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The trade/GDP ratio as a measure of openness

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The Trade/GDP Ratio as a Measure of Openness

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Abstract

The ratio of trade to GDP is often used as a summary measure of a country's openness to the rest of the world. It is well known that the trade/GDP ratio is affected by relatively time-invariant factors, such as country size and remoteness from trading partners, that can largely be controlled for in cross-country panels by using country fixed effects. It is shown here that there are also other important, time-varying influences on the trade/GDP ratio that have been little investigated, such as the prices of commodity exports and imports, the real effective exchange rate and the ratio of investment to GDP. These factors are shown to be significant, and not only in the short run, and need to be taken into account in estimating the long-run effects of transport costs or trade policy on the trade/GDP ratio.

Word count: 5,255

Keywords: trade openness, real exchange rate, commodity prices, investment

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1. Introduction

Measuring the barriers to international trade is difficult. An indication of this is the fact that the relative importance of trade liberalisation and cost reductions in the expansion of world trade relative to GDP since 1950 has been the subject of considerable debate (Baier and Bergstrand, 2001). Various factors contribute to the problem. Tariff regimes and non-tariff barriers tend to be complicated and difficult to summarise in a single statistic, and the tariff equivalence of a given set of non-tariff barriers varies over time because of its sensitivity to demand (e.g. Niu et al., 2018). A comprehensive index of transport costs is hard to construct because more than one mode of transport is usually involved, and the interface between them is likely to be a significant but unmeasured component of costs (Bernhofen et al., 2016; Hummels, 2007). In addition, the administrative costs of cross-border trade are frequently substantial, but are extremely hard to quantify, partly because they may take the form of delays and uncertain delivery times.

These considerations have led to the widespread use of the ratio of exports plus imports to GDP as a summary measure of "real" as opposed to "financial" openness or globalization (Gräbner et al., 2021), because this ratio is expected to encapsulate the effects of all these factors that are difficult to measure. In their survey article on openness and growth, Winters and Masters (2013, p. 1062) write in relation to the measurement of trade openness: "Around one-third of the cross-section/panel studies we have sampled use a binary indicator. The remainder mostly use a (trade/GDP) measure, with all its manifest simultaneity difficulties, or occasionally, tariff averages."

In a cross-country context, it is well known that the variation of the ratio of trade to GDP across countries is not just a matter of trade policy, but also of structural features such as country population and land mass, access to ports and remoteness from trading partners

(Harrison, 1996; Fujii, 2019). Fujii (2019) provides a comprehensive discussion of these issues, and shows that size, remoteness and specialisation affect the trade/GDP ratio of Japanese prefectures, even though, obviously, their trade policy is identical. In cross-country analysis, one possibility is to estimate the effect of these factors, to the extent that they are observable, and to measure trade openness relative to its predicted value from a regression (Chang et al., 2009; Leamer, 1988; Lockwood, 2004; and Vujakovic, 2010). The accuracy of this depends on the completeness of the regression specification and the orthogonality of structural trade barriers to the artificial ones which are being measured. If for example larger countries tend to have less protective trade regimes, then the difference in trade/GDP ratios between small and large countries will partly reflect this difference in trade policy, and the negative effect of country size on trade/GDP ratios will tend to be underestimated.

To the extent that these structural features that are associated with variation in trade openness across countries are time-invariant, or at least highly persistent across time, then the within-country variation in trade openness may still be a useful indicator of changes in the barriers to trade *in a given country*, in either a time series regression or in a cross-country panel estimated with country fixed effects (e.g. Harrison, 1996). In fixed effects estimation the average difference across countries is entirely absorbed by the country dummies, and is not "explained" at all by the other variables in the model, whose coefficients are determined by just the within-country variation in the dependent variable. In other words, even if cross-country differences in trade openness may tell us little about differences in trade policy, trade openness could potentially still be used to address the question: what are the effects of *changes* in trade policy or transport costs within a country?

The validity of such an approach depends on what other factors might influence the behaviour of the trade/GDP ratio over time. If the influence of these other factors is substantial, the trade/GDP ratio will be a rather noisy measure of trade barriers even in a time-series

context, and this may distort the estimation of the effect of trade policy changes. This is an issue that has received little attention, and certainly less than it deserves. Some candidate variables that spring to mind as "nuisance" time-varying influences on the trade/GDP ratio in this context are: the real effective exchange rate (because the value of non-traded output, which increases in relative value with exchange rate appreciation, appears in the denominator of the trade/GDP ratio but not the numerator); the prices of primary commodities that are exported or imported (a rise in the price of either will likewise raise the value of trade relative to non-traded output); the investment/GDP ratio (because in many countries investment has a particularly high import content); and the level of GDP relative to its trend, which may affect the demand for imports. In this paper we attempt to estimate how important these factors are in the variation of the trade/GDP ratio across time for different groups of countries.

2. Design of the Study

In order to highlight the issue, we initially estimate a first-difference model of the logarithm of the ratio of trade to GDP as a function of the real effective exchange rate, commodity price shocks, investment and the cyclical position:

$$\Delta lnTR_{it} = a_i + b * \Delta lnREER_{it} + c * \Delta PM_{it} + e * \Delta PX_{it} + f * \Delta INV_{it} + g * \Delta lnY_{it} + u_{it} \quad (1)$$

where: *TR* is the ratio of exports plus imports to GDP; *REER* is the real effective exchange rate (a rise representing an appreciation); *INV* is the ratio of gross fixed capital formation to GDP; *Y* is GDP in constant local currency; Δ is the first-difference operator; ΔPM and ΔPX are real import and export commodity price shocks as a proportion of GDP as estimated in Gruss and

Kebhaj (2019);[1] *i* denotes the country and *t* time; *u* is a random error; and *a*, *b*, *c*, *e*, *f* and *g* are parameters to be estimated. Note that the model specifies a change in the logarithm of the trade ratio as the dependent variable rather than a percentage point change, so the estimated effect on trade as a percentage of GDP of any given change in an independent variable will be larger in percentage point terms when the trade/GDP ratio is higher.

This model is estimated from 1970 to 2019 for the following country groups, the membership of which is listed in the Appendix: Advanced Countries (23), the Americas (15), sub-Saharan Africa (25), and Asia and the Mediterranean (19); and for all countries together. Some countries are omitted: those with a population of less than two million or that have been significantly disrupted by conflict, and those with a substantial quantity of entrepôt trade. Transition economies are also omitted because their trade liberalisations have just been one element of much broader changes in economic institutions and policies.

3. Empirical Results

Figure 1 (p. 20) shows the evolution of the trade/GDP ratio over the period for the different country groups. There has been a steady upward trend in this ratio since 1970 for all country groups, except that since 2010 the trend has continued much as before only in the advanced countries; for all other country groups the upward trend came to an abrupt halt after the global financial crisis.

Some basic statistics are shown in Table 1 (p. 13) on the year-to-year variation in the trade/GDP ratio for individual countries. Table 1 gives the within-country standard deviation of the change in the logarithm of trade/GDP, which varies from a low of 0.064 in the advanced countries to a high of 0.151 in sub-Saharan Africa, with intermediate values for the Americas

[1] To estimate these shocks, the US$ commodity price indices are deflated by the IMF's index of unit values of manufacturing trade.

and Asia plus the Mediterranean region. This suggests that the year-to-year variation in trade openness can be quite substantial, and is greater in poorer countries.

Table 2 (p. 14) shows the results of estimating equation (1) for different country groups. Since country fixed effects are included and absorb all the cross-country variation, the explanatory variables are only significant to the extent that they are correlated with the within-country variation in the dependent variable. The change in the logarithm of the real effective exchange rate is always significant at the 1% level, with a negative coefficient, indicating that appreciation is associated with a fall in the trade/GDP ratio. The elasticity varies from -0.250 for sub-Saharan Africa to -0.642 for the advanced countries. The negative coefficient is consistent with the interpretation of the real effective exchange rate as the price of non-traded goods relative to traded ones, even though it is actually measured as relative consumer prices in different currencies.

An import commodity price shock is also always significant at the 1% level, with a positive coefficient that is again closest to zero for sub-Saharan Africa (2.034) and highest for the advanced countries (2.640). The positive coefficient reflects the increase in the relative value of a given volume of commodity imports. An export commodity price shock also has a positive coefficient throughout, which is significant at 1% and approaching that of an import price shock for the Americas (1.827), but is not significant even at 5% for the other country groups (0.684, 0.097 and 0.047 respectively for sub-Saharan Africa, Asia and the Mediterranean and the Advanced Countries). This reflects the limited importance of commodity exports for many countries.

The change in the investment share of GDP is always positive and significant at the 1% level, with a coefficient ranging from 0.376 in the Advanced Countries to 0.663 in sub-Saharan Africa. The higher level for poorer countries is consistent with the idea that investment goods

are often of high complexity and therefore most likely to be produced in richer countries. Consequently, investment tends to have a high import content, particularly in poorer countries. Real GDP growth has an insignificant coefficient except in the Advanced Countries, where it is significantly positive at the 1% level.

How much each of these variables contributes to the year-to-year variability of the ratio of trade to GDP depends not only the coefficients in Table 2, but also on the variable's intrinsic volatility. Table 3A (p. 15) shows the within-country standard deviation of each independent variable which, when multiplied by its coefficient, shows the estimated effect of an increase in that variable by one standard deviation (shown in Table 3B).

Measured by this criterion, the real effective exchange rate comes out in Table 3B as the most important factor, followed by import price shocks. Investment is almost equally important in sub-Saharan Africa, and is of some significance in the Americas, but negligible elsewhere. Export price shocks are the third important factor in the Americas, and somewhat less so in sub-Saharan Africa, but they are also negligible elsewhere. Although in the Advanced Countries the REER coefficient is much the largest in absolute value, and has easily the highest t-statistic, its estimated impact is lower than elsewhere because of much lower real exchange rate volatility.

We now consider whether, after controlling for these nuisance factors, movements in trade openness are correlated with other measures of changes in trade policy. We use three measures: a World Bank data file on average tariffs; and two measures of major trade liberalisation episodes: one from Sachs and Warner (1995) [hereafter SW], and the other an adaptation and update of SW by Wacziarg and Welch (2008) [hereafter WW]. The tariff average is a continuous variable and clearly related to trade policy, but is available only from 1988. We use the weighted average tariff rate, where the weights reflect the value of imports

of the relevant commodities and are rolling rather than fixed over time. The SW and WW measures have the advantage of being available back to 1970, but they have their drawbacks. Because they are binary (open/closed), they do not capture policy changes that may be sizeable but do not cross the somewhat arbitrary threshold. As discussed below, they are also open to the criticism that they reflect the relaxation of state control of the economy in other areas as much as trade policy liberalisation (Rodriguez and Rodrik, 2000). Wacziarg and Welch (2008) defend their measure against this criticism by arguing that the trade liberalisation aspect of the policy change was still significant, even if not large enough on its own to satisfy the SW criteria for classification as a switch to an open economy.

Figure 2 (p. 21) shows how average tariffs have evolved over time in each region since 1988 (unfortunately the data are unavailable before 1988) Average tariffs in the advanced countries have always been well below 10%; in the rest of the world they have been below 15% since 1996, with some tendency to decline over time, but before 1996 they could be considerably higher.

Table 4 (p. 16) shows the results of adding the change in the weighted average tariff to the regression. Its inclusion severely reduces the sample size. Only in the case of Asia and the Mediterranean is the coefficient of the change in tariff rates significant (at the 1% level) and negative, as expected. The coefficient implies that a fall in tariffs by one percentage point raises the log of the trade/GDP ratio in Asia and the Mediterranean by 0.025, or approximately 2.5 percentage points. For all the other country groups the coefficient is unexpectedly positive. This probably reflects the fact that in most years the change in average tariff rates has been small, as Figure 2 shows.

Sachs and Warner (1995) define an economy as closed if any one of the following criteria apply:

(1) An average tariff rate greater than 40% (*TR*);

(2) Non-tariff barriers covering more than 40% of imports (*NTB*);

(3) A state monopoly of principal exports, often through an export-marketing board (*XMB*);

(4) A black market exchange rate at least 20% depreciated relative to the official rate (*BMP*);

(5) The economy is socialist (*SOC*).

Of these, the last criterion (*SOC*) is largely irrelevant to the present study because we ignore transition economies, and *XMB* is based purely on African data. The black market exchange rate premium (*BMP*) may reflect factors other than strictly trade policy, such as the likelihood of detection and the harshness of punishment for converting foreign currency outside the official channels. There is also the issue that if a country is only just above the threshold for being closed in any given year, it may take only a minor reduction in tariffs or non-tariff barriers to move it below the threshold in the next year. In other words, although the criteria for the state of openness may be consistent across countries, the degree of liberalisation in the particular year that takes the country below the threshold is not. Because of this, these measures may be better at capturing the long-run than the short-run effects of policy changes, particularly if they are rather gradual or take time to have their full impact.

Wacziarg and Welch (2008) update and amend SW's liberalisation dates in ways that are discussed in detail in their paper. They also present a graph (Fig. 4 of their paper) that shows a substantial but gradual increase in trade openness around the liberalisation dates (as in the case of SW, no country, once open, ever becomes closed again, so liberalisation is never reversed).

We test the effect of major liberalisations by including a dummy variable for openness as identified by SW (*SWOPEN*) or alternatively by WW (*WWOPEN*). These dummy variables

are equal to zero when the country is identified as closed, and equal to one from the year of liberalisation onwards. Since our model uses the change in trade openness as the dependent variable, we use the first difference of *SWOPEN* and *WWOPEN*, named *SWLIB* and *WWLIB*, to measure the short-run effect of liberalisation. These two variables are one in the year of liberalisation only, and zero in every year both before and after. We also include the first lag of *SWLIB* and *WWLIB* in the model, to allow for the possibility that the effects are delayed, or alternatively that liberalisation occurs late in the year so that its effects, even if immediate, are mainly felt in the following year. Finally, to allow for the possibility that the effects of liberalisation are gradual, we estimate an error-correction version of the model that distinguishes long-run from short-run effects.

Table 5 (p. 17) shows the effects of adding *SWLIB* and its lag to the model shown in Table 2, and Table 6 (p. 18) shows the same thing for *WWLIB*.

In Table 5, only for the Asia and the Mediterranean region is the *SWLIB* coefficient positive and significant as expected, and for the whole sample it is very close to zero. In the case of the lagged value of *SWLIB*, however, we get a very different picture. The coefficient is always positive and always significant except in the case of Asia and the Mediterranean. For the whole sample the point estimate of this effect is about four percent, which is not enormous but is statistically significant.

In Table 6, where *SWLIB* is replaced by *WWLIB*, the results follow a similar pattern, but are somewhat less statistically significant. The coefficient of the lagged value of *WWLIB* for the entire sample is only just significant at the 5% level, whereas the corresponding coefficient in Table 5 is significant at the 1% level.

Long-run effects

In this section we investigate whether taking account of these influences on the trade-GDP ratio affects the estimates of the long-run as well as the short-run impact of policy and technological changes, which we do by adding an error-correction term to equation (1). To estimate the long-run effects of a vector of *k* explanatory variables X_j, we augment the first-difference model by some terms in the lagged levels of the variables, and also allow for country-specific trends in the trade-GDP ratio (h_i):

$$\Delta lnTR_{it} = a_i + \sum_{j=1}^{k} b_j * \Delta X_{jit} - g * lnTR_{it-1} + \sum_{j=1}^{k} c_j * X_{jit-1} + h_i * t + u_{it} \qquad (2)$$

The country-specific trends are designed to capture incremental changes in transport technology and/or trade policy. When there exists a long-run equilibrium path towards which each country's trade-GDP ratio reverts, the estimate of *g* will be significantly greater than zero, and the implied equilibrium relationship for country *j* is:

$$lnTR_{it} = a_i/g + \sum_{j=1}^{k} (c_j/g) * X_{jit-1} + (h_i/g)t \qquad (3)$$

Table 7 (p. 19) shows the results of estimating equation (3) for the full sample of countries, and compares the estimated long-run effects of trade liberalisations without controlling for the factors previously discussed (columns (1) and (3)), and after controlling for them (columns (2) and (4)). In columns (1) and (2) this exercise is performed using the SW identification of major trade liberalisations, whilst in columns (3) and (4) the WW identification is used. As well as fixed country effects, the model allows for unobserved country-specific time-trends in trade openness that might otherwise bias the long-run estimates of the effects of the other variables.

There are two questions of interest: (1) is there a significant long-run increase in trade openness associated with a switch from a closed to an open economy? And (2) do the factors identified above as influencing trade openness in the short run also have significant long-run

effects that need to be taken into account when treating trade openness as a measure of trade policy? The answer to both questions is "yes", because the estimated long-run effects of trade liberalisations are substantially reduced when these nuisance factors are controlled for.

In column (1) of Table 7, the estimated long-run effect of Sachs-Warner liberalisations on the trade/GDP ratio is +0.256 log points (= 0.050/0.195), which is equivalent to +29.2%, in a regression just with country-specific time trends, but in column (2), with the controls added, it is only +0.155 log points (= 0.029/0.187), or + 16.8%, and the coefficient of SWOPEN(-1) is only significant at the 10% level. The results are similar for Wacziarg-Welch liberalisations. Without controls (column 3), the estimated long-run effect is + 0.219 log points (= 0.044/0.201), or +24.5%, compared with + 0.115 log points (= 0.022/0.191), or +12.2%, when controls are included (column 4). Once again the estimated long-run effect is significant at the 1% level without controls but only at the 10% level with them. The control variables themselves do not always have significant long-run effects, but they do in two cases: the real effective exchange rate and import prices.

4. Conclusions

We have shown that the trade/GDP ratio of an individual country varies significantly from year to year because of the impact of identifiable factors, such as the real effective exchange rate, import and export prices and the investment share of output. Since the trade/GDP ratio is widely used as a simple summary measure of openness to the rest of the world, recognition of its sensitivity to these influences is important, and not just in the short run, but also in the long run. Estimates of the long-run effects of major trade liberalisations on the trade/GDP ratio are reduced by 40-50% when these other factors are taken into account.

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Table 1. Standard Deviation of dln(Trade/GDP) 1970-2019

All countries	0.112
Advanced	0.064
Americas	0.113
Sub-Saharan Africa	0.151
Asia + Mediterranean	0.104

Table 2. Determinants of Changes in Trade Openness

	Countries				
Dep. Var.: dln TR	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables:					
dln REER	-0.349*** (-6.89)	-0.642*** (-18.7)	-0.388*** (-6.25)	-0.250*** (-3.40)	-0.440*** (-5.97)
dPM	2.399*** (11.2)	2.640*** (8.97)	2.515*** (5.44)	2.034*** (4.90)	2.375*** (9.16)
dPX	0.390* (1.90)	0.047 (0.26)	1.827*** (11.4)	0.684* (1.72)	0.097 (0.45)
dINV	0.579*** (3.87)	0.376*** (3.39)	0.618*** (3.10)	0.663** (2.58)	0.510*** (2.86)
dln Y	0.029 (0.41)	0.249*** (2.76)	-0.056 (-0.48)	0.028 (0.18)	0.028 (0.33)
No. of obs.	3615	1089	685	954	887
No. of countries	82	23	15	25	19
RMSE	0.095	0.046	0.092	0.134	0.087

Notes. The dependent variable is the change in the logarithm of trade/GDP. Fixed country effects are included. Figures in parentheses are t-statistics. *, **, ***: significantly different from zero at the 10, 5 and 1% level respectively. RMSE – root mean square error. REER – real effective exchange rate; INV – gross fixed capital formation/GDP; Y – GDP in constant local currency; dPM – commodity import price shock (volume of imports times price change divided by GDP summed over all commodity imports); dPX – commodity export price shock (volume of exports times price change divided by GDP summed over all commodity exports).

Table 3A. Table of Standard Deviations

	Countries				
	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables					
dln REER	0.110	0.050	0.141	0.147	0.089
dPM	0.011	0.011	0.009	0.011	0.013
dPX	0.025	0.014	0.022	0.022	0.036
dINV	0.029	0.017	0.023	0.042	0.028
dln Y	0.038	0.026	0.039	0.048	0.037

Table 3B. Estimated Standardised Effect of Each Variable on dln(Trade/GDP)

	Countries				
	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables					
dln REER	-0.0385	-0.0319	-0.0546	-0.0368	-0.0393
dPM	0.0267	0.0296	0.0230	0.0225	0.0315
dPX	0.0098	0.0007	0.0268	0.0166	0.0035
dINV	0.0168	0.0062	0.0140	0.0281	0.0014
dln Y	0.0011	0.0063	-0.0022	0.0013	-0.0010

Notes. The figures shown are the coefficients in the corresponding position in Table 2 multiplied by the variable's within-country sample standard deviation from Table 3A. REER – real effective exchange rate; INV – gross fixed capital formation/GDP; Y – GDP in constant local currency; dPM – commodity import price shock (volume of imports times price change divided by GDP summed over all commodity imports); dPX –commodity export price shock (volume of exports times price change divided by GDP summed over all commodity exports).

Table 4. Adding Tariff Rates to the Model

	Countries				
Dep. Var.: dln TR	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables:					
dln REER	-0.437*** (-3.53)	-0.666*** (-14.2)	-0.528*** (-6.11)	-0.099 (-0.57)	-0.668*** (-7.03)
dPM	2.229*** (8.97)	2.220*** (5.08)	2.238*** (4.70)	1.870*** (3.24)	2.396*** (7.71)
dPX	0.600** (2.60)	0.286 (1.12)	1.265*** (6.39)	1.108 (1.62)	0.223 (1.14)
dINV	0.898*** (4.75)	0.597*** (4.82)	1.126*** (2.88)	1.147*** (3.36)	0.580* (1.89)
dlnY	-0.062 (-0.40)	0.398** (2.65)	0.063 (0.23)	-0.350** (-2.14)	0.129 (0.77)
Change in tariff rates	-0.101* (-1.76)	0.049 (0.24)	0.134 (0.56)	0.027 (0.24)	-0.126 (-0.85)
No. of obs.	1613	646	361	349	298
No. of countries	81	23	15	25	18
RMSE	0.074	0.043	0.061	0.110	0.072

Notes. See notes to Table 2. The dependent variable is the change in the logarithm of (trade/GDP). Fixed country effects are included. Tariff rates (%) are the weighted mean of effective applied tariff rates (World Bank data). REER – real effective exchange rate; INV – gross fixed capital formation/GDP; Y – GDP in constant local currency; dPM – commodity import price shock (volume of imports times price change divided by GDP summed over all commodity imports); dPX – commodity export price shock (volume of exports times price change divided by GDP summed over all commodity exports). Nepal is omitted because of its very large spike in tariff rates for one year only in 2008.

Table 5. The Effect of Major Liberalisations (Sachs-Warner)

	Countries				
Dep. Var.: dln TR	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables:					
dln REER	-0.448*** (-9.21)	-0.665*** (-21.6)	-0.396*** (-4.95)	-0.346*** (-4.72)	-0.584*** (-6.70)
dPM	2.220*** (10.0)	2.609*** (6.43)	2.490*** (4.78)	2.205*** (3.49)	2.099*** (7.10)
dPX	0.746*** (3.40)	0.099 (0.28)	1.292*** (9.18)	-0.134 (-0.25)	0.936 (1.50)
dINV	0.722*** (3.49)	0.341*** (2.70)	0.820*** (3.08)	0.882** (2.23)	0.728*** (3.30)
dln Y	0.037 (0.42)	0.296*** (3.15)	-0.106 (-0.80)	0.119 (0.53)	-0.144 (-1.17)
SWLIB	0.002 (0.10)	-0.041*** (-3.88)	-0.019 (-0.65)	0.020 (0.29)	0.043** (2.26)
SWLIB(-1)	0.041*** (2.74)	0.033*** (4.87)	0.051** (2.09)	0.075** (2.27)	0.032 (1.32)
No. of obs.	2593	1040	588	382	583
No. of countries	56	22	12	10	12
RMSE	0.078	0.046	0.092	0.118	0.072

Notes. See notes to Table 2. The dependent variable is the change in the logarithm of (trade/GDP). Fixed country effects are included. REER – real effective exchange rate; INV – gross fixed capital formation/GDP; Y – GDP in constant local currency; dPM – commodity import price shock (volume of imports times price change divided by GDP summed over all commodity imports); dPX – commodity export price shock (volume of exports times price change divided by GDP summed over all commodity exports). SWLIB – a dummy variable that equals one in the first year that a country is defined as open by Sachs and Warner (1995) and zero otherwise.

Table 6. The Effect of Major Liberalisations (Wacziarg-Welch)

	Countries				
Dep. Var.: dln TR	All	Advanced	Americas	Sub-Saharan Africa	Asia + Mediterranean
Variables:					
dln REER	-0.430*** (-11.4)	-0.665*** (-21.6)	-0.389*** (-6.17)	-0.390*** (-6.28)	-0.454*** (-5.12)
dPM	2.155*** (10.8)	2.609*** (6.43)	2.410*** (5.31)	1.996*** (4.94)	1.935*** (7.77)
dPX	0.861*** (4.84)	0.099 (0.28)	1.251*** (11.4)	0.682 (1.39)	0.962 (1.57)
dINV	0.533** (2.53)	0.341*** (2.70)	0.640*** (3.06)	0.481 (1.34)	0.900*** (3.32)
dlnY	0.071 (0.89)	0.296*** (3.15)	-0.066 (-0.56)	0.108 (0.69)	-0.183 (-1.41)
WWLIB	0.000 (0.01)	-0.041*** (-3.88)	-0.015 (-0.59)	0.012 (0.25)	0.026 (1.13)
WWLIB(-1)	0.027** (1.98)	0.033*** (4.87)	0.039* (1.81)	0.036 (1.22)	0.012 (0.59)
No. of obs.	3035	1040	681	643	671
No. of countries	67	22	14	17	14
RMSE	0.085	0.046	0.098	0.117	0.084

Notes. See notes to Table 2. The dependent variable is the change in the logarithm of (trade/GDP). Fixed country effects are included. REER – real effective exchange rate; INV – gross fixed capital formation/GDP; Y – GDP in constant local currency; dPM – commodity import price shock (volume of imports times price change divided by GDP summed over all commodity imports); dPX – commodity export price shock (volume of exports times price change divided by GDP summed over all commodity exports). WWLIB – a dummy variable that equals one in the first year that a country is defined as open by Wacziarg and Welch (2008) and zero otherwise.

Table 7. Long-Run Effects of Major Liberalisations

Dep. Var.: dln TR	All Countries			
First-difference variables				
dln REER		-0.443*** (-8.89)		-0.424*** (-11.1)
dPM		2.139*** (9.61)		2.040*** (10.2)
dPX		0.716*** (3.17)		0.851*** (4.61)
dINV		0.686*** (3.34)		0.514** (2.40)
dlnY		0.063 (0.64)		0.079 (0.88)
SWLIB	0.021 (0.74)	0.003 (0.12)		
SWLIB(-1)	0.019 (0.99)	0.013 (0.94)		
WWLIB			0.026 (1.05)	-0.000 (-0.01)
WWLIB(-1)			-0.003 (-0.19)	0.003 (0.27)
Lagged levels variables				
ln TR (-1)	-0.195*** (-9.59)	-0.187*** (-9.70)	-0.201*** (-11.4)	-0.191*** (-11.4)
ln REER (-1)		-0.094*** (-4.78)		-0.106*** (-5.54)
PM (-1)		0.387*** (3.18)		0.412*** (3.66)
PX (-1)		-0.019 (-0.16)		0.015 (0.16)
INV (-1)		0.077 (0.98)		0.072 (0.79)
ln Y (-1)		0.007 (0.22)		0.011 (0.35)
SWOPEN (-1)	0.050*** (3.60)	0.029* (1.93)		
WWOPEN (-1)			0.044*** (3.55)	0.022* (1.74)
No. of obs.	2697	2593	3178	3035
No. of countries	56	56	67	67
RMSE	0.095	0.075	0.091	0.080
Implied long-run effect of trade liberalisation	+0.256	+0.155	+0.219	+0.115

Notes. See notes to Tables 2 and 5. SWLIB – a dummy variable that equals one in the first year that a country is defined as open (SWOPEN=1) by Sachs and Warner (1995) and zero otherwise. WWLIB and WWOPEN – as SWLIB and SWOPEN but based on the Wacziarg and Welch (2008) definition of openness. The model includes fixed country effects and country-specific time trends, the coefficients of which are not shown.

Figure 1. Average Trade/GDP Ratio across Countries 1970-2019

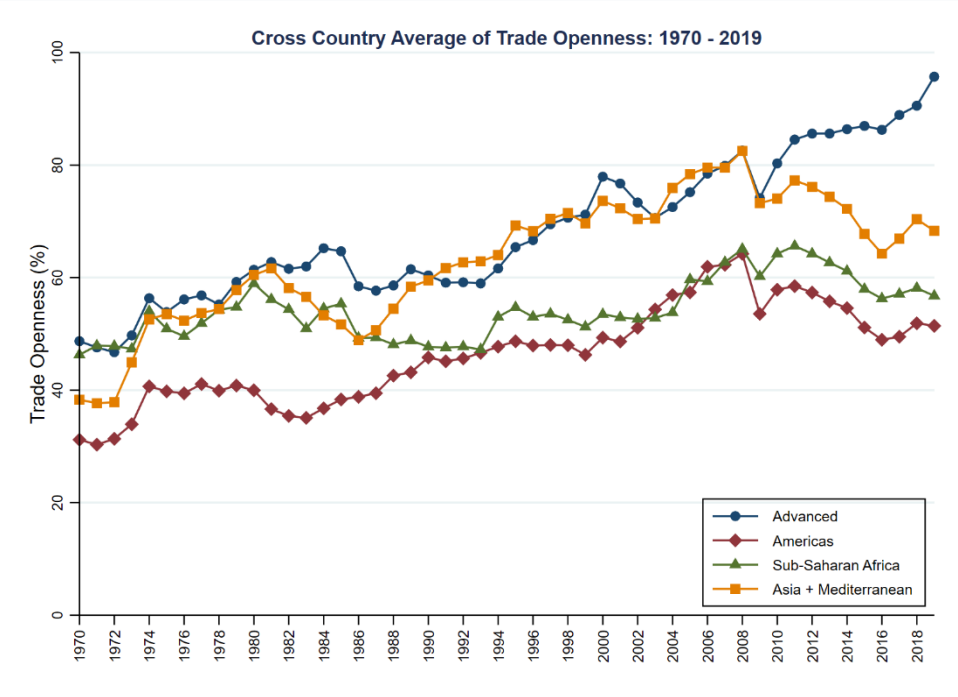

Figure 2. Average Tariff Rates across Country Groups