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Openness and Growth: An Empirical Investigation

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Openness and growth: An empirical investigation

1. *Introduction*

In a recent and influential study, *Trade, growth and poverty*, Dollar and Kraay (2001) advance the argument that trade liberalization improves the growth prospects of poor countries. They demonstrate this point principally using multiple regression analysis with data for 100 countries, through which the share of trade in an economy is shown to have had a statistically significant positive effect on income growth in the 1980s and 1990s. On the basis of this analysis, they assert that developing countries should enact more liberal trade policies to foster growth and reduce poverty.

This paper finds several errors in the conceptual logic and methodology underlying the DK study. First, it argues that the authors employ selective evidence in support of their view while overlooking their data that is open to alternative interpretations. Next, it argues that their reliance on the share of trade in GDP as an indicator of trade liberalization is highly misleading. Third, the failure to carefully consider selection bias in the descriptive analysis further distorts the results. Finally, the regression analysis contains several problems relating to the data used and specification.

The paper proceeds in the following manner. Section 2 provides a concise summary of the DK study¹ and highlights the data in the paper that do not accord with the conclusions reached. Section 3 addresses the inappropriate choice of the trade/GDP indicator to measure trade liberalization and advocates the use of changes in tariffs instead. Section 4 discusses problems raised by selection bias in the descriptive analysis, while Section 5 highlights flaws in the regression model. Finally, Section 6 presents an analysis of the data using tariffs in place of trade/GDP ratios, detailed descriptive statistics and a modified regression model. The putative connection between trade liberalization and growth all but disappears.

Together these arguments seek not only to provide a counterweight to the DK study, but also to make the larger point that while trade openness does appear to be positively associated with growth in the aggregate and in the long run, the direction of causation is unclear, and the linkage is not nearly as uncomplicated as Dollar and Kraay suggest. A number of factors appear to influence growth (of income and of trade shares) far more than the few trade-related policies governments can influence. Further research, ideally grounded in country-specific studies, is needed to further develop these conclusions.

2. *The Dollar and Kraay argument*

The DK argument rests critically on the juxtaposition of the experiences of “rich countries”, a set of “globalizing” countries and a set of “non-globalizers”. They identify as rich countries the original 24 OECD countries and “early liberalizers” Chile, Hong Kong, Korea, Singapore and Taiwan. Next, they label poor countries as either globalizers or non-globalizers based on

¹ The paper contains two principle arguments, that openness is positively connected with growth, and that this growth is proportionally transmitted to the poor. Here we focus only on the first linkage.

increases in their trade/GDP ratio between 1975/79 and 1995/97. They put the top third of developing countries (24 of the 72 for which data are available) that have experienced the largest jumps in the trade/GDP ratio into the globalizer category and define the remaining 48 as non-globalizers.

They go on to show descriptively that the globalizers enjoyed substantially higher p/c income growth over the 1980s and 1990s than those countries that failed to generate more trade. Indeed their globalizers recorded positive growth throughout the period, while growth among the non-globalizers fell steeply in the 1980s and was only marginal in the 1990s. On the basis that the globalizers grew at a higher rate than the rich countries over this period, while non-globalizers grew more slowly, they argue that globalizers are 'catching up' with their rich counterparts while non-globalizers fall further behind.²

The primary analytical support for their argument comes from regression analysis that explores the strength of the association between growth in per capita GDP and growth in trade volume controlling for "initial income" (here, income growth in the past decade) and the time period (through period dummies). From this analysis, they report that a 100 percent increase in the volume of trade would have the cumulative effect of raising p/c income by 25 percent over the course of a decade (p. 18). They identify and seek to control for the effects of several other potential determinants of growth and trade volume, namely foreign direct investment, investment, rule of law (proxied by contract-intensive money), government consumption, inflation and political stability (using a dummy indicating whether or not a revolution occurred). However, none of these factors is found to be statistically significant unless FDI is substituted for the volume of trade (a point returned to below).

From the data Dollar and Kray present, an immediate problem emerges. By focusing on dynamic gains rather than steady states, the authors devote no attention to the levels either of trade/GDP or indeed of tariffs when making their argument. Thus they fail to acknowledge that their non-globalizers have much higher trade/GDP ratios on average than the globalizers, at the beginning of the period, and that at the end of the period, the average ratios for the two groups are not far apart (72 percent for globalizers vs. 63 percent for non-globalizers).³ Similarly, the globalizers also had higher tariffs than non-globalizers throughout the period (57 percent falling to 35 percent, in contrast to 31 percent falling to 20 percent). Therefore the data lends itself equally well to the conclusion that economies with higher shares of trade and lower tariff rates grew more slowly than those with lower shares, a conclusion at odds with their purported findings.⁴

Moreover, this limits the prescriptive import of the paper given that presumably there is not a great deal of leeway for the non-globalizers to globalize much further (and no reason to suppose they would be able to increase their trade volumes if they did). Finally, it may also suggest that whatever dynamic gains the globalizers captured could be short-lived. This

² This argument is made highlighting population-weighted GDP averages which stress disproportionately the unrepresentative experiences of China and India. Using unweighted data, their claims become much more modest. Indeed, Oxfam (2002) points out that ten of their 24 globalizers have growth of less than 1 percent per year on average, while one-third have average annual growth rates in the 1990s that are lower than their non-globalizing counterparts (p. 130).

³ Using data unweighted by population.

⁴ It also defies their categorization of non-globalizers as countries "that have remained more closed" (Nye *et al.* 2002, p. 8).

interpretation would be is consistent with steady-state growth theory,⁵ as well as with the argument that there might be an inverse-U shaped relationship between openness and growth (Nye *et al.* 2002, p. 8, fn13).

3. Trade share as a measure of liberalization

Trade reforms are typically undertaken in conjunction with a host of other liberalization policies making it difficult to isolate the effects of any particular policy. As a result, increased trade can be the result of policies not specifically related to trade. Indeed, they may equally be the product of considerable state intervention, including protectionism.⁶ Dollar and Kraay are aware of this point – “we recognize that growth in trade volumes may also reflect many factors other than trade liberalization” (p. 7) – but do not consider its implications.

Rather, the DK argument rests on use of increases of trade in GDP to measure trade liberalization. While conceding that their measure is an “*imperfect proxy*” (p. 3), they nonetheless advocate its use. In a brief discussion of alternatives, they state that “*average tariff rates provide some information about trade policy... Still it is peculiar that changes in reported tariff rates are not accompanied by any change in trade volume*” (p. 3). Surely this problem – that trade policy inputs only sometimes translate into the desired outcome – is the crux of the issue and should not be overlooked so lightly.⁷

Of course governments cannot directly increase the share of trade in their economies. However, tariff rates (along with non-tariff barriers) are the principal instruments through which they might directly influence trade. Therefore the fact that lowering tariff rates does not always mechanically result in increased trade is pivotal and in our view, warrants looking at the mechanisms underlying this linkage instead of advocating tariff reduction on the premise that it might lead to increased trade which might in turn result in more growth. Moreover, it suggests that an analytical focus on the policy input – tariff rates – is far more accurate and useful than employing a proxy for output – which by design biases the DK sample in favor of successful liberalizers.

We attempt to make this argument more clearly by graphically illustrating the presumed linkages underlying trade policy inputs and outputs. Figure 1 gives a scatterplot of growth in trade/GDP versus p/c income between 1985 and 2003 for 86 countries.⁸ The huge diversity of relationships (and weak trend) suggests the linkage is not a direct one.

Figure 2 shows that the link between tariffs and p/c GDP growth is even more tenuous than the link between trade/GDP and growth, making clear that the nexus between the policy and an outcome measure requires scrutiny. Finally Figure 3 makes the central point that the link between tariffs and the share of trade/GDP is a highly indirect one. This echoes a point made implicitly by Dollar and Kraay, who provide a scatterplot of growth in trade relative to GDP

⁵ Winters (2004) summarizes recent work suggesting gains from trade represent “transitional dynamics” after which economies return to long-term steady-state growth.

⁶ See Rodrik 1995, 1997 – cited by Winters (2004), p. F7, fn4; also Bairoch 1997, cited in Sumner (2003) p. 7.

⁷ Its importance is heightened by a recent assertion that studies providing positive support for trade liberalization typically base their work on outcome measures like trade volumes, while those that are more sceptical have generally based their work on policy proxies such as tariffs (Sumner 2003, p. 7).

⁸ The post-1985 period is used because the tariff data – though available from 1981 – is too patchy to be of use before that point. Following Dollar and Kraay, I use the 1985/89 average as a measure for the late 1980s. The 2003 end date is selected as the latest year for which data are available.

(1975/79 to 1995/97) versus tariff reduction (1985/89 to 1995/97) (p. 34, Figure 7), though the different time periods they use for the two variables makes the comparison all but meaningless. They make a more cogent point when they identify globalizers based on tariff reductions rather than an increase in trade shares and find that these globalizers's share of trade in GDP barely altered between the 1960s and the 1990s (estimates are 51 percent and 52 percent respectively), while the non-globalizers raised their share from 70 percent to 77 percent over the four decades (p. 38, Table 3). Tariff cutting and increased trade volume are not strongly connected.

Taken together these figures show that the choice of indicators matters, and moreover that trade openness is not an automatic outcome of facile prescriptive advice to reduce trade barriers. Of course it would be preferable to include non-tariff barriers (NTBs) to trade in the analysis but this is a complicated undertaking that is difficult to standardize across countries. In any event, Rodrik (2000) concludes that average unweighted tariffs alone “*tend to be pretty accurate reflections of ... overall restrictiveness*” (p. 3), given that they are typically highly correlated with the extent of protection of the most important commodities in an economy. Moreover, countries tend to employ similar levels of tariffs and NTBs (Nye *et al.* 2002, p. 6).⁹ Another tariff-related measure sometimes adopted in the literature (especially on Latin America) is the Lora trade index which combines average tariff levels with the level of dispersion around the average, but data limitations preclude its estimation on a global basis.

4. Patchy data and selection bias

The results that Dollar and Kraay derive are very sensitive to the countries and time periods they select for comparison. Given the repeated instances of selection bias in their descriptive work, it is hard to escape the conclusion that they very carefully craft the data to lend support to their argument.

Figures 4-7 give a powerful example of this. They compare the growth experiences of the DK globalizers and non-globalizers for two periods (1985-97 and 1985-2003). Figure 4 shows that if China is omitted from the globalizer group, average annual per capita growth falls to below the level of the non-globalizers. Figures 5 and 6 give scatterplots of the relationships between tariff changes and growth for globalizers and non-globalizers, illustrating the diversity of experiences within each group. Finally, Figure 7 shows that for the longer period, if Sierra Leone is removed from the non-globalizer category, the group's average annual p/c GDP growth leaps above that of the globalizers. The purported trade volume-growth linkage is not a robust one.¹⁰

⁹ Rodriguez and Rodrik (2000) concur with this view: “*It is common to assert in this literature that simple trade-weighted tariff averages or non-tariff coverage ratios – which we believe to be the most direct indicators of trade restrictions – are misleading as indicators of the stance of trade policy. Yet we know of no papers that document the existence of serious biases in these direct indicators, much less establish that an alternative indicator ‘performs’ better (in the relevant sense of calibrating the restrictiveness of trade regimes). An examination of simple averages of taxes on imports and exports and NTB coverage ratios leaves us with the impression that these measures in fact do a decent job of rank-ordering countries according to the restrictiveness of their trade regimes*” (p. 38).

¹⁰ Note that Dollar and Kraay do assess the growth performance of countries they identify as globalizers based on tariff falls. They assert that these countries experienced higher growth than non-globalizers between 1975/79 and 1995/97. However, the tariff data is only available for the 1985/89 to 1995/97 period, which invalidates the comparison. Again, comparing their performance over the correct time period (1985/89 to 1995/97), the non-globalizers perform better than the globalizers (Nye *et al.* 2002, p. 5).

Rodrik gives a slightly different example of selection bias. Using the DK dataset he identifies 40 “globalizing” countries on the basis of the size of their tariff reductions and rise in import/GDP ratio over the 1980/84 to 1995/97 period. He shows that these countries experienced a steady *decline* in p/c GDP growth from an average of 4 percent in 1975 to 2.5 percent in 1985 to less than 2 percent in 1995. Examining such evidence, Oxfam (2002) concludes: “*It would doubtless be possible to arrive at different results by changing these reference years and indicators. Any number of outcomes might emerge.*”

Accordingly, we argue that the extreme variability of the results to very slight changes in the definitions used argues against deriving strong conclusions based on averages of the data, and instead for an analytical approach that makes careful use of more detailed country-specific data. We attempt to provide more disaggregated data below.

5. *The flawed regression model*

The DK regression is specified according to the following equation:

$$y_{ct} - y_{c,t-k} = \beta_1 * (y_{c,t-k} - y_{c,t-2k}) + \beta_2' (x_{ct} - x_{c,t-k}) + (\gamma_t - \gamma_{t-k}) + (v_{ct} - v_{c,t-k}),$$

where y_{ct} = log of per capita GDP in country c at time t;

$y_{c,t-k}$ = the log of income at a previous time (here k = 10, so ten years);

$x_{c,t}$ = a set of control variables averaged over the decade t-k to t, in the specifications that concern us, the trade/GDP ratio and FDI);

and the ‘disturbance’ terms γ and v representing an unobserved period effect and an unobserved component varying across countries and years, respectively.

Their dataset consists of 187 observations on growth in the 1990s and growth in the 1980s for about 100 countries. The explanatory variables they employ are average annual growth in the preceding decade (i.e., a 10 year lag) and the average annual change in trade volumes.

The equation is estimated using decade-long differences in the key variables, which the authors claim allows them to control for country-specific differences affecting the results. They write: “*By focusing on decadal changes in growth or changes in trade volumes we can at least be sure that are results are not driven by geography or by any other unobserved country characteristic that drives both growth and trade but varies little over time, such as institutional quality*” (p. 3). However many critics disagree, arguing that several “*unobserved country characteristics*” – e.g., institutional quality or income shocks – may be correlated with both growth and trade volume, and moreover that these potential determinants may have different impacts at different points in time (Rodrik 2000, Nye *et al.* 2002). Failure to control for these characteristics causes the trade/GDP variable to “pick up” their effects (*omitted variable bias*), exaggerating its true explanatory power. Dollar and Kraay do attempt to introduce a limited set of controls in some specifications of their model, as described above, claiming that the variables they use as controls are less correlated with changes in trade openness than levels; however Nye *et al.* (2002) show this is not the case (p. 12, fn 18).

A second key problem with the specification concerns endogeneity or causation. Trade and growth appear to be related in that trade may cause growth and growth may also lead to more trade. Dollar and Kraay attempt to deal with this by instrumenting for trade/GDP changes

over the 1980s and 1990s using 1970s trade levels (on the basis that they are unrelated to subsequent levels of growth but correlated with trade growth in the 1980s and 1990s). However, as Nye *et al.* (2002) point out, there is no reason to expect 1970s trade levels to be correlated with later changes in trade volumes (indeed in the DK data, there is no such relationship, as discussed above); and in any event, both factors may have similar longer-term determinants (p. 12, fn 19). Indeed country case studies would suggest causation probably goes in both directions in different contexts; e.g., trade liberalization may have preceded growth in sub-Saharan Africa and appears to have followed it in India and China (Sumner 2003, p. 10).

A final point concerns the identification of trade and FDI as determinants of growth. As noted above, Dollar and Kraay use this regression to show a highly positive and statistically significant relationship between trade share in GDP and p/c income growth. They then attempt a third specification which introduces FDI into the equation, as a substitute for and also along with trade volumes. They find that alone, FDI has a large and statistically significant growth effect, while when included with trade, the magnitude of the effects remains large but neither variable is statistically significant at the 90 percent level. The authors comment: *“This is not very surprising to us – it simply reflects the fact that different dimensions of openness tend to be correlated across countries and over time, and so it is difficult to disentangle the effects of particular dimensions of openness”* (p. 19). While this is undoubtedly the case, it also suggests that it is unclear whether their use of the trade volume measure is picking up the effects of trade or of FDI in their original specification (or indeed of something else entirely), and the two are very different policies with recent research indicating distinct effects on poverty and income distribution.¹¹ Again, the difference matters.

6. *A new look at the data*

We seek to replicate Dollar and Kraay’s empirical work using tariff falls instead of increases in trade/GDP to identify globalizers.¹² Tariff data are available for 1981 through 2003 but the early data is very patchy. Dollar and Kraay calculate an average rate for 1985/89, an imperfect measure since some countries record tariffs annually during this period, others have one or two observations, and many have none. However, I follow their example here and compare overall change over the period ending in 2001/2003. Table 1 lists the countries now considered globalizers and compares them with the countries put in this category by Dollar and Kraay on the basis of trade shares.

Figure 8 shows the growth performance for globalizers and non-globalizers defined on the basis of tariff cuts over this period. Globalizers registered growth of .94 percent p.a., while non-globalizers enjoyed somewhat higher growth (1.4 percent p.a.). In Figure 9, countries are divided into three categories based on the average size of their tariff cuts over the 1985/89-2001/03 period. The results suggest that the third of countries which cut their tariffs the most experienced less growth (1.35 percent p.a.) than those countries making less drastic cuts (the middle and bottom one-third of tariff cutters registered average growth of 1.6 percent p.a.). Figure 10 repeats this analysis excluding the rich countries (as defined by Dollar and Kraay); the middle one-third of countries enacting moderate cuts grew most, while the top third grew least. The suggestion that high tariff cuts may hamper growth receives some support in the

¹¹ For instance, see Vos *et al.* (2002), *Economic Liberalization, Distribution and Poverty: Latin America in the 1990s*. Cheltenham, UK: Edward Elgar.

¹² All data used in the succeeding analysis is from World Development Indicators (2004), except the tariff data, which is from <http://siteresources.worldbank.org/INTRANETTRADE/Resources/tar2002.xls>.

literature too, with Rodrik (2000) reporting that the 10 countries that made the deepest tariff cuts in the 1980/84 to 1995/97 period registered growth that is “*hardly exemplary*”, and that while China and India have sharply increased their trade/GDP ratios, their economies remain among the most protected in the world (p. 2-3).

Finally, Figure 11 puts countries into quadrants based on the relative size of their tariff cut and annual p/c growth rate relative to the median, for 1985/89-2001/03. Quadrant I contains countries with higher than median tariff cuts and growth, Quadrant II contains countries with higher than median tariffs but lower than median growth, and so on. Selected countries singled out by DK as globalizers are in bold face. The chart again reinforces the diversity of the relationships between tariff cuts and growth, and their fragility over time.

In short, a brief examination of these data point to three conclusions: 1) countries that reduced their tariffs appear to have fared no better than those that did not; 2) deeper tariff cuts may be associated with lower growth than more moderate cuts; and 3) more generally, the large diversity of experiences precludes drawing any sweeping conclusions.

These findings are subject to two cautions. First it may be that our “globalizers” would have fared worse than they did had they not reduced their tariffs, but we have no counterfactual evidence given that no countries with very high tariffs maintained them over this time period. Second, we reiterate the caution that the data is so patchy that the specific selection of countries and time periods may influence strongly the results (though we provide country data so that the full diversity of experiences is evident).

Finally, we conduct a modified version of the Dollar and Kraay regression model. For the sake of comparison, we first use (the log value of) trade/GDP as an indicator of trade liberalization, before substituting changes in tariff rates in its place. Because of the instrumentation problems referred to above which make the DK results meaningless, instrumental variable estimation is not attempted. Rather OLS is undertaken, the inconsistency of its results notwithstanding, to illustrate the partial correlations in the data.

Because far less data is available on changes in tariffs over time, we limit our analysis to the 1986/89 to 1995/97 period. The dataset contains data for just 77 countries. The results, shown in Table 2, are nonetheless suggestive. First, the relationship between trade volume and the increase in p/c income growth 1995/97 is found to be large and statistically significant at the 95 percent level; in line with the DK findings, a 100 percent increase in trade volume seems associated with a cumulative 26 percent rise in trade volume over the course of 10 years. However, when we substitute the tariff reduction into the equation in place of the change in trade volume, the tariff variable is negligible, negative in sign and loses any statistical significance. This exercise provides additional evidence of the at best tangential relationship the data show between the correct measure of trade policy – tariff shifts – and growth.

Rodriguez and Rodrik (1999) undertake a similar exercise in which they regress the growth rate of p/c GDP upon the average tariff rate and upon the coverage ratio for non-tariff barriers to trade, controlling for levels of initial income and secondary education. Similarly, they find that the slope of the trade barrier coefficient is only slightly negative and far from statistically significant (p. 2, also Figures I.1 and I.2). They conclude: “*Simple measures of trade barriers tend not to enter significantly in well-specified growth regressions, regardless of time periods, sub-samples or the conditioning variables employed*” (p. 2).

7. Conclusion

In close, while rich economies appear to be more open, the direction of causation is unclear and the linkage is a complex one. Policy designed to liberalize trade – namely the lowering of tariff and non-tariff barriers – does not automatically increase in trade, while the relationship between increased trade and growth seems to depend to a great extent on country-specific circumstances. As Rodriguez and Rodrik (2000) conclude from a review of the literature:

“We are in fact sceptical that there is a general unambiguous relationship between trade openness and growth waiting to be discovered. We suspect that the relationship is a contingent one, dependent on a host of country and external characteristics. Research aimed at ascertaining the circumstances under which open trade policies are conducive to growth (as well as those under which they may not be) and at scrutinizing the channels through which trade policies influence economic performance is likely to be more productive” (p. 4).

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Table 1 – Countries identified by DK as “globalizers” (1975/79-1995/97) based on trade share increase vs. countries identified here using size of tariff fall (1985/89-2001/03)

Dollar and Kraay	Alternative criteria
Argentina	Bahamas
Bangladesh	Bangladesh
Brazil	Benin
China	Brazil
Colombia	Burkina Faso
Costa Rica	Burundi
Dominican Republic	Cameroon
Haiti	Central Africa Rep
Hungary	Congo, Rep.
India	Dominica
Ivory Coast	Ecuador
Jamaica	Egypt
Jordan	Ethiopia
Malaysia	Grenada
Mali	India
Mexico	Indonesia
Nepal	Kenya
Nicaragua	Mauritius
Paraguay	Nigeria
Philippines	Pakistan
Rwanda	Peru
Thailand	Sierra Leone
Uruguay	Sri Lanka
Zimbabwe	Sudan
	Venezuela
	Zambia

Note: Following Dollar and Kraay, I identified the top one third of countries for which data were available as “globalizers”; this leaves 26 countries of my sample as opposed to 24 in theirs.

Table 2 – OLS regression results, impact of trade volume and tariff reduction on income growth, 1985-96

Regressor	Specification 1	Specification 2
Initial income	.388 (.117)***	.360 (.113)***
Trade volume	.263 (.101)**	
Tariff reduction		-.00046 (.001)

*** Statistically significant at 99 percent level.

** Statistically significant at 95 percent level.

Robust standard errors reported in parentheses.

Figure 1 – Average annual growth in trade/GDP vs. p/c GDP growth by country, 1985-2003

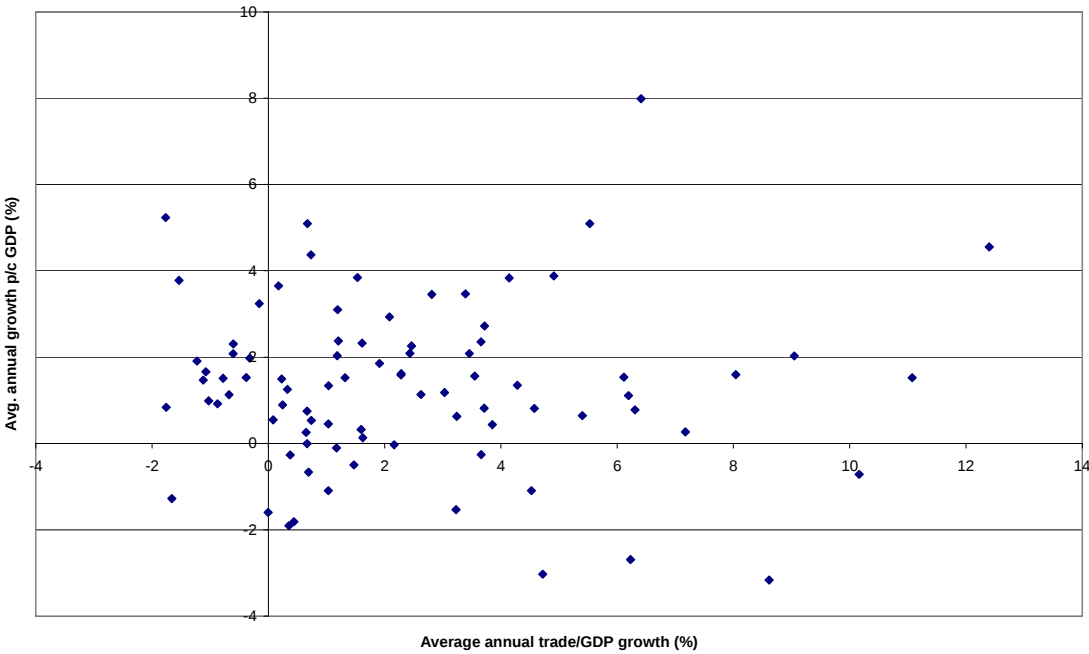


Figure 2 – Average annual change in tariffs vs. p/c GDP growth, 1985/89-2001/03

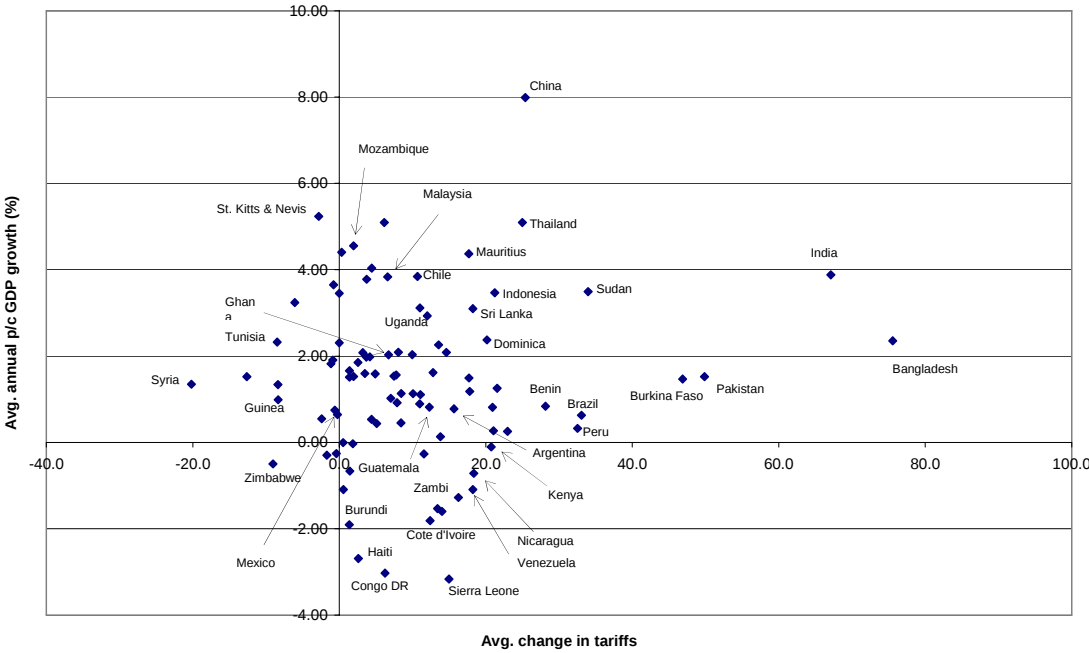


Figure 3 – Average annual change in tariffs vs. share of trade in GDP, 1985/89-2001/03

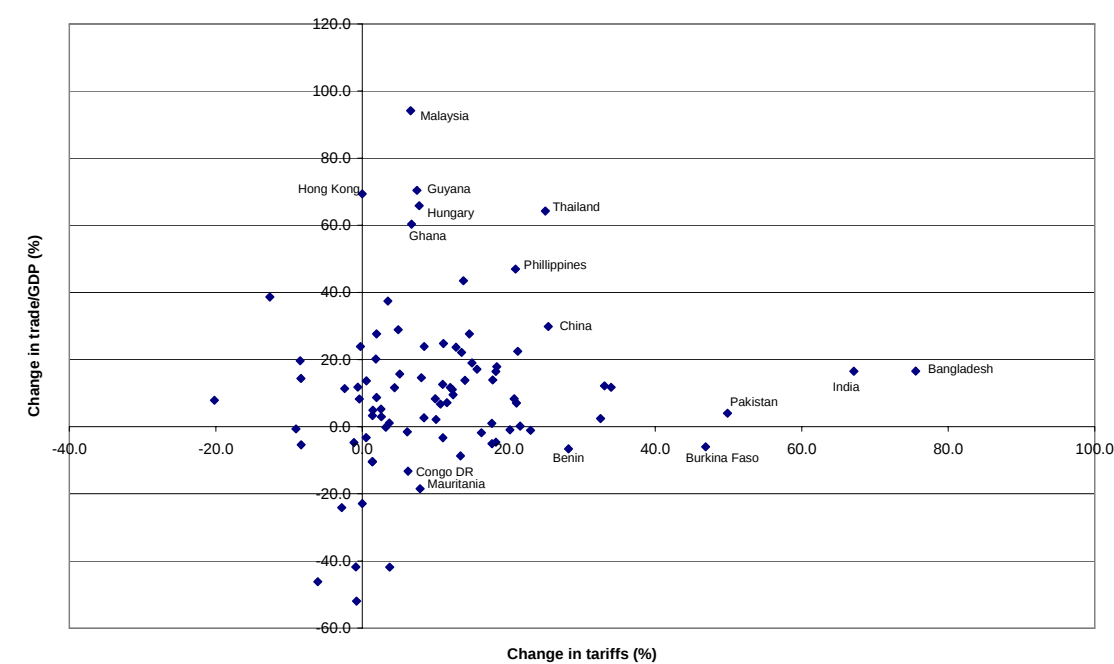


Figure 4 – Average annual growth rates of countries categorized “rich countries”, “globalizers” and “non-globalizers” by Dollar and Kraay, 1985/89-1995/97

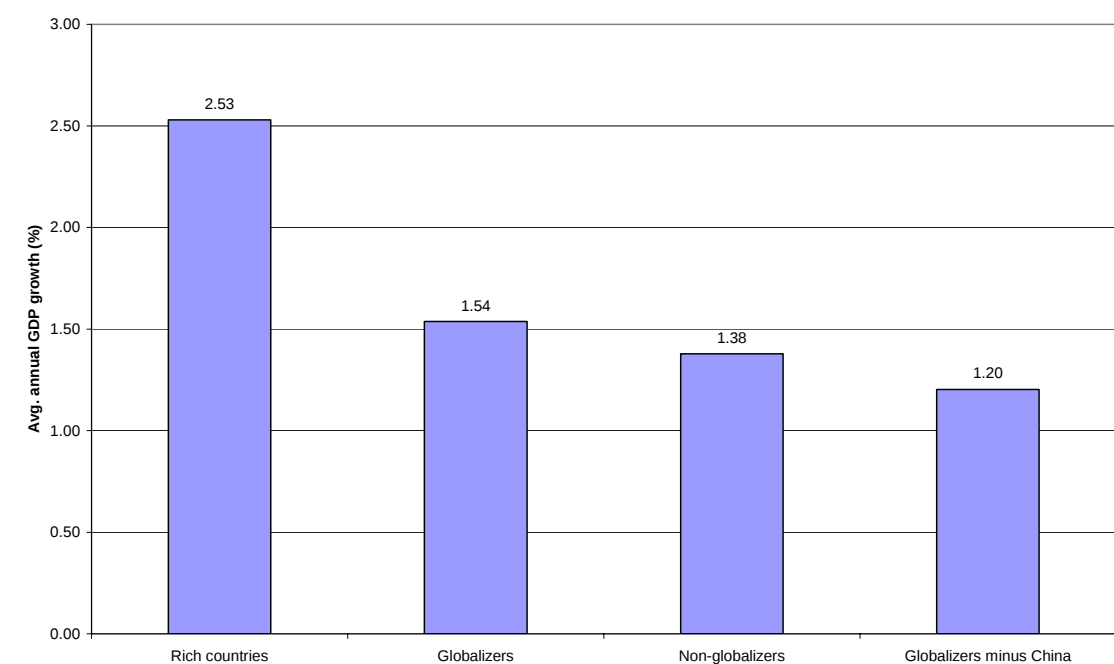


Figure 5 – “Globalizers”: Average change in tariffs vs. average annual p/c GDP growth, 1985/89 to 1995/97

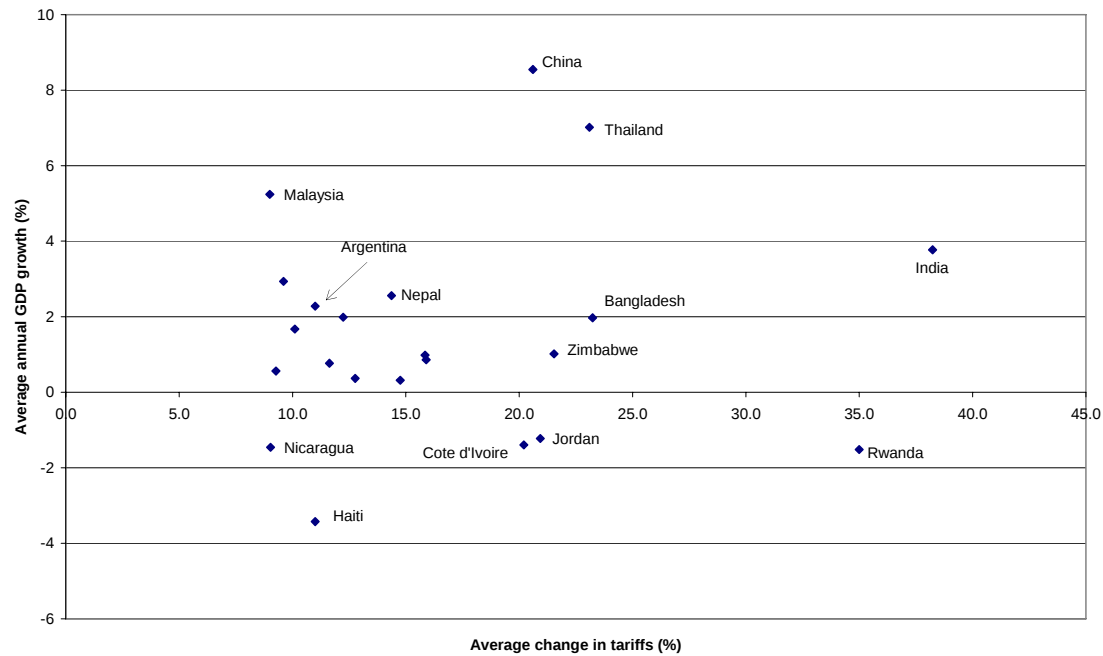


Figure 6 – “Non-globalizers” Average growth in tariffs vs. average annual p/c GDP growth, 1985/89 to 1995/97

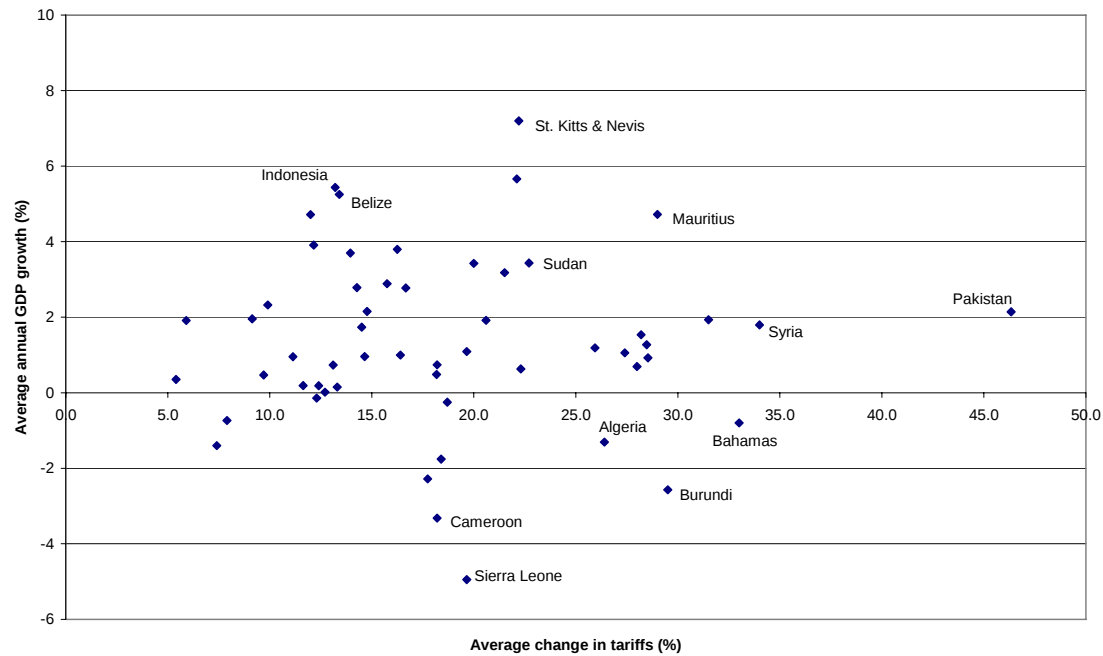


Figure 7 – Average annual growth rates of countries categorized “rich countries”, “globalizers” and “non-globalizers” by Dollar and Kraay, 1985/89-2001/03 add tariffs

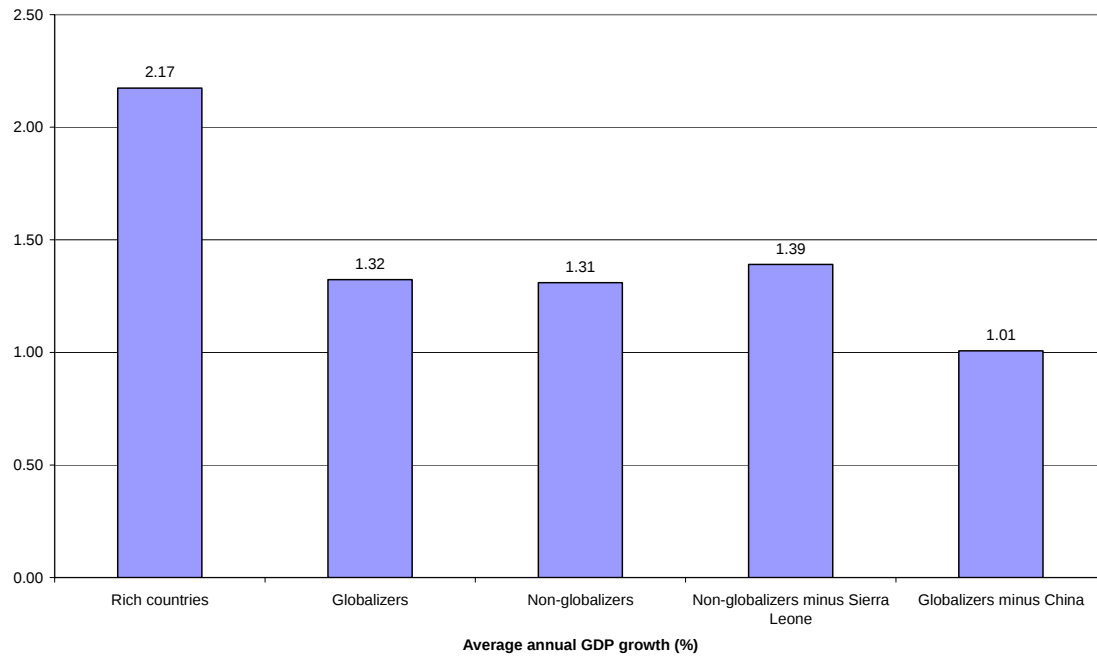


Figure 8 – Average annual growth rates of countries categorized as globalizers according to size of tariff reductions, vs. non-globalizers, 1985/89-2001/03

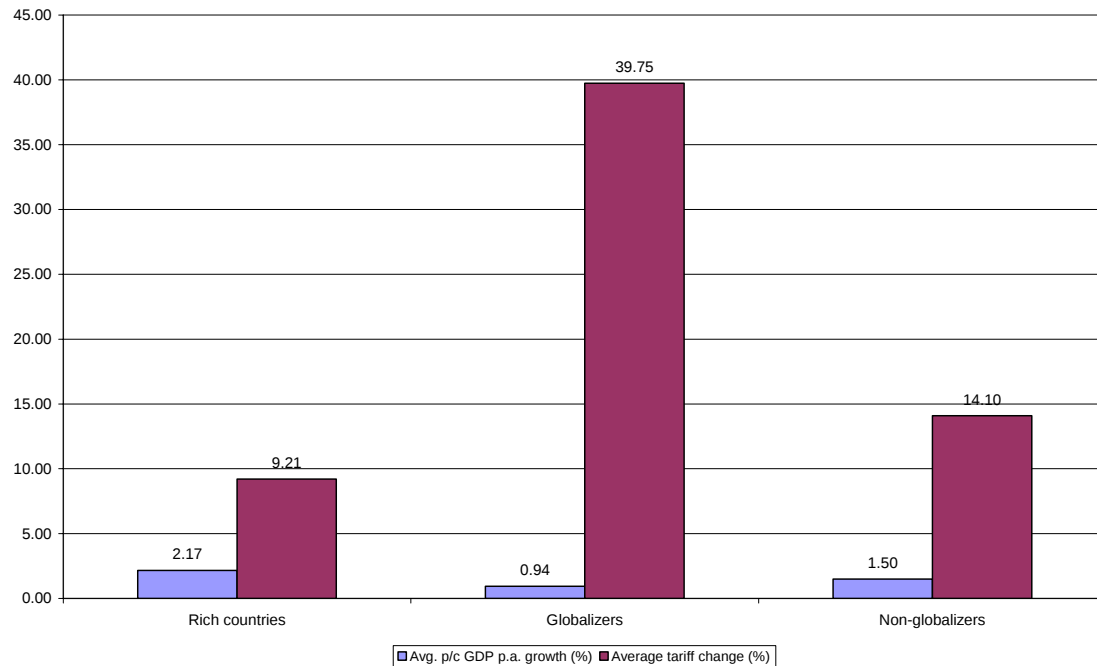


Figure 9 – Relationship between annual average tariff reduction and p/c income growth, 1985/89-2001/03 (92 countries split into three groups)

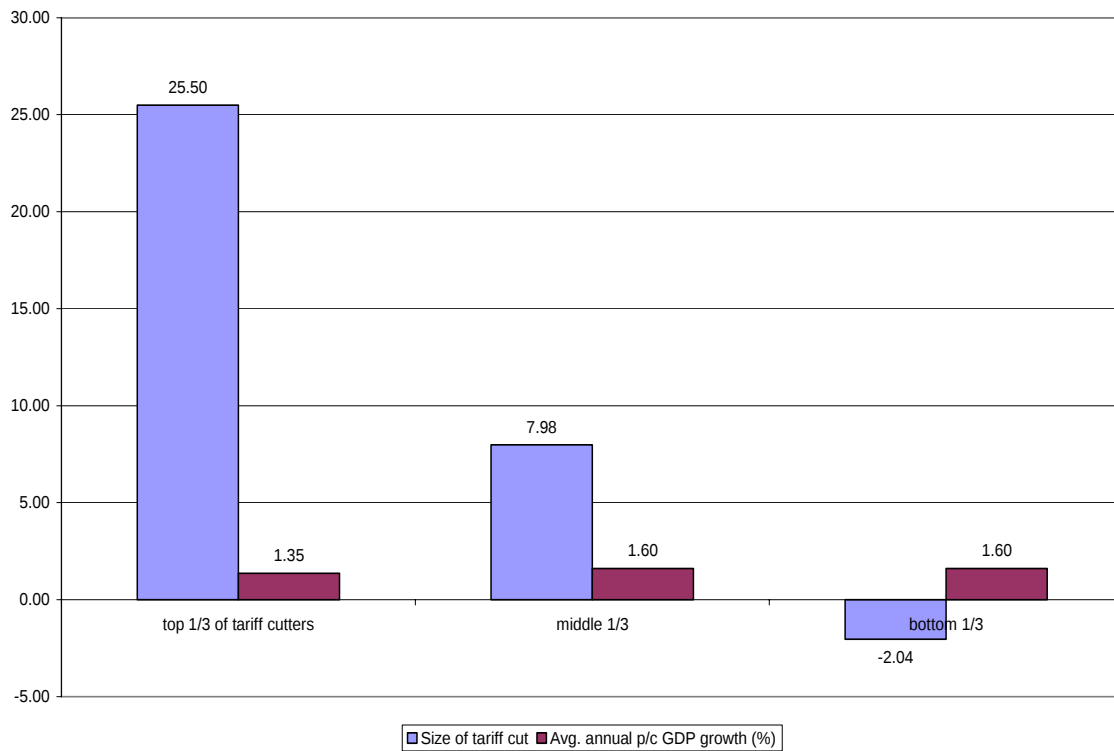


Figure 10 – Relationship between annual average tariff reduction and p/c income growth, 1985/8-2001/03 (78 countries split into three groups, excluding rich countries)

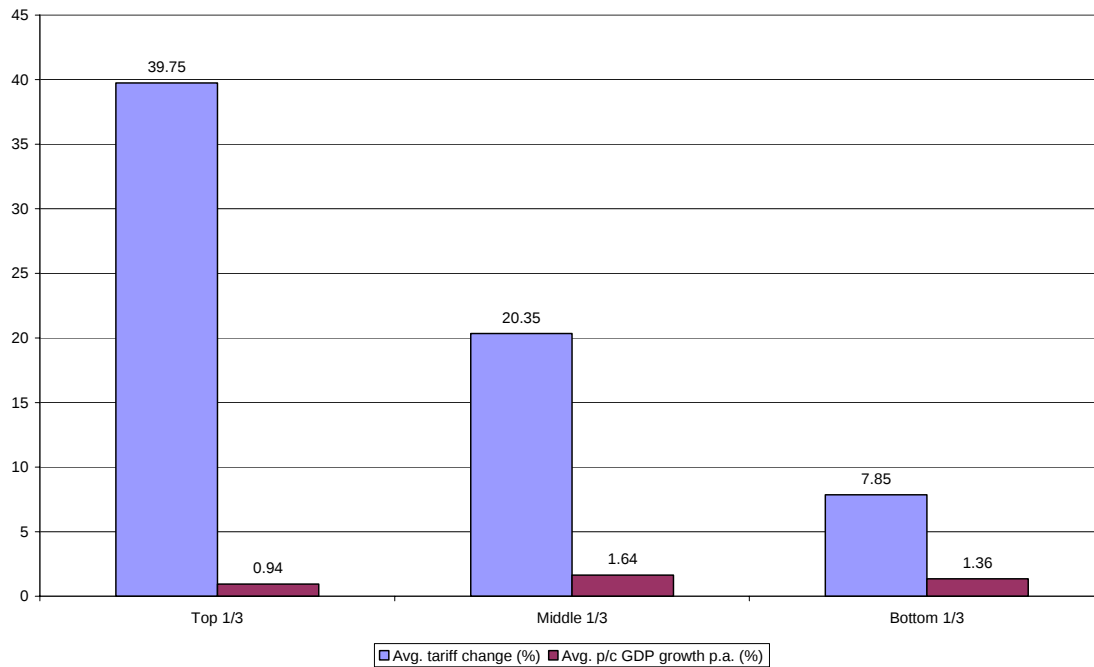


Figure 11 – Typology of countries categorized by size of tariff change and annual average p/c GDP growth, excluding rich countries (Selected DK globalizers in bold)

