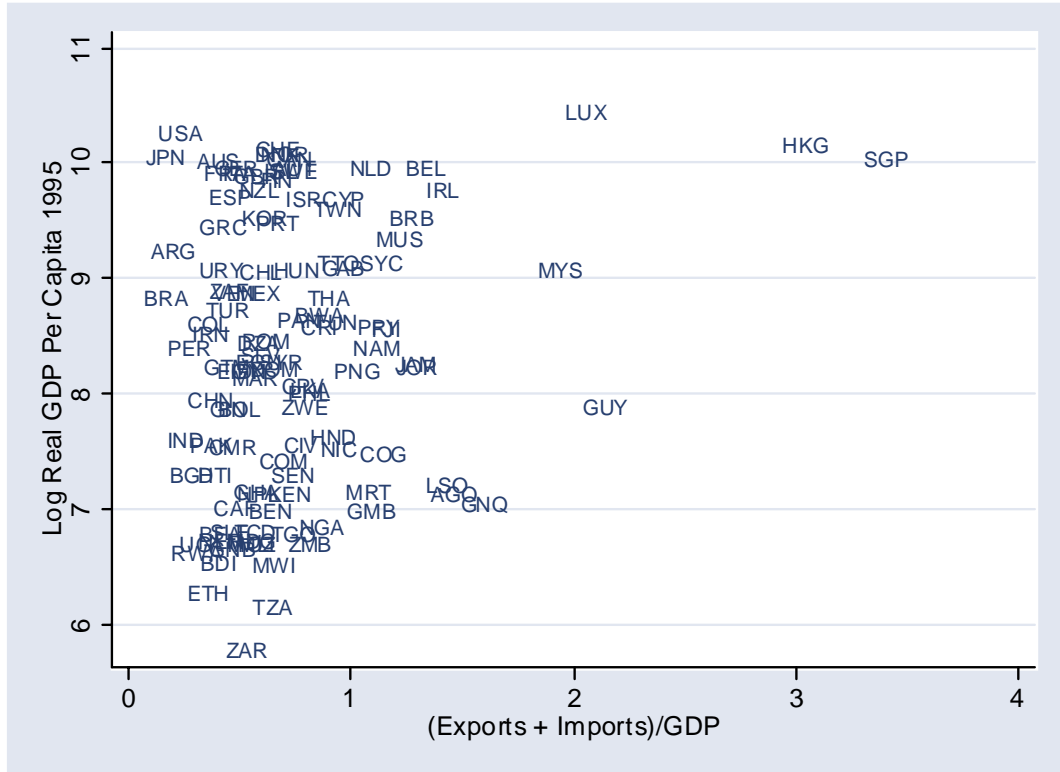
Figure 2: Trade and Growth
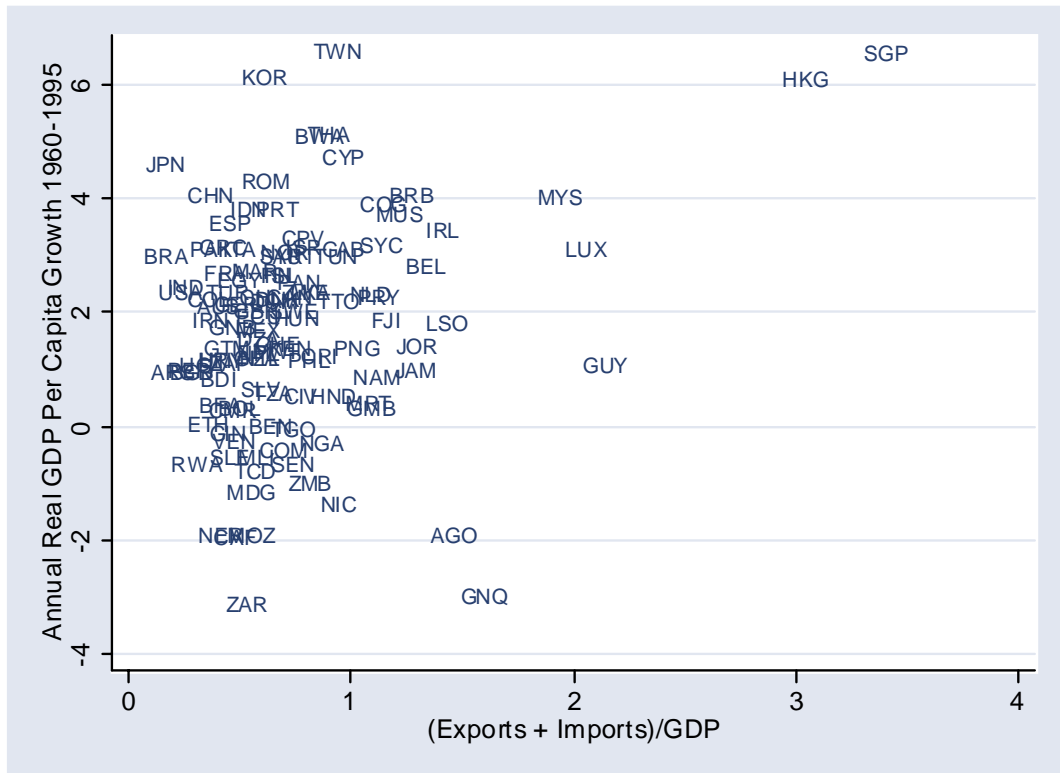
Notes: Figures 1 and 2 show the unconditional association between levels or growth of GDP per capita using *rgdpl* (Laspeyres series) from the Penn World Tables 6.1 ('PWT') and the trade to GDP ratio in 1995 at current prices from the PWT.

Figure 3: Market Access and Developing Country Openness
Current Price Trade to GDP Ratio
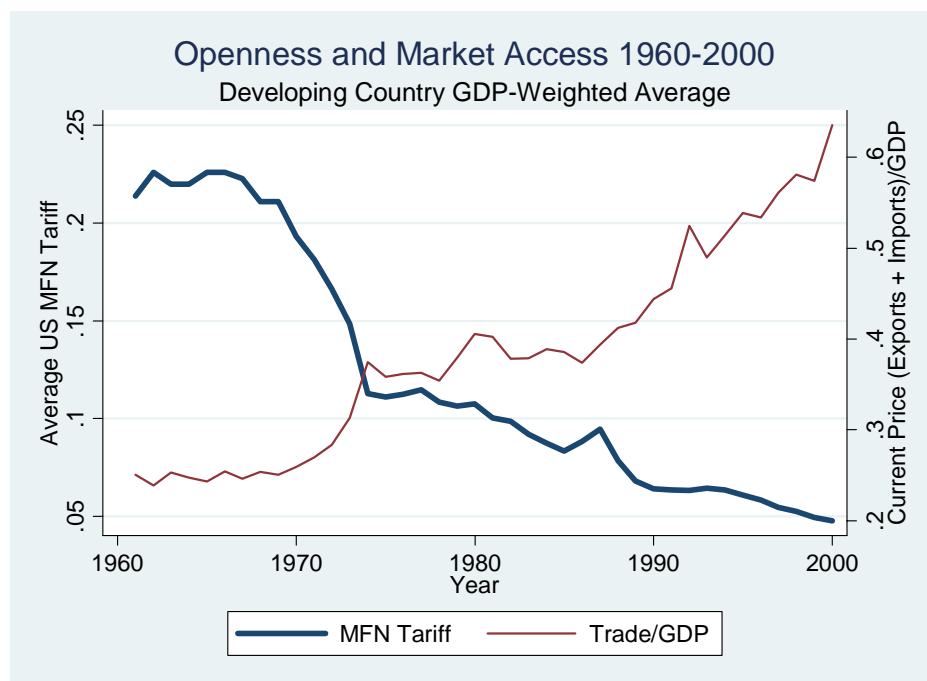
Figure 4: Market Access and Developing Country Openness
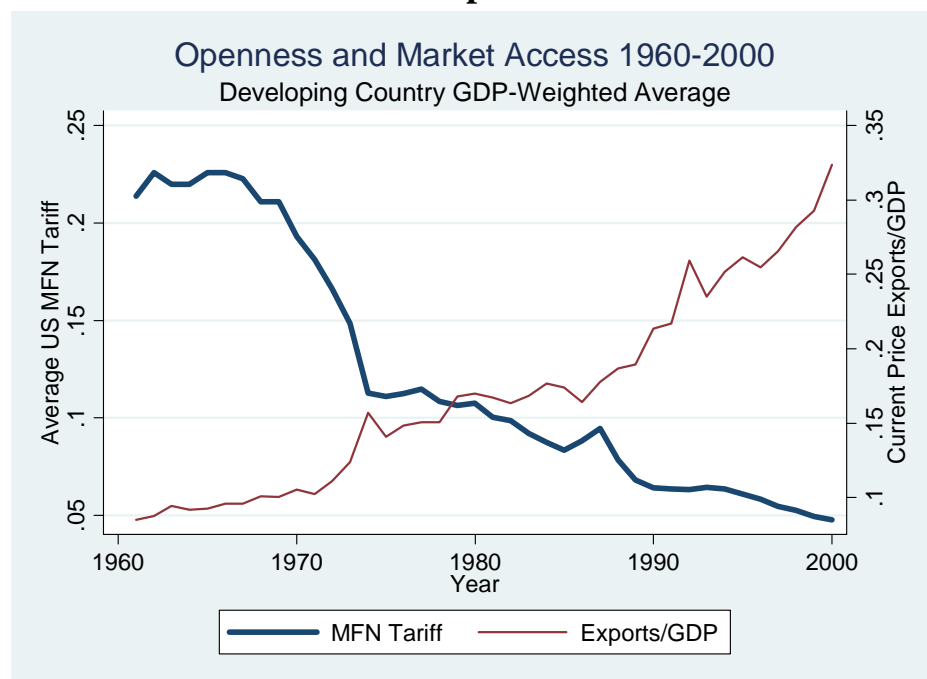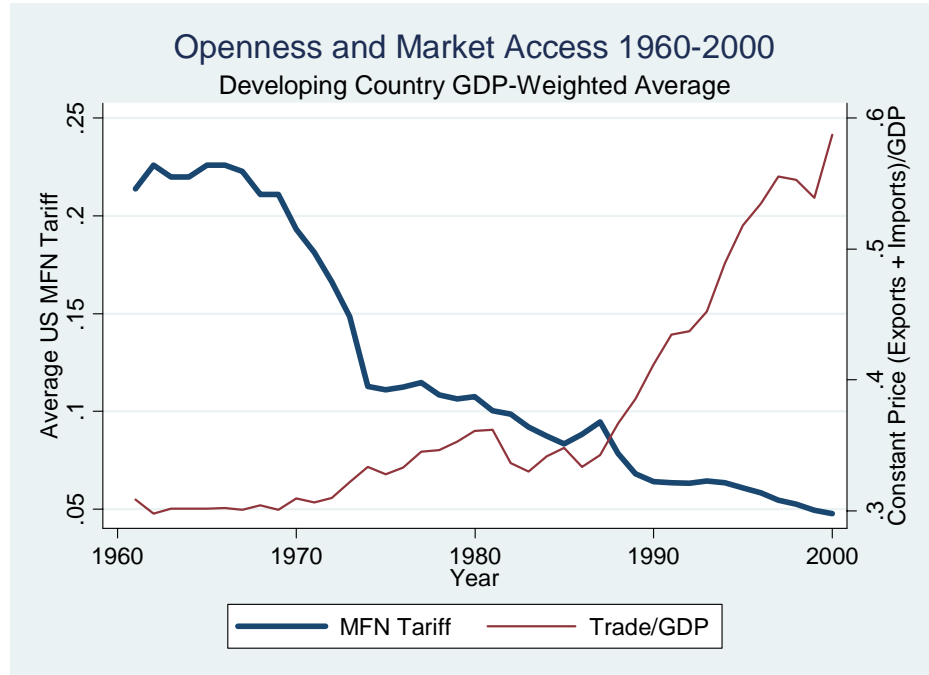**Current Price Export to GDP Ratio**

Figure 3 plots the average US MFN tariff and the GDP-weighted average of trade to GDP ratios for developing countries. Figure 4 plots the average US MFN tariff and the GDP-weighted average of export to GDP ratios for developing countries. See the data description for the details of the construction of the average MFN tariff. Trade to GDP is from the Penn World Tables 6.1 and is measured at current prices. Exports to GDP is from the World Bank's World Development Indicators and is measured at current prices.

**Figure 5: Market Access and Developing Country Openness
Constant Price Trade to GDP Ratio**

**Figure 6: Market Access and Developing Country Openness
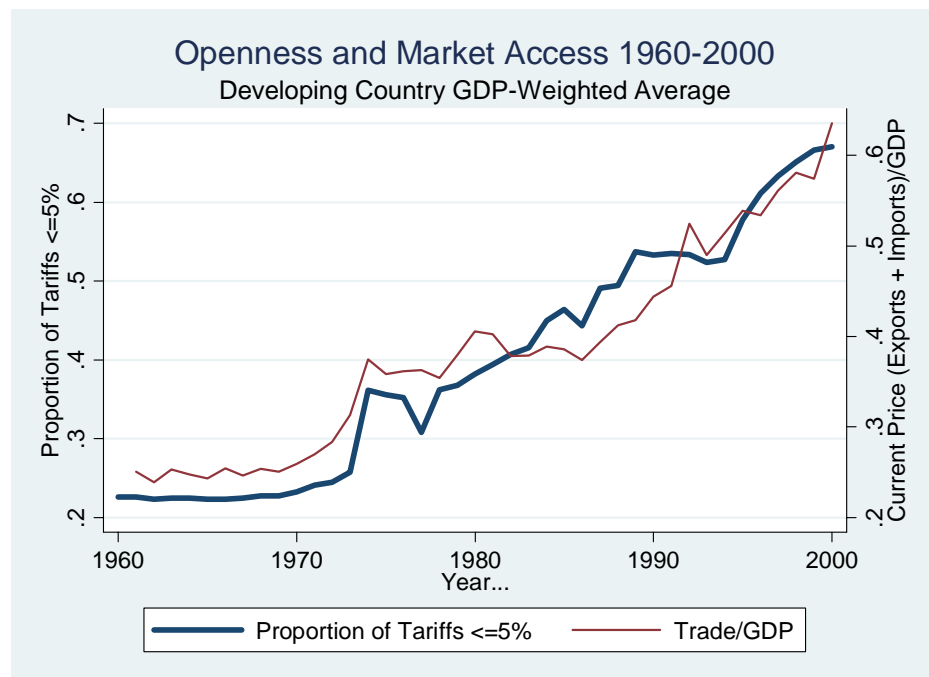Current Price Trade to GDP Ratio**

Figure 5 plots the average US MFN tariff and the GDP-weighted average of trade to GDP ratios for developing countries measured at constant prices. Figure 6 plots the proportion of US MFN tariffs that are less than or equal to 5 percent and the GDP-weighted average of trade to GDP ratios for developing countries measured at current prices. See the data description for the details of the construction of MFN tariffs. Trade to GDP is from the Penn World Tables 6.1.