IS TRADE POLICY OPENNESS GOOD FOR GROWTH?

CHARLES ACKAH

CREDIT, School of Economics, University of Nottingham, UK

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ABSTRACT

Very few issues are more contentious today than the effects of trade policy on the rate of economic growth and poverty in developing countries. The paper investigates the relationship between trade barriers and growth using a dynamic panel regression model for data on 48 developing countries over 1980-1999. Trade barriers are captured by measures of tariffs, import and export taxes. Particular attention is paid to simultaneity, country-specific effects and the potential contingency of this relation on income. Our preferred specification for growth includes as an explanatory variable an interaction term between trade barriers and initial income levels. The interaction term is meant to capture the non-linearity in the relationship between trade barriers and economic growth. This specification reveals a significant interaction effect under which the marginal impact of tariffs on growth is rising in initial income. In particular, the relationship between tariffs and growth is negative and significant across all alternative policy measures, but is not uniform across income groups. The richer the country, the smaller are the growth-reducing effects of trade protection and the poorer the country the more likelihood that trade protection will affect growth negatively. This finding is particularly interesting for Sub-Saharan Africa (the world's poorest continent) where trade restrictions are still pervasive and where poverty is widespread.

Author
Charles Ackah is research student in the School of Economics. I am grateful to my supervisors, Professor Oliver Morrissey and Dr Simon Appleton for guidance and comments. Contact email: lexcga@nottingham.ac.uk.

1 INTRODUCTION

For many years, economists and policy makers have discussed the impact of trade barriers on economic performance. Economic theory generally supports the conclusion that trade liberalization has a positive effect on economic growth, although there are scenarios in which liberalization might slow economic growth. Empirically, some studies have identified a positive linkage between a country's rate of economic growth and its openness to international trade, while others have failed to demonstrate this linkage. A general criticism of many of the empirical studies is that they use measures of trade or indices of openness, rather than using measures of trade policy. We address this latter concern by using three alternative policy measures: average unweighted scheduled tariffs, import taxes (as a percentage of import, a measure of average implicit tariff) and export taxes (as a percentage of exports). These indicators have limitations as measures of trade policy (see Milner and Morrissey, 1999; Rodrik, 1999), but should capture the broad pattern of trade policy across countries and over time.

This study investigates the impact of trade policy on economic growth in developing countries during the period 1980-1999, based on a dynamic panel regression model. The focus of this study is an empirical question: Does trade policy openness cause economies which liberalize to grow more rapidly than those which do not? Is the relationship between trade policy and growth dissimilar for poor and rich countries? What can we say specifically about Africa?

Even though the focus of this study is on Africa, the strategy is to begin by placing Africa's trade policy in a global context where we introduce the 'traditional' Africa dummy in a developing country sample. Then we take a detailed look at trade policy and growth in an 'Africa only' sample. In this study, we address the extremely important issue of endogeneity by employing the GMM systems estimator. We find that trade policy has a large and significant effect on economic performance in developing countries, but this effect is non-universal across countries in different income groups.

The remainder of this paper is organized as follows. The next section provides a brief review of the theoretical and empirical literature on trade and growth. In Section 3 we describe a standard growth equation and present some preliminary statistics from the data. Section 3 further describes the econometric methodology we employ for our estimations. In Section 4, we present evidence from a dynamic panel data model based on the Generalised Methods of Moments (GMM) estimator of trade barriers and growth, and discuss the estimation results for various measures of trade restrictions. In Section 5, we carry out some sensitivity analysis to test for the robustness of our results. Section 6 presents concluding remarks.

2 LITERATURE REVIEW

There is a large literature on the empirical and theoretical linkages between the degree of an economy's openness to international trade and its growth rate. While theory is ambiguous regarding the relationship between greater openness to trade and economic growth (Riveria-Batiz and Romer (1991), Grossman and Helpman (1991), Parente and Prescott (2002)), most empirical work (Levine and Renelt (1992), Sachs and Warner (1995), Harrison (1996), Sala-i-Martin (1997), Harrison and Hanson (1999), and Wacziarg and Welch (2003)) has generally found a positive relationship, although a fragile one, as pointed out by Rodriguez and Rodrik (2001).

2.1 Theoretical Arguments

Economic theory offers many reasons to expect trade liberalisation to stimulate economic growth and poverty reduction. There is a very strong claim that trade liberalisation or openness to trade leads to faster economic growth and that the poor share (to some extent) in the benefits of growth (Jenkins, 2004). The theoretical models of endogenous growth suggest positive association between openness and growth through several channels, e.g. embodied technology, availability of inputs, technical assistance and learning, and reduced networking costs, e.g. see Bhagwati and Srinivasan (2001), Grossman and Helpman (1991) and Lucas (1988). However, there are also endogenous growth models that suggest that trade may be growth-stunting (Grossman and Helpman, 1991; Srinivasan, 2001). It is possible to develop endogenous growth models in which protection of the domestic market promotes

growth.[1] Harrison (1996), for example, has pointed out that the endogenous growth theorists do not predict that free trade will unambiguously raise economic growth; increased competition could, for example, discourage innovation by lowering expected profits. Thus, 'there should be no theoretical presumption in favour of finding an unambiguous negative relationship between trade barriers and growth rates in the types of cross-national data typically analyzed' (Rodrik and Rodriguez, 2001: 18). Ultimately, the issue of the impact of trade policy on economic growth remains a matter of empirical testing.

2.2 Empirical Literature

In spite of the numerous critiques of cross-country studies they still have become a major research tool over the last decade for understanding the links between trade policy and economic growth. Most of the empirical literature using cross-country data has found international trade in goods to be growth inducing (see Baldwin, 2003), e.g. Dollar (1992), Edwards (1993, 1998), Sachs and Warner (1995), Coe *et al*. (1997), Dollar and Kraay (2001b) and Mbabazi *et al* (2002). These studies, specifically or the general empirical approach, have come under severe criticism from free-trade skeptics (Rodriguez and Rodrik, 2001) and pro-free-trade economists (Srinivasan and Bhagwati, 2001). A number of methodological and econometric problems have been identified that could account for the lack of robustness of these studies. In what follows, we consider the main limitations of these cross-country studies and note some of the main arguments advanced by their critics.

2.2.1 Causation and Simultaneity Bias

First, while the studies may have unearthed a positive association between trade and growth, most are unable to conclude anything about causality *per se*. It has also been pointed out that in the case of the relationship between openness and growth, the direction of causation is by no means straightforward. As Rodrik (1999) argues, it may well be the case that faster growing economies become more open rather than economies that become more open grow faster. Rodrik (2000b) holds the view that both are caused by the quality of institutions. Harrison (1996) concludes that previous

[1] See (Romer, 1990; Grossman and Helpman, 1990; Rivera-Batiz and Romer, 1991a,b; Matsuyama, 1992; Young, 1991 and Lucas, 1988).

studies on the direction of causality between openness and growth have generated mixed results, with causality being bi-directional. Rodríguez and Rodrik (2001) believe that there has been a tendency to overstate the pure tariff effect on growth.

2.2.2 Definition and Measurement Issues

Research must confront the fact that it is very difficult to obtain reliable direct measures of trade policy openness across countries over time. Measuring the extent of trade openness is a major challenge for any study involving the analysis of trade policy (Winters 2003, 2004; Rodrik and Rodriguez 2001; Pritchett 1996; Edwards 1993, 1998; Greenaway *et al*, 1998; Milner and Morrissey, 1999; Rodrik, 1992, 1998, 1999). Several approaches have been employed to circumvent the problem, especially the use of indices of trade orientation that are constructed using quantitative and qualitative judgements, e.g. Dollar (1992), Sachs and Warner (1995), Harrison (1996), Edwards (1998), and Frankel and Romer (1999). Some studies confuse trade outcome measures (trade volume or its components) with policy indicators, e.g. those that interpret the trade volume measure of openness, (X+M)/GDP, as a policy indicator. Rodriguez and Rodrik (2001) argue that the indicators of openness used by researchers have crucial shortcomings in measuring the trade orientation of countries and are therefore problematic as measures of trade policy. Given the problems of measuring openness we use more direct measures of trade policies - average tariffs, tax revenue from imports and tax revenue from exports.

Only a handful of studies have looked at the relationship between actual trade barrier indicators (tariff rates, non-tariff barriers and tariff revenues) and growth in the last several decades and reported mixed empirical results. Edwards (1992) tested for a relationship between average tariffs and growth using a sample of 20 countries over 1972-80, and finds a statistically insignificant (negative) relationship. However, Lee (1993), Harrison (1996), and Edwards (1998) found a significant and negative relationship between tariff rates and growth. Clemens and Williamson (2002) find that prior to 1950, the correlation between average tariffs and growth was positive, but since 1950 the correlation has been negative. Vamvakidis (2002) finds that prior to 1970 there is no evidence of a negative relationship between average tariffs and growth, but finds evidence of a non-robust negative relationship between average tariffs and growth between 1970 and 1990. Yanikkaya (2003), looking at the growth

of more than 100 countries between 1970 and 1997, finds that trade barriers are positively correlated with growth. Further, the positive correlation is found to be stronger for developing countries than developed countries. However, as the results reported in his Table 6 (p. 82) indicate, this pattern is not robust to the removal of bias resulting from unobserved fixed effects. DeJong and Ripoll (2004) find that the relationship between tariffs and growth depends on the level of development. They find a negative relationship only among the world's richest countries, and a positive but not significant relationship among the world's poorest countries.

2.2.3 Cross-sectional or Panel Data Analysis

Developing countries differ in terms of their colonial history, their political regimes, their ideologies and religious affiliations, their geographical locations and climatic conditions, not to mention a wide range of other country-specific variables. Failing to take this heterogeneity (country-specific effects) into account will bias the results. Greenaway *et al*. (2002) argue that dynamic mis-specification is a further limitation of many empirical studies. The use of panel data techniques, exploiting both the cross-section and time series properties of the data, offers potential benefits. Panel data could also offer a potential solution to the endogeneity problem through the use of lagged levels as instruments for the endogenous variables. Another important advantage of a panel model is that fixed country and time effects can be used to control for unobserved heterogeneity that is correlated with both growth and the regressors.

2.2.4 Specification Issues (Linear or Non-linear Relationship)

DeJong and Ripoll (2004) argue that a potential source of mis-specification in the literature involves the presence of an un-modelled contingency in the relationship between trade barriers and growth. Using a non-linear specification, for a global panel data set comprising 60 developing and OECD countries, they find that the relationship between tariffs and growth depends on the level of development. They find a significant interaction between tariff and initial income under which the marginal impact of tariff is decreasing in income. Most of the empirical literature has not yet systematically addressed the question of whether trade policy affects growth differently across countries in different income groups. Rodrik (1999) argues that the benefits from openness are contingent on the availability of complementary policies

and institutions, implying a contingent or nonlinear relationship between openness and growth.

The picture that emerges is that the effect of trade policy openness may not be uniform across countries and over time. A general proposition that is consistent with the cross-country regression studies is that the countries that have grown rapidly on a sustained basis have almost always done so in the presence of either low or declining barriers to trade. In a systematic defence of free trade along these lines Panagariya (2004a) concludes that openness is necessary but not sufficient for sustained rapid growth. He identifies all countries that have grown at three percent or more in per-capita terms during the last four decades and shows that these growth "miracles" uniformly took place in the presence of low or declining barriers to trade. He also identifies the growth "debacles" - the countries that did not experience any growth in per-capita terms on a sustained basis or actually declined - and show that they are rarely the outcome of openness. Thus, in his view, while openness is an important part of the miracles, it does not lead to debacles.

3 EMPIRICAL METHODOLOGY AND DATA

3.1 Data

We construct an unbalanced panel that consists of data for 48 developing countries over 20 years (1980-1999),[2] averaging the data over five non-overlapping four-year periods. Not all countries have data for all five time periods, but the use of unbalanced panels may lessen the impact of self selection in the sample. The final sample consists of 20 Sub- Saharan African countries, 13 Latin American countries, 7 from East Asia, 5 from South Asia and 3 from the Middle East and North Africa. The data comprise a heterogeneous group of countries in terms of size, level of income, degree of openness, population, resource endowments and so on. Our dependent variable (*GROWTH*) is the (period) growth of real per capita GDP (detailed data definitions and sources are provided in Appendix A).

[2] We began with a sample of 64 countries for which data on per capita GDP growth and average tariffs were available. However, 16 of these countries were eliminated from the sample due to lack of data for the other two alternative trade policy measures.

The variables included in the model are widely accepted as core explanatory variables. The log of Real GDP per capita in the year preceding the period (*lnGDP0*) is included to capture initial country specific effects or convergence. If initial income captures convergence the expected sign is negative. However, in a cross-country regression it may capture country-specific initial conditions, and the sign could be positive (Mbabazi *et al* 2001). The coefficient on population growth (*POP*) is expected to be negative. The coefficient on investment share of GDP (*INV*) is expected to have a positive sign. We employ three alternative measures of trade policy – average (unweighted) scheduled tariffs (*TARIFF*), export taxes as a percentage of exports (*XTAX*) and import taxes as a percentage of imports (*MTAX*). We add to this basic specification other variables believed to be particularly important in the openness-growth relation. These variables include foreign direct investment (*FDI*)[3], the interaction effects between trade policy and initial income and a dummy variable for Sub-Sahara Africa (*AFRICA*).[4]

To capture potential contingencies in the relationship between tariffs and growth, we include in our baseline specification an additional explanatory variable constructed as the product of log initial income and our individual trade policy variables. The interaction term is meant to capture the non-linearity in the impact of trade barriers on economic growth. Evidence of a contingent relationship is provided by a significant coefficient on the interaction term. This approach is in keeping with the work of DeJong and Ripoll (2004), which used three approaches to capture potential contingencies in the relationship between tariffs and growth and found evidence of a negative relationship only among the relatively rich countries of the world.[5]

[3] There is evidence that FDI contributes to growth (Borensztein *et al*. 1998). Over the two decades under study FDI has become the single largest capital flow to developing countries, far surpassing portfolio equity investment, private loans, and official development assistance. The World Bank (2002) reported that in 1997 developing countries received 36 percent of total FDI flows.

[4] The 'Africa' dummy is meant to test if there is an 'Africa effect' (to check whether the estimated coefficient is negative and statistically significant) in our sample. The common belief is that Sub-Saharan Africa is different from, in the sense that growth is worse than, other regions (Collier and Gunning, 1999) and much of this difference can be related to trade factors (Mbabazi et al., 2002).

[5] In the first approach, they include an additional explanatory variable constructed as the product of the log of initial income and tariffs. Under the second, they replace this variable with an alternative interaction term: the product of tariffs and World Bank income rankings. The third approach involves stratifying the data set into separate sub-samples: one that includes high- and upper-middle income countries; and one that includes lower-middle and low-income countries.

It is useful to examine simple statistics for the measures of openness and growth over the period under consideration (Tables 1 and 2). Table 1 displays correlations between per capita GDP growth, trade share and the trade barrier measures. The simple correlations suggest that while we can expect to find a positive and statistically significant association between trade volumes (trade share) and growth, the unconditional relationship between trade barriers and growth is a less clear. There is evidence of a negative and statistically significant correlation in two cases (export tax and import tax); for average tariff the correlation appears positive but is not significantly different from zero. All the trade barrier indicators are negatively and significantly correlated with trade shares, suggesting that trade barriers do repress trade. Given the positive relationship between trade share and growth, the negative correlation between trade barriers and trade share suggests that trade barriers may have negative effect on growth. As the econometric estimates that follow indicate, the situation is more complicated than these statistics suggest.

Table 1: Correlation matrix between policy measures

	TARIFF	*MTAX*	*XTAX*	*TRADE (%GDP)*	*GROWTH*
TARIFF	1.0000				
MTAX	0.5168	1.0000			
	(0.0000)				
XTAX	0.0711	0.1256	1.0000		
	(0.3399)	(0.0693)			
TRADE (%GDP)	-0.3759	-0.3148	-0.1848	1.0000	
	(0.0000)	(0.0000)	(0.0074)		
GROWTH	0.0645	-0.1502	-0.1694	0.2384	1.0000
	(0.3586)	(0.0295)	(0.0140)	(0.0002)	

P-values in parentheses

Table 2 provides information about the means and standard deviations of the main variables, one aspect being of particular interest in our analysis. With the highest mean value of all three trade barrier measures SSA remains, on average, the most closed region.

Table 2: Summary Statistics for the Main Variables (1980-99)

Variable	Obs	Mean	Std. Dev.	Min	Max
East Asia					
Average Tariff	40	20.628	12.562	0.200	49.500
Import Tax (% Imports)	38	7.310	4.626	0.268	15.593
Export Tax (% Exports)	38	0.914	1.542	0.000	7.315
Trade (% GDP)	39	98.895	101.483	14.713	407.348
Gross Domestic Investment	40	30.702	7.184	17.650	47.100
Foreign Direct Investment	40	2.661	3.402	-0.004	12.697
Per Capita GDP Growth	40	4.198	3.337	-4.058	11.413
Sub-Sahara Africa					
Average Tariff	78	24.200	12.000	6.000	76.400
Import Tax (% Imports)	81	17.400	6.900	3.877	36.280
Export Tax (% Exports)	81	6.030	8.700	0.000	34.575
Trade (% GDP)	99	56.300	28.000	11.390	147.699
Gross Domestic Investment	99	17.300	7.100	4.325	45.525
Foreign Direct Investment	96	0.740	1.400	-6.520	5.715
Per Capita GDP Growth	99	0.007	3.690	-9.910	12.928
Latin America					
Average Tariff	51	18.810	10.700	8.000	50.500
Import Tax (% Imports)	52	9.340	3.820	2.039	18.387
Export Tax (% Exports)	52	1.280	2.510	0.000	10.897
Trade (% GDP)	60	62.130	37.884	14.110	168.718
Gross Domestic Investment	60	21.993	4.676	12.250	33.800
Foreign Direct Investment	60	2.420	3.017	-0.087	16.673
Per Capita GDP Growth	60	0.730	3.054	-5.923	10.288
All					
Average Tariff	206	25.770	17.403	0.200	99.900
Import Tax (% Imports)	210	14.165	8.056	0.268	46.769
Export Tax (% Exports)	210	3.141	6.223	0.000	34.575
Trade (% GDP)	238	63.957	51.788	11.390	407.348
Gross Domestic Investment	239	21.718	7.680	4.325	47.100
Foreign Direct Investment	236	1.553	2.420	-6.520	16.673
Per Capita GDP Growth	239	1.320	3.553	-9.910	12.928

Calculations are based on all 48 countries in our sample and for the three different regions of interest. Averages are taken of annual values for 1980-1999.

East Asia is the region with the lowest levels of protection according to import and export taxes. Sub-Sahara Africa exhibited the lowest average growth in real per capita GDP over the period 1980 to 1999, whereas East Asia recorded the highest trade share and rate of average growth.

3.2 Empirical Methodology

Drawing from recent modelling techniques in the literature (Greenaway *et al*. (1998); Easterly and Levine (2001); DeJong and Ripoll (2004)), we begin with a basic specification of the form:

$$y_{i,t} = \alpha y_{i,t-1} + \mathbf{x}_{i,t}'\beta + \eta_i + \lambda_t + \varepsilon_{i,t} \qquad (1)$$

where is $y_{i,t}$ is a country's per capita growth rate in period t, and $x_{i,t}$ is the vector of determinants of economic growth as named above, λ_t is a time-specific effect, $\varepsilon_{i,t}$ is the time-varying error term, and i and t represent country and (4-year) time period, respectively. The term η_i is a permanent but unobservable country-specific effect that captures the existence of other determinants of an economy's growth rate that are not already controlled for by the vector $\mathbf{x}_{i,t}$. It is time invariant and generally captures such cross sectional heterogeneity as differences in technology between countries. If the country-specific parameter were not included, random country-specific fluctuations would be grouped into the common error term. This would bias the error term. In a pure cross-sectional regression, the unobserved country-specific effect is part of the error term. Therefore, a possible correlation between η_i and the explanatory variables results in biased coefficient estimates.

It can be observed that equation (1) is a dynamic equation with a lagged dependent variable. Furthermore, the determinants of growth can be classified according to whether they are strictly exogenous, predetermined or endogenous. The possibility of endogeneity together with the presence of country specific effects correlated with some of the explanatory variables implies that estimation methods such as OLS will not be consistent. A first step in obtaining consistent estimates is to eliminate the country-specific heterogeneity. One approach is to employ the fixed-effects estimator by taking deviations with respect to individual country means. However, when the model includes a lagged dependent variable the dynamic fixed-effects model produces estimates that are inconsistent if *N* (number of 'individuals', or cross section) is large relative to *T* (number of time periods), hence the fixed effects estimator is biased (Wooldridge, 2002; Baltagi, 1995).

In such cases it is appropriate to use an estimation procedure which simultaneously addresses the issues of correlation and endogeneity. The Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond (1991) relies on first-differencing to eliminate unobserved individual-specific effects, and then uses lagged values of endogenous or predetermined variables as instruments for subsequent first-differences. Thus, it is able to control for the endogeneity of the lagged dependent variable as well as the potential endogeneity of other explanatory variables.

Endogeneity is a particular problem in studies that relate growth to openness using trade outcome measures such as trade share of GDP or its components export/GDP or imports/GDP. Such openness measures could clearly be endogenous since both the export and the import share seem likely to vary with income levels. Even direct trade policy measures, such as average tariffs, are susceptible to potential endogeneity. The pressure for protection may increase as growth falters, at least in the short run (Winters, 2004). Trade barriers may present issues of reverse causality if protection depends on economic growth (O'Rourke, 2000).

To address this and the endogeneity problem, Arellano and Bond (1991) propose using the lagged values of the explanatory variables in levels as instruments under the assumptions that there is no serial correlation in the error term and the explanatory variables. We follow Easterly and Levine (2001) and DeJong and Ripoll (2004) in addressing the issue of endogeneity by imposing the identifying restriction that the determinants of growth (variables in the **x** vector) are predetermined.[6] The assumption is that shocks to economic growth in period *t*-1 could affect gross domestic investment, foreign direct investment, population growth, openness or their interaction terms in period *t*. Given this assumption, an appropriate instrument for the difference is the lagged value.

Given the shortcomings of the differenced estimator (Easterly and Levine, 2001), we use the alternative systems estimator that estimates jointly the regression in

[6] This is a testable hypothesis for which the Sargan test of overidentifying restrictions is reported with all regression results. We relax this assumption later in the sensitivity analysis section to check for the robustness of our results.

differences with the regression in levels, as proposed by Arellano and Bover (1995) and Blundell and Bond (1998). The consistency of the GMM estimator depends on the validity of the assumption that the error term does not exhibit serial correlation and on the validity of the instruments. By construction, the test for the null hypothesis of no first-order serial correlation should be rejected under the identifying assumption that the error is not serially correlated; but the test for the null hypothesis of no second-order serial correlation, should not be rejected. We use two diagnostics tests proposed by Arellano and Bond (1991) and Blundell and Bond (1998), the Sargan test of over-identifying restrictions, and whether the differenced residuals are second-order serially correlated. Failure to reject the null hypotheses of both tests gives support to our model.

4 RESULTS AND DISCUSSION

Our specification of equation (1) in standard form is:

$$GROWTH_{it} = \delta_0 + \delta_1 GROWTH_{it-1} + \delta_2 \ln GDP0_{it} + \delta_3 POP_{it} + \delta_4 INV_{it} + \delta_5 FDI_{it} + \delta_6 POLICY_{it} + \delta_7 GDPOxPOLICY_{it} + \varepsilon_{it} \quad (2)$$

Tables 3a, 3b and 3c report coefficient estimates obtained from the growth regressions where we measure trade policy by average tariff (*TARIFF*), import tax (*MTAX*) and export tax (*XTAX*) respectively. Column 1 in Tables 3a, 3b and 3c presents estimates from a non-linear specification designed to establish whether the relationship between trade policy and growth is contingent on the level of income by introducing an interaction term between the respective policy measures and initial income.[7] Finally, we test for the existence of a 'Sub-Sahara Africa effect' by introducing a Sub-Saharan African Dummy (*AFRICA*) into the specification in column 1 and present the results in column 2. The baseline specification as in column (1) and its variant as in column (2) are dynamically specified (with lags of per capita GDP growth) and estimated using the GMM systems estimator. Various diagnostic tests are reported alongside the coefficient estimates.

[7] We first experimented with a baseline specification under which we model the relationship between trade barriers and growth as linear (i.e., without interaction between trade policy and income) in all the regressors. When trade policy alone is introduced into the growth regression it has inconsistent signs. We do not report the results (available upon request from authors) here for brevity.

Table 3a: Trade Policy (TARIFFS) and Growth in Developing Countries (1980-1999)

	Dependent variable: Per Capita GDP Growth	
Explanatory variables:	**1**	**2**
GROWTH $_{t-1}$	0.319	0.303
	(9.92)**	(9.59)**
lnGDP0	-0.728	-0.776
	(2.68)*	(3.03)**
POP	-0.236	-0.015
	(0.82)	(0.05)
INV	0.163	0.144
	(7.97)**	(6.99)**
FDI	0.274	0.19
	(2.43)*	(1.8)
TARIFF	-0.229	-0.182
	(3.73)**	(3.28)**
TARIFF ***x*** *lnGDP0*	0.044	0.033
	(4.41)**	(3.61)**
AFRICA		-0.87
		(2.33)*
Constant	1.081	2.444
	(0.51)	(1.22)
Sargan Test	[0.756]	[0.738]
1st Order Serial Correlation	[0.010]	[0.014]
2nd Order Serial Correlation	[0.694]	[0.703]
Wald Test	[0.000]	[0.000]
Observations	170	170
Number of Countries	48	48

Notes: Absolute *t*-statistics in parentheses while *p*-values in brackets, * denotes significant at 10%; ** denotes significant at 5%.
1. Time dummies (not reported) are included to capture the effects of cyclical impacts on growth.
2. The Wald test is for the joint significance of the independent regressors.
3. The Sargan test is for the validity of the set of instruments.
4. The tests for 1st and 2nd - order serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1991). The p-values report the probability of rejecting the null hypothesis of serial correlation, where the first differencing will induce (MA1) serial correlation if the time-varying component of the error term in levels is a serially uncorrelated disturbance.

Table 3b: Trade Policy (MTAX) and Growth in Developing Countries (1980-1999)

	Dependent variable: Per Capita GDP Growth	
Explanatory variables:	**1**	**2**
GROWTH $_{t-1}$	0.244	0.249
	(7.82)**	(6.51)**
lnGDP0	-1.126	-1.157
	(4.51)**	(4.20)**
POP	-0.73	-0.61
	(3.77)**	(2.70)**
INV	0.147	0.1
	(6.80)**	(3.77)**
FDI	0.279	0.363
	(2.69)**	(3.23)**
MTAX	-0.624	-0.617
	(5.40)**	(4.37)**
MTAX ***x*** *lnGDP0*	0.10	0.101
	(5.32)**	(4.24)**
AFRICA		-0.788
		(2.61)*
Constant	6.165	7.144
	(3.70)**	(4.26)**
Sargan Test	[0.843]	[0.891]
1st Order serial correlation	[0.003]	[0.003]
2nd Order serial correlation	[0.380]	[0.423]
Wald Test	[0.000]	[0.000]
Observations	163	163
Number of Countries	48	48

Notes: See Table 3a.

We begin by discussing the relationship observed between trade policy and growth, given the inclusion of the interaction term, from our baseline specification.[8] Trade policy enters consistently with a negative and statistically significant coefficient, but the interaction term is significantly positive in all cases, which, according to the theory, suggests a contingent relationship. This specification reveals a significant interaction effect under which the marginal impact of trade barriers on growth is

[8] We first experimented by estimating the global relationship observed between tariffs and growth given the exclusion of the interaction term from our baseline specification. We find weak evidence of a globally positive relationship between growth and trade barriers. When trade policy alone is introduced into the growth regression it has inconsistent signs. Results available from authors upon request.

rising in initial income. These results imply that the impact of trade barriers on growth is a function both of the level of restriction and of the level of income.

Table 3c: Trade Policy (XTAX) and Growth in Developing Countries (1980-1999)

	Dependent variable: Per Capita GDP Growth		
Explanatory variables:	**1**		**2**
GROWTH $^{t-1}$	0.245		0.256
	(8.10)**		(9.90)**
lnGDP0	0.057		-0.033
	(0.62)		(0.29)
POP	-0.733		-0.54
	(6.37)**		(5.90)**
INV	0.148		0.139
	(5.51)**		(5.35)**
FDI	0.084		0.065
	(1.16)		(0.75)
XTAX	-0.191		-0.241
	(2.41)*		(2.54)*
XTAX ***x*** *lnGDP0*	0.03		0.04
	(2.09)*		(2.51)*
AFRICA			-0.659
			(3.69)**
Constant	-0.403		0.155
	(0.82)		(0.23)
Sargan Test	[0.813]		[0.887]
1st Order serial correlation	[0.003]		[0.003]
2nd Order serial correlation	[0.240]		[0.246]
Wald Test	[0.000]	[0.000]	[0.000]
Observations	163	163	163
Number of Countries	48	48	48

Notes: See Table 3a.

To examine the conditional hypotheses, we chose three values for *lnGDP0* at which to compute the marginal effects of trade policy and report the results in Table 4. From equation (2), the derivative of growth with respect to trade policy (i.e. *TARIFF*, *MTAX* and *XTAX*) is calculated as

$$\frac{\partial GROWTH}{\partial POLICY} = \delta_6 + \delta_7 \left(\ln GDP_0 \right)$$

Table 4: Marginal Effect of Trade Policy on Growth

	At *lnGDP0* = MIN = 4.40	At *lnGDP0* = MEAN = 6.86	At *lnGDP0* = MAX = 10.1
TARIFF	-0.054 (2.93)**	0.044 (4.0)**	0.174 (4.25)**
MTAX	-0.184 (5.32)**	0.066 (3.41)**	0.385 (5.01)**
XTAX	-0.059 (3.39)**	0.015 (0.64)	0.303 (4.44)**

Note: *t*-ratios in parentheses

The interaction model asserts that the effect of a change in *POLICY* on *GROWTH* depends on the value of the conditioning variable log initial GDP (*lnGDP0*). Evaluated at mean trade policy level, we find a statistically positive effect for two (*TARIFF* and *MTAX*) of our trade barrier measures. The marginal effect of *XTAX* is also positive but not indistinguishable from zero. Similarly, if we compute the marginal effects at the maximum value of *POLICY*, we find a statistically positive. However, evaluated at minimum *lnGDP0* the marginal effect of *POLICY* turns negative and significant. Thus, the regression indicates that the derivative of growth with respect to trade policy is an increasing and linear function of the level of initial income. We know from the fact that the coefficient on the interaction term is positive that the reductive effect of trade barriers declines as the level of income increases. Consequently, the potential positive benefits accruing from any given trade policy reforms will not be universal across different income groups. Thus, for two economies that belong to different income groups (low and high), similar trade policies will have different effects on economic growth. Poorer countries stand to benefit more than richer countries. This finding is particularly interesting for SSA (the world's poorest continent) where trade restrictions are still pervasive and where poverty is widespread. Moreover, we also find that the dummy for SSA countries has a negative and significant coefficient in all the relevant specifications (Tables 3a, b and c). Africa does appear to be different – even allowing for the other explanatory variables,[9] SSA countries have a below average growth performance.

[9] As expected, the results in all three tables show that both domestic and foreign direct investments are strong determinants of the growth rate of an economy.

We have assumed that the right hand side variables (including trade policy measures and their interaction terms) are not strictly exogenous. The Sargan Test of the null hypothesis for over-identifying restrictions (regressors are predetermined) is not rejected at the 0.05 level of significance. This suggests that the over-identifying restrictions are valid. The p-values in the test for second order serial correlation indicates that we cannot reject (at 0.05 level) the null hypothesis that there is no second order serial correlation in the differenced residuals, suggesting consistency of our estimates. In addition, we have rejected the null hypothesis that all parameter estimates are simultaneously zero.

4.1 Evidence on Trade Policy and Growth within Africa

The previous econometric analysis has been based on assessing Africa's growth performance in a global perspective. We find evidence that Africa's slow growth is partly explicable in a 'global' cross-country framework. We recognise the fact that the 'traditional' SSA dummy approach adopted in these regressions may obscure important facts about trade policy and growth within the African continent. If the region is truly different from other regions, it is appropriate to move away from the 'traditional' Sub-Saharan Africa dummy approach and focus on a regression limited to a sub-sample of African countries. Given the findings from the 'global' regression and the fact that SSA countries are among the poorest countries in our sample[10], we would expect, *a priori*, to find evidence of a negative effect of trade policy barriers on growth in SSA.

The vast majority of SSA countries have had restrictive and distortionary trade policies since independence until the 1980s (at least), typically motivated by some desire to protect domestic industries, although most have liberalised significantly since then (Ackah and Morrissey, 2005). Table A2 in the appendix shows how SSA has lagged behind other regions in trade liberalization. Trade barriers have generally been higher in Africa; by the end of the 1990s, Africa and South Asia maintained the highest trade barriers. Latin America and East Asia had pursued intensive trade reforms during the 1980s such that by the end of the 1990s trade barriers had fallen to

[10] In fact, 85% of all SSA countries in the sample are classified as low or lower-middle income by the World Bank (July, 2005). The only exceptions are Mauritius, South Africa and Botswana who are classified as upper-middle income countries.

relatively low levels of 11 percent and 13 percent respectively. Compared to other regions, Africa, and especially SSA, has exhibited poor economic performance over at least the past two decades. While some countries have been exceptions to the trend and performed very well, the regional performance is cause for concern.

Table 5: Trade Policy (*TARIFF, MTAX & XTAX*) and Growth in Africa (1980-1999)

	Dependent variable: Per Capita GDP Growth		
Explanatory variables:	**1**	**2**	**3**
GROWTH $_{t-1}$	0.229	0.316	0.43
	(2.69)*	(2.66)*	(5.98)**
lnGDP0	0.113	-0.137	-0.219
	(0.19)	(0.26)	(0.36)
POP	-1.104	-0.249	-0.226
	(1.85)	(0.61)	(0.59)
INV	0.182	0.114	0.193
	(3.14)**	(2.08)	(2.90)**
FDI	0.218	0.232	0.258
	(3122)	(0.52)	(2.52)*
TARIFF	-0.196		
	(6.14)**		
MTAX		0.056	
		(0.84)	
XTAX			0.067
			(0.75)
Constant	2.662	-0.761	-0.555
	(0.53)	(0.21)	(0.11)
Sargan Test	[0.623]	[0.842]	[0.398]
1st Order serial correlation	[0.055]	[0.068]	[0.067]
2nd Order serial correlation	[0.249]	[0.582]	[0.812]
Wald Test	[0.000]	[0.000]	[0.000]
Observations	63	61	61
Number of Countries	20	20	20

Notes: See Table 3a.

Our econometric results for the SSA sample (Table 5) show that trade policy (*TARIFF*) is associated with lower growth in SSA countries. The estimated coefficient, -0.196, on *TARIFF* is significantly negative, implying that a reduction in average tariffs by ten percentage points would increase the average growth rate of per

capita GDP by about two percentage points annually (*ceteris paribus*). The results suggest that African countries with lower tariffs grow faster than countries with higher tariffs. The evidence in this section and the rest of this paper does not support the pessimism that trade policy reforms would be growth-retarding in low-income countries in general and Africa in particular. High levels of trade restriction have been partly responsible for the slow growth in Africa, and their reduction can be expected to result in improved economic performance in the region.

Despite the focus on an SSA sample, it is reasonable to believe that average estimates do not provide enough information about the within-country variance in the impact of trade policy on growth. For most practical purposes, however, it may be useful to have some information on individual country experiences. In Table 5 we show the 20 African countries in our regression sample, along with their actual per capita growth rates and their predicted growth from the regressions. In addition, we estimate how much of the variations in within-country growth is explained by trade policy.

The evidence suggests that trade policy plays an important role in explaining the variations in growth within SSA. The table is organized such that the ten observations for which unexplained growth (residual) is lowest in absolute terms are listed in the upper panel, and the ten observations with the largest residual in the bottom panel. By construction, the model explains reasonably well the growth experience of those countries in the upper panel. The simple mean growth for these countries is about 0.4 per cent whereas *TARIFF* has a negative impact of almost four per cent on average (i.e. in many countries, other factors offset the negative impact of tariffs). For those in the bottom panel, simple mean growth is -1.5 per cent whereas *TARIFF* has a negative impact of over five per cent on average. For all the twenty observations in the table the contribution of *TARIFF* to growth is negative. The results suggest, unsurprisingly, that although trade barriers have a negative impact on growth, other factors may offset this in some countries but exacerbate it in others. A corollary is that trade liberalisation (reducing barriers) itself has a positive impact but does not ensure growth – other factors may offset the benefits.

Table 6: Actual Growth, Predicted Growth and Tariff contribution

Country	*Time Period*	*Actual Growth*	*Predicted Growth*	*Unexplained Growth*	*Contribution of TARIFF*
10 lowest absolute values of unexplained *GROWTH*					
Botswana	1992-95	0.009	0.029	0.020	
Botswana	1996-99	3.622	3.460	0.162	-2.177
Cameroon	1992-95	-3.922	-3.569	0.353	-3.615
Congo DR	1984-87	0.082	0.017	0.064	-4.484
Ethiopia	1988-91	-3.578	-3.814	0.236	-5.805
Guinea	1996-99	1.943	1.472	0.472	-3.010
Kenya	1996-99	-0.174	0.168	0.342	-3.089
Madagascar	1996-99	0.455	0.445	0.010	-1.399
Mauritius	1988-91	5.415	4.970	0.445	-5.413
Sierra Leone	1984-87	-0.310	-0.565	0.255	-5.060
Simple Average		***0.354***	***0.261***	***0.236***	***-3.993***
10 highest absolute values of unexplained *GROWTH*					
Burkina	1984-87	0.968	-4.389	5.356	-11.924
Burundi	1992-95	-6.265	0.497	-0.497	-1.451
Congo DR	1988-91	-7.115	-2.188	2.188	-4.452
Congo	1996-99	-1.880	4.600	-4.600	-3.265
Congo Rep	1984-87	-3.058	5.208	-5.208	-6.276
Ethiopia	1992-95	2.938	-2.590	5.528	-4.422
Kenya	1988-91	0.993	-3.430	4.422	-7.692
Rwanda	1992-95	-3.897	0.323	-0.323	-6.668
Uganda	1992-95	4.017	-0.932	4.948	-3.353
Zimbabwe	1984-87	-1.691	4.797	-4.797	-1.726
Simple Average		***-1.499***	***0.190***	***0.702***	***-5.123***

Note: Residuals are from Regressions of Table 8

5 SENSITIVITY ANALYSIS

This section examines the robustness of our results with respect to several modifications of our model. Simultaneity bias is a particular problem in studies that relate growth to openness measured by outcome variables (trade/exports/imports shares). Such openness measures could clearly be endogenous since they are likely to vary with income levels. Even actual policy-induced barriers, such as average tariffs, are not totally exonerated from endogeneity issues. This potential problem has been addressed by the over-identifying assumption that the trade policy measures and their interaction terms together with other growth determinants are at best predetermined and not strictly exogenous. This suggests that potential endogeneity has been properly instrumented with lagged values. We tested for the sensitivity of our results by relaxing this assumption for the trade barrier indicators and their interaction terms (i.e.

we relax the over-identifying restrictions that trade policy is predetermined in favour of a rather stronger assumption that trade policy is strictly exogenous; hence the trade policy variables themselves are available as instruments). Further, we experimented whether our results are sensitive to the exclusion of investment (*INV* and *FDI*) in our models by re-estimating the regressions by dropping *INV* and *FDI* from the regressions. We suspected that the relationship we investigate may be sensitive to the inclusion of these predictors in the regressions (note however, that these variables have been assumed predetermined and hence instrumented). In addition, we check the sensitivity of the results to the exclusion of six countries suspected to be outliers from the original sample.[11] The results were robust to all of these tests (results available on request).

Finally, we employ an alternative technique to explore the potential contingency already established by our results in Table 3. To test for the robustness of the existence of contingency, we follow DeJong and Ripoll (2004) again (but with an updated version of the World Bank income classification table) by specifying a regression model under which we interact trade policy with the World Bank's (July 2005) income-rank index with low-income countries ranked as 1, lower-middle income countries ranked as 2, upper-middle income ranked 3 and high-income ranked as 4 (see appendix for exact cut-off values corresponding to the indexes). We then consider the differential impact of trade policy for high and low – income countries. A significant coefficient on the interaction term confirms the earlier results of the existence of contingency. This result suggests that for any two countries classified differently by the World Bank, the impact of trade restriction on growth will be dissimilar, given the same tariff level. The results as reported in Table A1 in appendix confirm our earlier finding of a contingent relationship between trade barriers and growth. We consider this as a robustness check for our results. In all cases, our results remain largely unaltered. Both the signs and orders of magnitude of the coefficients are preserved in most cases. Thus the model parameters are robust in that they show little sensitivity to changes in the model specification. We still find convincing evidence of

[11] It is quite common to omit data points with extreme values of the explanatory variables. Several standard deviations away from the mean value can define extreme values. The result is robust in a variety of specifications in which outliers are included or excluded. We arbitrarily set a cut-off point at five standard deviations from the mean of the variables. By this criterion, Singapore, Malaysia, Pakistan, India, Bangladesh and St. Lucia are identified as outliers.

a negative and statistically significantly relationship between trade barriers and economic growth which is contingent on income. We also find that the marginal impact of trade barriers is increasing in income. Overall trade policy openness appears to be conducive to growth but with differential impact for poor and rich countries.

6 CONCLUSION

In this paper we have investigated several questions regarding the relationship between trade policy and growth. Our primary question concerned the effect of protection on economic growth for the poorer countries, SSA countries especially. In this regard, we investigate the relationship between a variety of trade policy measures and growth. We find that trade protection has, on average, a robust negative effect on economic performance for low-income countries in general and SSA countries in particular. Openness to trade seems to offer the possibility of achieving faster growth with differing impacts on countries belonging to different income groups. The richer the country, the smaller are the growth-reducing effects of trade protection and the poorer the country the more likelihood that trade protection will affect growth negatively. Thus, for two economies that belong two different income groups (low and high), similar trade policies will have different effects on economic growth. Our study demonstrates that the relation between trade barriers and growth performance can be extremely sensitive to a country's level of development. This finding seems consistent with intuition and the commonly held view that poorer, slower growing countries tend to have much higher tariff rates than richer, faster growing countries.

The perception that low-income countries could increase growth by using tariffs based on the infant industry argument appears intuitive, but the empirical evidence supporting that view is not strong and our empirical evidence contradicts this view. There is no coherent body of evidence that trade restrictions generally stimulate growth, as even Rodriguez and Rodrik (2001) concede. However, the weight of evidence suggests that it would be too simplistic to think that trade liberalization *per se* is the key to prosperity for all countries. The evidence suggests that the relationship between openness and growth is likely to be very case-specific. We conclude that the maintenance of high protection appears to be one of the causes of poor economic performance in poor countries including SSA countries. If policy makers would like

to see the prospects of faster growth for the SSA region, trade liberalization would definitely be a policy option, although alone it may be insufficient to ensure growth.

REFERENCES

Arellano, M. and Bond, S. R. (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies*, Vol.58, pp.277–97.

Arellano, M. and Bond, S. R. (1998). 'Dynamic Panel Data Estimation Using DPD98 for Gauss: A Guide for Users' Mimeo.

Barro, R.J., (1997), *Determinants of Economic Growth: A Cross-Country Empirical Study*. MIT Press, Cambridge.

Bhagwati, Jagdish, (2000), "Globalization and Appropriate Governance," Wider Annual Lecture 4, WIDER, United Nations University.

Bhagwati, Jagdish and T. N. Srinivasan, (2002), "Trade and Poverty," *American Economic Review. Papers and Proceedings* May.

Blundell, R. and S. Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, 87, 115-143.

Borensztein, E., De Gregorio, J. and J-W. Lee, (1998). "How does Foreign Direct Investment affect Economic Growth?" *Journal of International Economics* 45, 115-135.

Davis, D. (1996), "Trade Liberalization and Income Distribution", *Working Paper No.5693*, NBER.

DeJong, David N. and Marla Ripoll (2004), "Tariffs and Growth: An Empirical Exploration of Contingent Relationships." University of Pittsburgh, mimeo.

Dollar, D., (1992), "Outward-oriented developing economies really do grow more rapidly: Evidence from 95 LDCs, 1976–1985". *Economic Development and Cultural Change* 40, 523– 544.

Dollar, David and Aart Kraay (2000), "Growth is Good for the Poor", *World Bank Policy Research Working Paper 2587*.

Dollar, David and Aart Kraay (2001), "Trade, Growth, and Poverty", *World Bank Policy Research Working Paper 2615*.

Easterly, William (2001), "The Lost Decades: Developing Countries' Stagnation in Spite of Policy Reform 1980-1998", *Journal of Economic Growth*, vol. 6(2), pp. 135-57.

Easterly, W. and R. Levine (2001) "It's Not Factor Accumulation: Stylized Facts and Growth Models," *World Bank Economic Review*, 15, pp. 177-219.

Edwards, S., (1992), "Trade Orientation, Distortions and Growth in Developing Countries, *Journal of Development Economics*, 39, 31– 57.

Edwards, S., (1993), "Openness, Trade Liberalization, and Growth in Developing Countries", *Journal of Economic Literature* 31, 1358–1393.

Edwards, S., (1998), "Openness, productivity and growth: what do we really know?" *Economic Journal*, 108, 383– 398.

Greenaway, D. Morgan, W. and Wright, P. (2002), "Trade Liberalisation and Growth in Developing Countries", *Journal of Development Economics*, 67, 229-244.

Grossman, G.M., Helpman, E., (1990), "Comparative Advantage and Long-Run Growth". *American Economic Review* 80, 796–815.

Grossman, G.M., Helpman, E., (1991a), "Quality Ladders in the Theory of Growth", *Review of Economic Studies* 58, 43– 61.

Grossman, G.M., Helpman, E., (1991b), "Endogenous Product Cycles", *Economic Journal* 101, 1229–1241.

Harrison, A., (1996), "Openness and Growth: a Time Series, Cross-country Analysis for Developing Countries", *Journal of Development Economics*, 48 (2), 419– 47.

Jenkins, R., (2004), "Globalization, Production, Employment and Poverty: Debates and Evidence", *Journal of International Development*, 16, 1-12.

Mbabazi, J., Morrissey, O., and Milner, C. (2002), "The Fragility of the Evidence on Inequality, Trade Liberalisation, Growth and Poverty", *Credit Research Paper No. 02/19*, University of Nottingham.

Milner, C. and Morrissey, O. (1999), "Measuring Trade Liberalisation", chapter 3 in M. McGillivray and O. Morrisey (eds), *Evaluating Economic Liberalisation*, London: Macmillan.

Ng, Francis (2001) "Patterns of Trade and Protection: Selected Country Data", http://publications.worldbank.org/catalog/content-download?revision_id=1526199.

O'Rourke, K.H., (2000), "Tariffs and Growth in the Late Nineteenth Century", *Economic Journal* 110, 456– 483.

Panagariya, A. (2003), "Miracles and Debacles: Do Free-trade Skeptics Have a Case?" mimeo, University of Maryland.

Pritchett, L. (1996), "Measuring Outward Orientations in Developing Countries: Can It Be Done?", *Journal of Development Economics* 49(2), 307-35.

Rodrik, Dani and Francisco Rodríguez (2001), "Trade Policy and Economic Growth: A Skeptics Guide to the Cross-National Evidence", in Ben Bernanke and Kenneth Rogoff (eds.), *Macroeconomics Annual 2000*. pp. 261– 324, Cambridge, MA: MIT Press for NBER.

Rodrik, D. (1992), "The limits of Trade Policy Reform in Developing Countries", *Journal of Economic Perspectives*, 6(1), 87-105.

Rodrik, D. (1998), "Globalisation, Social Conflict and Economic Growth", *World Economy*, 21(2), 143-158,

Rodrik, D. (1999), *The New Global Economy and Developing Countries: Making Openness Work*, Washington DC: ODC Policy Essay No. 24.

Rodrik, Dani, (1998), "Trade Policy and Economic Performance in Sub-Saharan Africa", *NBER Working Paper, No. 6562*. http//www.nber.org/papers/w6562.

Sachs, Jeffrey, and Andrew Warner, (1995). "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity* 1, 1-118.

Sachs, Jeffrey, and Andrew Warner, (1997). "Sources of Slow Growth in African Economies", *Journal of African Economies*, 6(3), 335-376.

Sala-i-Martin, X. (1997). "I Just Ran Two Million Regressions", *American Economic Review*, vol. 87 (2), pp. 178–83.

Srinivasan, T. N. and Bhagwati, J. (2001). “Outward-orientation and development: are revisionists right?’, in(D. Lal and R. H. Snape (eds.), *Trade, Development and Political Economy: Essays in Honour of Anne O. Krueger*, New York: Palgrave.

Vamvakidis, Athanasios. (2002). “How Robust is the Growth-Openness Connection? Historical Evidence.” *Journal of Economic Growth*, 7:57–80.

Wacziarg, R. (2001) “Measuring the Dynamic Gains from Trade”, *World Bank Economic Review*, vol. 15 (3), pp. 393–429.

Winters, L. A. (2004), “Trade Liberalisation and Economic Performance: An Overview”, *The Economic Journal*, 114 (February), F4–F21.

Yanikkaya, H. (2003), “Trade Openness and Economic Growth: A Cross-Country Empirical Investigation”, *Journal of Development Economics*, 72, 57– 89.

APPENDIX

Table A1: Trade Barriers and Economic Growth in Developing Countries (1980-1999)
Robustness of Contingency: Interacting Income Classification and Trade Policy.

	Dependent variable: Per Capita GDP Growth		
Explanatory variables:	**13.1**	**13.2**	**13.3**
Growth $_{t-1}$	0.239	0.205	0.115
	(6.96)**	(4.01)**	(3.12)**
InGDP0	-0.796	-0.999	-0.023
	(4.72)**	(7.43)**	(0.33)
POP	0.328	-0.429	-0.907
	(1.54)	(2.25)*	(6.60)**
INV	0.112	0.144	0.204
	(5.03)**	(3.79)**	(11.52)**
FDI	0.344	0.256	0.207
	(6.83)**	(3.33)**	(2.58)*
TARIFF	-0.049		
	(3.88)**		
TARIFF x Income Classification	0.085		
	(6.48)**		
MTAX		-0.206	
		(4.54)**	
MTAX x Income Classification		0.153	
		(7.07)**	
XTAX			0.03
			(1.55)
XTAX x Income Classification			-0.023
			(1.30)
Constant	0.26	5.105	-0.639
	(0.23)	(3.25)**	(0.71)
Sargan Test	[0.594]	[0.683]	[0.753]
1st Order serial correlation	[0.020]	[0.004]	[0.003]
2nd Order serial correlation	[0.958]	[0.341]	[0.231]
Wald Test	[0.000]	[0.000]	[0.000]
Observations	170	163	163
Number of Countries	48	48	48

Table A2: Trade Policy and Trade Volume Measures

Country	Average Tariff (unweighted)			Trade Volume (% GDP)		
	Pre-Reform	1996-1999	Change	Pre-Reform	1996-1999	Change
East Asia	**%**	**%**	**%**	**%**	**%**	**%**
China	50	17	-195	15	40	63
Indonesia	29	11	-159	52	57	8
Korea	24	12	-104	74	74	1
Malaysia	11	8	-28	111	203	46
Philippines	34	12	-182	50	106	53
Thailand	32	19	-74	51	93	46
Average	***30***	***13***	***-124***	***59***	***96***	***39***
Africa						
Congo Dem. Rep.	24	18	-34	31	48	36
Cote d'Ivoire	28	20	-39	76	84	10
Egypt	47	28	-72	72	44	-64
Ghana	34	11	-228	11	67	83
Kenya	40	16	-156	58	62	7
Malawi	22	21	-7	55	66	16
Morocco	45	22	-104	51	59	14
Nigeria	33	23	-41	42	71	41
Tunisia	25	30	16	85	86	2
Zimbabwe	10	23	57	43	84	49
Average	***31***	***21***	***-61***	***52***	***67***	***22***
Latin America						
Argentina	28	12	-138	14	20	29
Brazil	47	13	-254	19	18	-4
Jamaica	16	10	-64	93	114	19
Mexico	26	12	-110	25	62	59
Paraguay	11	10	-16	34	87	61
Uruguay	47	9	-418	38	43	11
Average	***29***	***11***	***-167***	***37***	***57***	***35***

Source: Author's calculations based on data drawn from Ng (2001) (Average tariff) and Easterly 2001 (Trade volumes). Countries selected based on the availability of tariff and trade data for both pre-reform and late 1990s.

Table A3: LIST OF COUNTRIES

Argentina*	Ethiopia	Pakistan
Bangladesh	Ghana	Paraguay
Botswana*	Guinea	Philippines
Brazil	India	Rwanda
Burkina Faso	Indonesia	Sierra Leone
Burundi	Jamaica	Singapore*
Cameroon	Kenya	South Africa*
Chile*	Korea Rep.*	Sri Lanka
China	Madagascar	St Lucia*
Congo Dem. Rep.	Malawi	Thailand
Congo Republic	Malaysia*	Tunisia
Costa Rica*	Mauritius*	Uganda
Cote d'Ivoire	Mexico*	Uruguay*
Dominican Rep.	Morocco	Venezuela*
Ecuador	Nepal	Zambia
Egypt	Nicaragua	Zimbabwe

Countries marked with asterisk are classified by the World Bank as high-income (i.e. including 'Upper middle income') countries (with gross GNI per capita of at least $3,256 in 2004. There are 13 'rich' countries (upper-middle and high), 35 'poor' countries (lower-middle and low) and 20 SSA countries (of which all except 3 are 'poor' countries).

Table A4: DEFINITIONS AND SOURCES OF DATA

Variable:	Definition	Source
GROWTH	Real Per Capita GDP growth	World Development Indicators (2003) and Easterly (2001)
lnGDP0	Log Real Per Capita GDP at beginning of each period	World Development Indicators (2003) and Easterly (2001)
TRADE	Ratio of total trade (exports + imports) to GDP	World Development Indicators (2003) and Easterly (2001)
INV	Gross Domestic Investment	World Development Indicators (2003) and Easterly (2001)
FDI	Foreign direct investment (% of GDP)	World Development Indicators (2003)
TARIFF	Average scheduled tariff (unweighted)	Data drawn from World bank
MTAX	Import duties as percentage of total imports	World Development Indicators (1999)
XTAX	Export duties as percentage of total exports	World Development Indicators (1999)
AFRICA	Dummy variable with the value of unity for countries in Sub-Saharan Africa and zero for all others	Author's construction using data from Easterly (2001)
POP	Country population total; log of population; population growth	World Development Indicators (2003) and Easterly (2001)

Unless stated otherwise, all data series are drawn from the World Development Indicators (WDI, CD-ROM 2003 and 1999) and Easterly William (2001) data series. The data is available as the Global Development Network Growth Database at the web site www.worldbank.org/research/growth. TARIFF data are drawn from http://publications.worldbank.org/catalog/content-download?revision_id=1526199.